The Effect of a Multifaceted Educational Intervention on Allied Health Clinicians’ Outcome Measurement Behaviours

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Dedication

This thesis is dedicated to the memory of my father Douglas Richard Bowman, and my grandfather Morril Boyd, who taught me that anything worth doing, is worth doing well.

Douglas Richard Bowman  
04.03.42 – 09.08.01

Morril Boyd  
20.02.16 – 13.06.87

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Statement of Authentication
The work presented in this thesis is, to the best of my knowledge and belief, original except as acknowledged in the text. I hereby declare that I have not submitted this material, either in full or in part, for a degree at this or any other institution. In addition, ethical approval was granted for the two studies presented in this thesis. Participants were required to read an information sheet and informed consent was gained prior to data collection.

Julia Bowman

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<td>APA</td>
<td>Australian Physiotherapy Association</td>
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<tr>
<td>ASK</td>
<td>Activity Scale for Kids</td>
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<tr>
<td>CFA</td>
<td>Confirmatory Factor Analysis</td>
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<td>CFI</td>
<td>Comparative Fit Index</td>
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<td>CME</td>
<td>Continuing Medical Education</td>
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<tr>
<td>CReMOS</td>
<td>Clinician Readiness for Measuring Outcomes Scale</td>
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<tr>
<td>CTT</td>
<td>Classical Test Theory</td>
</tr>
<tr>
<td>CVI</td>
<td>Content Validity Index</td>
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<tr>
<td>DASS</td>
<td>Depression, Anxiety and Stress Scale</td>
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<tr>
<td>EFA</td>
<td>Exploratory Factor Analysis</td>
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<td>FFSS</td>
<td>Family Function Styles Scale</td>
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<tr>
<td>GAS</td>
<td>Goal Attainment Scale</td>
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<tr>
<td>GFI</td>
<td>Goodness of Fit Index</td>
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<tr>
<td>GMFM</td>
<td>Gross Motor Function Measure</td>
</tr>
<tr>
<td>ICC</td>
<td>Intraclass Correlation Coefficient</td>
</tr>
<tr>
<td>ICF</td>
<td>International Classification of Functioning, Disability and Health</td>
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<tr>
<td>IPPA</td>
<td>Individually Prioritised Problem Assessment</td>
</tr>
<tr>
<td>IRF</td>
<td>Item Response Function</td>
</tr>
<tr>
<td>IRT</td>
<td>Item Response Theory</td>
</tr>
<tr>
<td>MAA</td>
<td>Motor Accidents Authority</td>
</tr>
<tr>
<td>NNT</td>
<td>Number Needed to Treat</td>
</tr>
<tr>
<td>OLS</td>
<td>Ordinary Least Squares</td>
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<tr>
<td>OMKT</td>
<td>Outcome Measures Knowledge Test</td>
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<tr>
<td>PCA</td>
<td>Principal Components Analysis</td>
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<td>PSS-10</td>
<td>Perceived Stress Scale – 10 items</td>
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<tr>
<td>RCT</td>
<td>Randomised Controlled Trial</td>
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<td>RMSEA</td>
<td>Root Mean Square Error of Approximation</td>
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<td>SDQ</td>
<td>Strengths and Difficulties Questionnaire</td>
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<tr>
<td>SEM</td>
<td>Standard Error of Measurement</td>
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<tr>
<td>SMART</td>
<td>Specific, Measurable, Activity-based, Review, Timeframe</td>
</tr>
<tr>
<td>TLI</td>
<td>Tucker-Lewis Index</td>
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<tr>
<td>WHOQoL-Bref</td>
<td>World Health Organisation Quality of Life – Brief Scale</td>
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Abstract

Background: Routine measurement of clinical outcomes is a challenge for allied health professionals. If allied health professionals are to routinely measure outcomes, a change in attitudes and behaviour is necessary. Individuals need to be ready to change and often move through several stages before practice change is observed. Further, clinicians require adequate knowledge and skill to apply appropriate outcome measurement in their daily practice.

Purpose: The purpose of this research program was to evaluate the effect of a multifaceted education program on the outcome measurement behaviours of allied health clinicians. Two studies were undertaken and are reported in this thesis.

Study 1: Development and Psychometric Testing of the Clinician Readiness for Measuring Outcomes Scale (CReMOS)

Aim: To develop and test the psychometric properties of a questionnaire that determines clinicians’ readiness to measure outcomes.

Methods: Study 1 describes the development, validation and reliability testing of the Clinician Readiness for Measuring Outcomes Scale (CReMOS). Ten expert allied health professionals (including academics, researchers and clinicians) were involved in content validity testing. A further 396 allied health professionals completed the questionnaire to establish content and construct validity, internal consistency, and temporal reliability (or stability). Of these 396 allied health professionals, 70 participated in the temporal reliability assessment. Content validity was established using the Content Validity Index (CVI). Construct validity was determined using confirmatory factor analysis (CFA) and Rasch analysis and internal consistency was ascertained using Cronbach’s Alpha. Temporal reliability was confirmed using intraclass correlation coefficients (ICC 3,1).
**Results:** A 30-item questionnaire was developed, reflecting the five stages of change from the Transtheoretical Model of Change, and commonly cited barriers to outcome measurement. Content validity was excellent (CVI = 0.96). Using CFA, a two factor model provided best fit. Based on CFA results, four items were dropped resulting in a 26-item questionnaire (range 26 to 156). Rasch analysis highlighted an additional item to be dropped resulting in a 25-item questionnaire (range 25 to 150). Internal consistency reliability was excellent (α = 0.94). Temporal (stability) reliability ICC (3,1) was very good (r = 0.86, p = 0.0001). CReMOS scores were a poor predictor of clinicians’ use of outcome measures, rho = 0.126 (p=0.023).

**Conclusions:** The final 25-item questionnaire takes 10 minutes to complete and five minutes to score. The CReMOS provides educators with useful information about clinician readiness and helps identify strategies for effecting behaviour change.

**Study 2: The effect of a multifaceted educational intervention on allied health clinicians’ outcome measurement behaviours: A randomised controlled trial (RCT)**

**Aim:** To determine the effect of a multifaceted educational workshop combined with printed educational materials and follow-up support on:

i. The *proportion* of participants who measure outcomes (primary outcome)

ii. The *frequency* with which outcome measures are used by participants

iii. The *variety* of outcome measures used by participants

iv. Participants’ *knowledge and skills* of outcome measurement

v. Participants’ *readiness to measure outcomes*

**Study design:** Randomised, assessor-blinded trial.

**Setting:** Community setting, city and rural New South Wales.
**Participants:** Allied health clinicians (n=120) including occupational therapists, physiotherapists, speech pathologists, social and welfare workers, psychologists and early educators employed by the Spastic Centre of New South Wales.

**Interventions:** The intervention group (n=60) participated in a one-day interactive educational workshop. Participants were provided with workshop notes and a package of nine ready to use outcome measures. The workshop covered the process of outcome measurement, goal setting, and implementation strategies. Participants had the opportunity to practise using and scoring the nine outcome measures in their package. Participants had access to email and telephone follow-up support post workshop for three months. The control group (n=60) participated in a one-day interactive workshop on evidence based practice and critical appraisal, containing lectures, small group work and discussion. Printed handouts of workshop notes and activities were given to participants. Workshop facilitators ensured there was no overlap of content between the two workshops.

**Outcome measures:** The primary outcome measure was a clinical file audit conducted at baseline, three and six months post intervention. The audit was used to measure: i) the *proportion* of clinicians measuring outcomes; ii) the *frequency* of use of outcome measures; and iii) the *variety* of outcome measures used. Two secondary self-report outcome measures were also used at baseline, three and six months. The Outcome Measures Questionnaire captured data related to study aims i-iv and the CReMOS related specifically to study aim v.

**Results:** A total of 1730 clinical files were audited. At baseline the *proportion* of clinicians measuring outcomes was 13% (8 out of 60) of the control group and 32% (19 out of 60) of the intervention group, highlighting a statistically significant between group difference on the primary outcome measure at baseline ($p=0.034$). Outcomes were therefore analysed with adjustment for baseline characteristics (covariates).
Primary outcomes: There were no statistically significant between-group differences in the proportion of participants measuring outcomes at either three or six months post intervention. At three months, frequency of discussion of change in outcome measure score over time increased by a mean of 1.07 occasions (95% CI 0.42 to 1.71) across five client files per participant in the intervention group when compared to the control group ($p=0.001$). At six months, frequency of discussion of change in outcome measure score over time in client files further increased by a mean of 1.36 occasions (95% CI 0.67 to 2.05) across five client files per participant in the intervention group when compared to the control group ($p=0.001$). There were no clinically important or statistically significant differences between groups on the variety of outcome measures documented in the client files.

Secondary outcomes: In contrast to the objective audit data, there were significant between-group differences on the secondary, self-reported outcome measures. Participants in the intervention group self-reported a higher proportion of outcome measurement use (at 3 months, 84% versus 61% $p=0.021$, but not 6 months), and a greater variety of outcome measures used (at both 3 months, 5.2 versus 3.2 measures $p=0.001$, and 6 months, 5.8 versus 3.5 measures $p=0.0001$). In terms of knowledge and skill of the outcome measurement process, the intervention group were assessed to be more able to write measurable goals (three months), identify desired outcomes of intervention (three and six months), select appropriate outcome measures (three and six months), administer outcome measures (three months), interpret and report outcome measure results (three months) in comparison to the control group. Clinicians in the intervention group were also more ready to measure outcomes at both three and six months post intervention than clinicians in the control group. All statistically significant between-group differences were in favour of the intervention group.

Conclusions: Findings indicate that a one-day interactive educational workshop coupled with printed educational materials and three months of email and telephone support did not increase the proportion of allied health clinicians using outcome measures. Further, this strategy was not effective in an organisation that championed change, evidence-based
practice and quality improvement. Findings also highlighted a difference between what allied health clinicians believed they were doing, based on self-report data and what they were actually doing in practice, based on data from objective file audits.

**Recommendations:** There are four major recommendations from these two studies. Firstly, psychometric testing needs to be carried out on the CReMOS to further develop scoring of the scale. This will assist users to better understand the scoring system and facilitate interpretation of results. Secondly, the CReMOS needs to be tested with other health professions such as medicine and nursing who also measure clinical outcomes with their clients to allow for broader application of this scale. Thirdly, this study has shown that allied health clinicians need to be able to specifically and objectively identify their strengths and weakness in the steps in the outcome measurement process. Objective information about strengths and weaknesses would assist clinicians and/or educators to identify and better match strategies that target their gaps in knowledge and skill. The need for an instrument to objectively identify gaps in knowledge and skill in the outcome measurement process is again highlighted. Fourthly, the discrepancy between objective and subjective data of participants’ changes in outcome measurement behaviour was important. These findings reinforce the need for researchers to use objective measures of behaviour when assessing the effectiveness of an intervention.
Chapter One

Introduction

1.1 Background
Outcome measurement is a necessary part of clinical practice. Using standardised measures, health professionals need to show that their interventions improve health outcomes (Laver-Fawcett, 2007). However, research shows that most allied health professionals are not using outcome measures. One explanation is that outcome measurement requires new knowledge, skills and attitudes, and considerable changes in behaviour. These changes can be difficult for many health professionals to achieve (Cusick & McCluskey, 2000; McCluskey, 2003; McCluskey & Lovarini, 2005). This thesis examines the nature of change and theories of change associated with improved outcome measurement. Potential barriers to change are identified and discussed. A new instrument for measuring readiness to change is described, and its psychometric properties evaluated. A multifaceted educational intervention which targets known barriers to outcome measurement is described. The intervention is then evaluated empirically for effectiveness, using a randomised controlled trial design. The thesis aims to add to the body of knowledge about implementing outcome measures in practice.

1.2 Context of the study
In the current constrained healthcare environment, clinicians are increasingly expected to provide evidence-based interventions that are cost-effective and achieve outcomes that clients consider clinically important (Hoffmann, Bennett & Del Mar, 2010; Laver-Fawcett, 2007). Evidence-based practice is a relatively new phenomenon for allied health professionals. Evidence–based practice is a multifaceted process that aims to improve clinical effectiveness. Outcome measurement and evidence-based practice are often described as complementary, as they both contribute to quality health care (Deaton, 2001). Outcome measurement provides clinicians with a way to demonstrate client
change has occurred, and change has occurred as a result of their intervention, service or program (Unsworth, 2000).

Clinicians should be explicitly working towards achieving evidence-based practice in all areas of their clinical work (Laver Fawcett, 2007; Sackett, Richardson, Rosenberg & Haynes, 2000). For the majority of clinicians, evidence-based practice and outcome measurement will require a change in daily practice behaviour in order for these processes to become a routine part of clinical decision making (Cusick & McCluskey, 2000). Regardless of clinicians’ desire and motivation to implement evidence and measure the effectiveness of their interventions, they perceive significant barriers. These barriers include: lack of time, lack of knowledge and skills, lack of support and their own values and beliefs (Bennett & Bennett, 2000; Bowman, 2006; Curtin & Jaramazovic, 2001; McCluskey & Lovarini, 2005). At the commencement of this study in 2005, few allied health professionals were routinely measuring clinical outcomes using standardised measures (Garland, Kruse & Aarons, 2003; Mayo, Cole, Dowler, Gowland & Finch, 1993; Stokes & O’Neill, 1999).

Individuals need to be ready to change before practice changes are likely to occur. At present there is no instrument available to establish clinician’s readiness to change their practice behaviours in relation to outcome measurement. By establishing clinicians’ readiness to change, service managers and educators can identify the most suitable strategies for effecting behaviour change. A number of strategies have been suggested to change clinicians’ behaviours and to overcome perceived barriers. These strategies include: interactive educational meetings; educational outreach; leadership by local opinion leaders; audit and feedback; reminders; local consensus processes; consumer mediated interventions; educational materials; marketing; and multifaceted interventions (Goodpastor & Montoya, 1996; Nutley, Davis & Tilley, 2000; Richardson & Droogan, 1999; Thomson-O’Brien, Oxman, Haynes, Davis, Freemantle & Harvey, 2003). Multifaceted educational interventions have been suggested to be the most effective strategy in overcoming barriers and facilitating change in specific clinician behaviours (Thompson-OBrien et al., 2001; Thompson-O’Brien et al., 2003). A number of
randomised controlled trials have demonstrated the effectiveness of these strategies in changing the practice behaviours of medical doctors (Davis, Thomson, Oxman & Haynes, 1995; Grimshaw, et al., 2001). Therefore there is a need to evaluate the effect of multifaceted educational interventions with other health professionals.

1.3 Research aims
The aims of this research were to:

1. Develop an instrument to establish the readiness of allied health professionals to use outcome measures in practice, before and after receiving a targeted educational intervention; and

2. Determine the effectiveness of an interactive, multifaceted educational workshop, with printed educational materials and follow-up email and telephone support on the use of outcome measures by allied health professionals.

1.4 Research objectives
To achieve the aforementioned aims, the following objectives were developed:

- Perform a critical appraisal of the literature relating to readiness to change instruments.
- Develop an instrument that quantifies clinicians’ readiness to measure outcomes.
- Test the psychometric properties of the clinician readiness to measure outcomes instrument.
- Develop a multifaceted interactive educational intervention underpinned by the Andragogy in Practice Model and the Transtheoretical Models Stages of Change to increase allied health clinicians’ outcome measurement behaviours.
- Conduct a randomised controlled trial to determine the effectiveness of a one-day educational workshop, combined with follow-up support to increase allied health clinicians outcome measurement behaviours.
1.5 Outline of the thesis

The thesis contains five chapters:

This chapter has introduced the concept of outcome measurement and highlights its importance in the context of the evidence-based practice movement and the current health care climate.

Chapter 2 includes a review of literature on outcome measurement, commonly cited barriers, clinician readiness to change and strategies to facilitate change.

Chapter 3 describes the development of the Clinician Readiness to Measure Outcomes Scale (CReMOS) and presents the results of psychometric testing of this instrument. This study has been published in the Journal of Evaluation in Clinical Practice (Bowman, Lannin, Cook & McCluskey, 2009) and described in the text Evidence-based Practice Across the Health Professions (Hoffmann et al., 2010).

Chapter 4 discusses findings of a randomised controlled trial conducted to evaluate the effectiveness of a one-day educational workshop, combined with follow-up support to increase allied health clinicians outcome measurement behaviours.

Finally, Chapter 5 discusses the overall findings of this thesis, including the utility of the CReMOS and the effectiveness of the one-day workshop to change clinician outcome measurement behaviours. Implications for future research, practice, education, policy and professional bodies are discussed.

1.6 Significance of the thesis

Two key outcomes are expected from this PhD research. First, the development of a valid and reliable self-report survey instrument that can be used to quantify allied health clinicians’ readiness to measure outcomes. Knowledge of a person’s level of readiness to accept, embrace, and adopt a new way of practice will assist educators and service
managers to identify the best strategies to facilitate behaviour change. Second, this research will provide empirical evidence about the effectiveness of a commonly used strategy, multifaceted educational workshops, to improve clinicians’ use of outcome measures. This information will also assist service managers and organisations to make informed choices when planning strategies to effect staff behaviour change. Research to date has not rigorously examined whether multifaceted educational workshops and follow-up support change clinicians’ readiness to measure outcomes and increases their use of outcome measures in practice. This study attempts to fill this gap in the allied health literature.

1.7 Definition of terms

Key terms defined in this section are central to this study been provided to enhance clarity and reduce ambiguity. These terms will be further explored in later chapters.

Allied health professionals

The allied health professions are distinct from medicine and nursing. The group includes a broad group of diverse professions, including occupational therapy, physiotherapy, speech pathology, social work, social welfare, psychology, dietetic services, radiology services and audiology. Allied health professionals play a critical role in hospitals, primary care, in preventative health care and in community and aged care services. Allied health clinicians work collaboratively with doctors and nurses. Allied health clinicians diagnose and treat a range of conditions and often work as part of a multidisciplinary team (Allied Health Professions Australia, 2008).

Change

Change is defined in this study as the act or an instance of becoming different (Pearsall & Trumble, 1996). Change is represented by an alteration in, or modification to, a clinician’s values, beliefs, attitude, knowledge, skill or behaviour.
Effectiveness

An effect is the power of a person, intervention or event to produce an outcome or achieve a result. Effectiveness in a clinical setting relates to whether or not the anticipated outcome is achieved as a result of the intervention process. The effect of an intervention is the identifiable outcome that can be recorded at an agreed point (often the end) of the intervention process (Laver-Fawcett, 2007).

Evidence-based practice

Evidence-based practice (EBP) assists health professionals to make the best clinical decisions for their clients by promoting the integration of best research available with their clinical expertise, acknowledgment of client values and circumstances and consideration of the practice context (Hoffmann, Bennett & Del Mar, 2010; Straus, Richardson, Glasziou, & Haynes, 2005).

Readiness for change

Readiness to change is the extent to which an individual or group are cognitively and emotionally inclined to accept, embrace, and adopt a plan designed to alter the status quo (Holt, Armenakis, Feild & Harris, 2007). Readiness for change is an attitude that is influenced simultaneously by the content (what is being changed), process (how the change is being implemented), context (circumstances under which the change is occurring), and the individuals involved (characteristics of those being asked to change) (Holt et al., 2007).

Outcome

An outcome is a characteristic or construct expected to change as a result of a strategy, intervention or program (Finch, Brooks, Stratford, & Mayo, 2002). More simply put, an outcome is an agreed upon, predetermined, clearly defined expected result of an intervention (Hagedorn, 2001).
**Outcome measure**

An outcome measure is a subjective or objective instrument used to calculate change in a characteristic or construct over time (Austin & Clark, 1993; de Clive-Lowe, 1996; Hagedorn, 2001).

**Outcome measurement**

Outcome measurement is defined in this study as the process of selecting and using valid and reliable instruments to determine the amount of change in a construct or characteristic over time, and documentation of progress toward goal attainment (Austin & Clark, 1993; De Clive-Lowe, 1996).

**1.8 Scope and limitations**

The RCT study was restricted to allied health clinicians employed by one organisation in New South Wales, Australia who volunteered to participate in this study. Study 1 consisted of the development and psychometric testing of a self-report survey instrument to evaluate clinicians’ readiness to accept, embrace and adopt outcome measures in practice. Study 2 used a randomised controlled trial design to evaluate the effectiveness of a multi-faceted intervention on outcome measure use by allied health professionals.

The study did not explore the impact of the multifaceted educational intervention on other aspects of practice, how clinicians experienced the process of change, nor did the study explore the views of managers with respect to implementation of outcome measures in their organisation. This study also did not aim to objectively quantify change in clinicians’ knowledge and skill related to the outcome measurement process. Development and psychometric testing of such an instrument is still needed. These topics deserve investigation in their own right.
1.9 Synopsis

Outcome measurement is a critical component of the intervention process in the current evidence-based health care climate. However, allied health clinicians are not routinely measuring outcomes. Clinicians need to be ready to change before change can occur. Until now, a measurement instrument to quantify an individual’s readiness to change has not been available. Barriers to outcome measurement use, and strategies to overcome these barriers have been identified, however these strategies have not been rigorously evaluated for effectiveness. The following chapter will provide a summary of literature relevant to this study, and highlight gaps in the current body of knowledge. The review of the literature in Chapter 2 begins with a discussion of outcome measurement in the context of evidence-based. This chapter will establish a clear picture of allied health clinician’s current practice behaviours and the related issues and implications for clinical practice.
Chapter Two

Literature Review

2.1 Chapter overview
This thesis seeks to explore allied health clinicians’ outcome measurement behaviours. Anecdotal reports and research data suggest there is limited use of outcome measures in practice. Such variation leads to concern, particularly in a health care climate where evidence-based practice and the need for clinician accountability is at the fore. As a result, educational interventions are a commonly used strategy to increase clinicians’ use of outcome measures. However, there is a need to better understand the effectiveness of educational interventions for changing clinician outcome measurement behaviours. Findings will help to answer important questions about the effectiveness of educational interventions and will provide high quality evidence to guide educators and service managers to facilitate the change process. In this chapter, important topics relevant to the study aims will be reviewed. Firstly, the importance of allied health clinicians measuring outcomes and the need to change current practice habits is addressed. Secondly, barriers to outcome measure use are discussed, as are potential strategies to facilitate clinicians’ use of outcome measures. Thirdly, as behaviour change is required, factors and theories influencing positive change are considered. Finally, this chapter will identify gaps within the current body of knowledge related to the effectiveness of strategies thought to facilitate clinician participation in outcome measurement, and will conclude with a statement of the research problem.

2.2 Outcome measurement in the evidence-based practice context
With an increasing global emphasis on evidence-based practice and cost effectiveness, health professionals are expected to demonstrate intervention outcomes (Abrams, Davidson, Harrick, Harcourt, Zylinski & Clancy, 2006; Bowman, 2006; Bowman & Llewellyn, 2002; Cook, McCluskey & Bowman, 2007; Copeland, Taylor & Dean, 2008; Maher & Williams, 2005; Monk, 2006; Stokes & O’Neill, 1999). Interventions can no longer be justified on the assumption
that they are helpful to clients (Cleary, Jordan & Happell, 2002). The onus is now on individual clinicians to ensure their practice and the interventions they provide are based on the best available evidence. There is a clear need to support the effectiveness of interventions with empirical evidence (Cleary et al., 2002). One way of meeting this requirement and providing evidence to support practice is through the use of standardised assessment and outcome measures (College of Occupational Therapists, 2005; Stapleton & McBrearty, 2009). Consistent or routine use of outcome measures to evaluate the effectiveness of interventions or services is considered fundamental to evidence-based practice (Garland et al., 2003; Law, Dunn & Baum, 2005; Stapleton & McBrearty, 2009). Further, clinicians working in an evidence-based environment want to know whether their interventions are beneficial to their clients (Hefford, Lodge, Elliott & Haxby Abbott, 2008).

Outcome measurement has a dual role in the proliferation of evidence-based practice. Firstly, outcome measures are used in randomised controlled trials as the criterion to judge effectiveness of interventions and services (Fitzpatrick, Davey, Buxton & Jones, 1998; Greenhalgh, Flynn, Long & Tyson, 2008). Randomised controlled trials then form the basis of guidelines and protocols used to standardise clinical practice and provide a rational foundation for clinical decisions (Harrison, 2004). Secondly, there has been increasing interest in the collection of client self-report or clinician rated outcome measures at an individual level to facilitate decision-making and management of individual clients (Long & Fairfield, 1996). Outcome measures are assumed to offer a systematic way of assessing the various dimensions of a client’s health as opposed to clinical judgement alone (Greenhalgh, Flynn, Long & Tyson, 2008; Schor, Lerner & Malpeis, 1995) and can be used to determine whether desired outcomes have been achieved (Greenhalgh et al., 2008; Long, 2002).

2.3 Outcome measurement
Outcome measurement refers to the use of an instrument to quantify change over time on a defined client characteristic. Change of the defined characteristic is the end result (or outcome) of an intervention or service provided (Unsworth, 2000). It must be recognised that outcome measures measure outcomes, not the effects of intervention (Herbert, Jamtvedt, Mead & Birger
Hagen, 2005). The outcomes of interventions and the effects of interventions are not the same thing. Clinical outcomes are influenced by a myriad of factors other than the intervention, such as the natural course of the condition, statistical regression, placebo effects and the environment (Beattie, 2001; Herbert et al., 2005). This means that a good outcome does not necessarily indicate that an intervention was effective and a poor outcome does not necessarily indicate that intervention was ineffective (Herbert et al., 2005). For these reasons, it is necessary to look at the results of randomised controlled trials (if available) to determine, with any degree of certainty, the effects of an intervention. Clinical outcome measures become more important when there is little or no evidence from high quality randomised controlled trials (Herbert et al., 2005), which is the case in many areas of allied health at present.

The history of outcome measurement highlights how clinical practice has changed and gives insight into clinicians’ current measurement behaviours. A description of the outcome measurement process will reveal the complex and multi-factorial nature of the process, thus explaining why clinicians identify barriers and feel overwhelmed by the process. Finally, a universal conceptual framework, the International Classification of Functioning, Disability and Health (ICF) (World Health Organisation, 2001) that can be used to guide the outcome measurement process will be discussed.

2.3.1 The history of outcome measurement
Outcome measurement was first used in clinical practice in the 1920s (Lambert, Christiansen, & DeJulio, 1983). The “Era of Expansion” (1920s-1960s) was a time of significant growth in hospitals and health care settings driven by advances in technology and increases in the number of specialist professionals available. However, pressures of inflation led to the “Era of Cost Containment” (1960s-1980s). During this period, the cost of health care was a major factor influencing interventions received by individuals (Relman, 1988). In recent years, outcome measurement has continued to increase, change and reflect the important processes many clinicians undertake in everyday practice (Charman, 2003). This movement forward led to the “Era of Assessment and Accountability” (1980s-present) (Epstein, 1990). This era, also known as “The Outcomes Movement” has a focus on integrating outcome measurement into everyday clinical practice in order to generate specific information to rationalise and determine the
effectiveness of health care being provided to clients (Dickey & Sederer, 1996; Relman, 1988). In an era of assessment and accountability, the provision of care to clients remains the emphasis for practicing clinicians. Effective use of outcome measures provides the basis for the continuation of quality care.

2.3.2 The outcome measurement process
The outcome measurement process involves a number of steps (Finch et al., 2002). However, at present there is no consensus within the literature regarding the sequence of these steps. Furthermore, these steps are frequently presented in an ad-hoc manner. Unless steps in the outcome measurement process are presented in a clear and coherent way, clinicians may struggle when attempting to measure outcomes in practice. An in-depth analysis of the literature identified six key steps in the outcome measurement process. These steps are: 1) plan the outcome measurement strategy; 2) search for and screen potential outcome measures; 3) appraise the psychometric properties of the outcome measure; 4) administer the outcome measure in practice; 5) document change at consistent intervals; and 6) re-evaluate progress. These steps are detailed in Table 2.1.
Table 2.1. Steps in the outcome measurement process

<table>
<thead>
<tr>
<th>Description of steps in the outcome measurement process</th>
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<tr>
<td>1. Plan the outcome measurement strategy</td>
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<tr>
<td>• Document a measurable goal (intended outcome) of the intervention</td>
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<tr>
<td>• Identify the purpose of measurement and potential use of arising data</td>
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<td>• Identify an appropriate conceptual/theoretical framework to guide outcome measure selection</td>
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<td>• Establish the need to measure single or multiple outcomes</td>
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<td>• Identify mode of administration and data collection</td>
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<td>• Decide on the use of subjective (self-report) vs. objective (performance) measures</td>
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<td>• Decide on generic vs. specific measures</td>
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<td>• Establish the need for qualitative vs. quantitative measures</td>
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<tr>
<td>2. Search for and screen potential outcome measures</td>
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<tr>
<td>• Search databases and literature for potential outcome measures</td>
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<tr>
<td>• Consider the outcome measure features which best suit the purpose</td>
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<tr>
<td>• Identify whether the outcome measure is client centred</td>
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<td>• Establish whether the outcome measure is context specific</td>
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<tr>
<td>• Determine whether the outcome measure is standardised</td>
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<tr>
<td>Important considerations:</td>
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<tr>
<td>• Establish whether training is necessary</td>
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<tr>
<td>• Consider the environment, space needed, equipment required and resources available</td>
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<tr>
<td>• Ascertain ease of administration</td>
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<tr>
<td>• Consider the timeframe available to implement the outcome measurement strategy</td>
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<tr>
<td>• Establish how the measure is to be administered</td>
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<tr>
<td>3. Appraise the psychometric properties of the outcome measure</td>
</tr>
<tr>
<td>• Establish whether the measure meets rigorous psychometric demands</td>
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<tr>
<td>• Determine levels of measurement – nominal, ordinal, interval, or ratio</td>
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<tr>
<td>• Establish whether the outcome measure is valid</td>
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<td>• Establish whether the outcome measure is responsive or sensitive to change</td>
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<tr>
<td>• Establish practicality/usefulness of the measure</td>
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<td>• Identify bias/measurement error</td>
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<tr>
<td>• Determine if the measure is norm or criterion referenced</td>
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<td>• Determine whether outcome measures results are easily interpreted</td>
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<td>• Identify research evidence of test results</td>
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<td>• Identify specificity of the measure</td>
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<td>• Establish relevance of the instrument</td>
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<td>• Understand the scale to be used</td>
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<tr>
<td>• Use of instrument developer’s instructions</td>
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<tr>
<td>• Consider floor and ceiling effects</td>
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<tr>
<td>• Select measures that closely reflect the anticipated outcome</td>
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<td>• Identify the client groups the outcome measure has been tested with</td>
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<tr>
<td>4. Administer the outcome measure in practice</td>
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<tr>
<td>• Implementation of a measurement plan</td>
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<tr>
<td>• Use clinical reasoning skills when implementing outcome measures</td>
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<tr>
<td>• Pilot test potential measures</td>
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<tr>
<td>• Timing of outcome assessment</td>
</tr>
<tr>
<td>• Establish a consistent method in test administration</td>
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<tr>
<td>5. Document change at consistent intervals</td>
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<tr>
<td>• Data handling/interpretation of results</td>
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<tr>
<td>• Document effects of change</td>
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<tr>
<td>• Identify bias – subjective, self-report measures, consistency of administration</td>
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<tr>
<td>• Provide feedback to clients</td>
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<tr>
<td>• Assess the outcome measure results (clinically important or statistically significant)</td>
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<tr>
<td>6. Re-evaluate progress</td>
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<tr>
<td>• Modify intervention as necessary based on results</td>
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<tr>
<td>• Identify whether the measure provides adequate or additional information</td>
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</table>
2.3.3 A conceptual framework to guide the outcome measurement process

When planning use of outcome measures in practice a conceptual framework can assist clinicians in the decision making process (Allen & Yen, 2002; Fawcett, 2007; Finch et al., 2002; Hand, 2004; Horner & Larmer, 2006; Kaplan, 2007; McDowell & Newell, 2006; Patrick & Chiang, 2000; Thorndike, 2005). The ICF is a framework that can be used to guide measurement of health and disability at both the individual and population level. The ICF consists of three key components (see Figure 2.1). The first component, “body functions and structures” refers to physiologic functions and anatomic parts; loss or deviations from normal body functions and structures are described as impairments. The second component, “activity” refers to task execution by the individual. Activity limitations consist of the difficulties individuals may experience when executing activities. The third component, “participation” refers to an individual’s involvement in life situations. If problems arise, these are known as participation restrictions. These three components are features of functioning and disability and as such may interact with an individual’s health condition as well as their personal and environmental factors (Stucki, 2005). It is now widely accepted that measurement of outcomes should occur across these three components (Abrams et al., 2006). As such, the ICF is also intended to assist clinicians in the decision making process about what to measure, which consequently guides the selection of appropriate outcome measures (Allet, Burge & Monnin, 2008; Cieza, Geyh, Chatterji, Kostanjsek, Ustun & Stucki, 2005; Stucki, 2005). A vast number of instruments have been developed over the past few decades that can be used for measuring a wide range of health and rehabilitation outcomes (Abrams et al., 2006; Cieza et al., 2005; Garratt, Schmidt, Mackintosh & Fitzpatrick, 2002). The number and variety of instruments has added to the complexity of selecting the most appropriate outcome measure. By defining the intended intervention outcome according to the ICF component and selecting an outcome measure that targets the corresponding ICF level, clinicians are able to reduce the likelihood of a disparity between the intended outcome and the outcome measure.
2.4 Importance of using outcome measures

In the current climate of evidence-based practice, allied health clinicians are required to demonstrate that their interventions achieve desired client outcomes and are cost-efficient (Copeland et al., 2008; Greenhalgh et al., 2008; Stapleton & McBrearty, 2009; Van Peppen, Schurmans, Stutterheim, Lindeman & Van Meeteren, 2009). Clinicians are being challenged to move towards values-based decision-making while maintaining a commitment to delivering services in a manner that meets their profession’s ethical standards (Dubouloz, Egan, Vallerand & von Zweck, 1999; Greenhalgh et al., 2008; Stapleton & McBrearty, 2009). Previously, the allocation of allied health services was based on clinicians’ personal and professional judgments and values. Now, clinical decisions must be responsive to the values of all stakeholders in the health care system – that is, the clinicians themselves, their clients and families, those who pay for the service, and those who employ the clinicians to provide the service (Foto, 1998).

There are clear benefits to all stakeholders from the measurement of clinical outcomes (Kaplan, 2007). For clinicians, routine outcome measurement provides a means of documenting the
effectiveness and quality of their clinical interventions and assists with clinical decision-making (Kaplan, 2007; Beattie & Maher, 1997; Unsworth, 2000). Standardised outcome measures can be used to determine the impact of an intervention on an individual client (Chesson, Macleod & Massie, 1996; Hanna, Russell, Bartlett, Kertoy, Rosenbaum & Wynn, 2007). Improved scores following the implementation of an intervention provides clear and meaningful evidence that change has occurred (Hanna, et al., 2007; Hefford, et al., 2008; Huijbregts, Myers, Kay & Gavin, 2002). This useful feedback to clinicians concerning client performance assists them to determine whether there is a need to alter intervention. Outcomes data is also assumed to improve the accuracy of clinical judgments and is an important part of the ongoing intervention planning process (Greenhalgh et al., 2008; Hatfield & Ogles, 2004). An unanticipated positive aspect of using outcome measures in practice is the perceived improvement in client-clinician interactions (Cook et al., 2007). Through outcome measurement, clients are given the opportunity to actively engage in the therapy process (Kaplan, 2007). Outcome measurement assists clinicians to collaboratively set measurable goals with their clients, and together objectively monitor progress toward goal attainment (Cook et al., 2007; Hanna, et al., 2007; Hefford, et al., 2008; Huijbregts, et al., 2002). Outcome measure data therefore enhances communication with clients, their families and other professionals involved in the intervention process (Akinpelu & Eluchie, 2006).

Clients today have better access to information about their health issues through the Internet than they ever have before (Kaplan, 2007). This increased knowledge has lead to clients seeking more information about their condition, justification about interventions being administered and alternative interventions available (Kaplan, 2007). Outcomes data can be used to assist clients to make informed decisions regarding their clinical care and intervention options (Chesson et al., 1996; Hanna, et al., 2007; Hefford et al., 2008; Skeat & Perry, 2007) and assists in the client education process (Huijbregts et al., 2002). Use of outcome measures is also thought to be motivating for clients by objectively showing progress (Hanna et al., 2007).

Outcome measurement audits provide service providers with a systematic, reliable means of demonstrating the value of their services (Addis, Wade, & Hatgis, 1999; Greenhalgh et al., 2008; Huijbregts et al., 2002; Kaplan, 2007; Page & Benton, 2005; Skeat & Perry, 2007). An outcomes
audit identifies whether the desired outcomes were achieved, reasons as to why or why they were not they achieved and ways to assist their achievement in the future (Kaplan, 2007; Long, 1995). Outcome measurement also provides a way to justify the value of interventions, services and programs to health care agencies, including government health agencies and insurance companies (Abrams et al., 2006; Beattie, 2001; Beattie & Maher, 1997; Hatfield & Ogles, 2004; Kaplan, 2007; Page & Benton, 2005; Unsworth, 2000). Managers can use outcomes data to make informed decisions about re-allocating health dollars from inefficient to efficient services; and developing, implementing and evaluating health policy (Huijbregts et al., 2002; Noyce & Schofield, 1997). Further, government agencies rely on data from health clinicians to aid in determining funding allocation, the provision of staff and services and health care policy (Huijbregts, et al., 2002). Service providers who do not provide objective evidence of the effectiveness of their services may not receive funding or additional staff to continue their service (Kaplan, 2007). In addition, outcome measurement can provide clinicians with information that allows comparison of aggregated results from different treatments or from different service providers, or from different regions, states or countries.

Overall, the routine measurement of clinical outcomes is considered to be vital to a clinicians’ professional credibility, particularly in the context of an evidence-based practice. Many benefits stem from using outcome measures. The current use of outcome measures by clinicians however, is limited (Hanna, et al., 2007; Huijbregts, et al., 2002; Kay, Myers & Huijbregts, 2001; Skinner & Turner-Stokes, 2006; Stokes & O'Neill, 1999, 2008; Walter, Cleary, & Rey, 1998). A variety of issues related to allied health clinicians’ use of outcome measures are reported in the literature. These issues are discussed on subsequent pages.

2.5 Use of outcome measures in practice

Over the past 16 years, 29 studies from across the world, have specifically explored clinicians’ use of outcome measures (see Appendix A). Of these, the majority (n=13 studies) used a descriptive cohort design where a self-report survey instrument was administered on a single occasion; eight intervention studies evaluated change over time in outcome measure use (seven before and after studies’ one pilot randomised controlled trial); four were mixed method studies
and two were exploratory qualitative studies which used focus group methods. These studies are discussed below.

### 2.5.1 Ability to name standardised outcome measures

Three studies used self-report surveys to examine clinicians’ ability to name standardised outcome measures. The first study conducted in 1992 surveyed 207 Canadian physiotherapists. Of these clinicians, 10% could not name any outcome measures and 20% could only name one measure (Mayo, Cole, Dowler, Gowland & Finch, 1993). A comparative study was conducted in Canada in 1998 after physiotherapists had been exposed to a series of educational workshops, inservices and a published book of rehabilitation outcome measures (Finch et al., 2002). Of the 69 physiotherapists, and the 20 professional practice leaders surveyed, 97% of physiotherapists and 100% of leaders could name at least one outcome measure (Kay et al., 2001). Another study conducted in Nigeria, surveyed 236 physiotherapists and found over 60% of participants could not name any standardised outcome measures (Akinpelu & Eluchie, 2006). Whilst clinicians’ ability to name standardised outcome measures demonstrates their knowledge of particular instruments, this knowledge cannot be equated to outcome measure use.

### 2.5.2 Self-reported use of outcome measures

Twelve studies have presented data on outcome measure use. All, with the exception of one study are based on self-report survey data. These studies conducted in North America, Australia and New Zealand, the United Kingdom, the Netherlands and Europe, revealed much variation in outcome measure use. Studies which aimed to establish outcome measure use at a single point in time reported use from as low as 9.4% (Gilbody, House & Sheldon, 2002) up to 100% (Stokes & O’Neill, 2008). Studies that measured change in outcome measure use after participants underwent an intervention reported use varying from 8% (Garland et al., 2003) up to 91.4% (Cook et al., 2007).

#### 2.5.2.1 North America

In 1992, of 207 Canadian physiotherapists surveyed, 50% reported using outcome measures in practice (Mayo et al., 1993). In contrast, 92% of 100 North American mental health clinicians stated they had *never* used standardised outcome measures in practice (Garland et al., 2003). A
A larger survey study of 874 North American psychologists revealed only 37% reported use of some form of outcome assessment, and 22% stated they used standardised outcome measures (Hatfield & Ogles, 2004). Another self report survey of 209 Canadian allied health clinicians working in paediatric rehabilitation revealed 59% reported using standardised outcome measures in their routine practice; however 56% reported they sometimes modified the measure when using it (Hanna et al., 2007).

### 2.5.2.2 Australia and New Zealand

Four studies have been conducted in Australia and New Zealand. A small study surveyed 18 physiotherapists working in lung transplant centres across Australia and New Zealand. Of those surveyed, 62% reported use of outcome measures to obtain pre-transplant data, however only 5% reported using measures for the purpose of evaluating intervention outcomes (Maher & Williams, 2005). A longitudinal postal survey of 154 Australian physiotherapists found 30% of clinicians reported using outcome measures at baseline. After exposure to active education initiatives, professional support and position statements from peak bodies, 66% of 164 physiotherapists surveyed at 6 months reported using outcome measures (Abrams et al., 2006). A before and after study conducted in Australia with 36 occupational therapists found the proportion of clinicians using outcome measures increased from 65.7% at baseline to 91.4% at four months after a one day workshop, provision of a resource package and follow-up support (Cook et al., 2007). Finally, a postal survey of 369 New Zealand physiotherapists who treated low back pain revealed 40% used standardised outcome measures (Copeland et al., 2008).

### 2.5.2.3 United Kingdom

A follow-up survey conducted with 15 Irish physiotherapists showed the proportion of clinicians using standardised outcome measures increased from 30 to 50% in 1998 to 100% in 2003 (Stokes & O’Neill, 2008). Similarly, a larger Irish study of 109 occupational therapists working with adults with physical disabilities revealed only 30% of clinicians reported a commonly used instrument in a routine manner (Stapleton & McBrearty, 2009). One Irish survey study investigating the assessment practices of 50 occupational therapists found the most common form of assessment was observation (66%) and the least common was standardised outcome measures (Brangan & O’Neill, 1998).
2.5.2.4 The Netherlands

In a pilot randomised controlled trial conducted in the Netherlands, 30 physiotherapists reported using a median of 4 out of 7 specified outcome measures at baseline (Van Peppen et al., 2009). A clinical file audit showed clinicians were actually using a median of 3 measures. After participation in an education program, clinicians in the intervention group reported using 6 of the 7 outcome measures, compared to those in the control group who reported using 4 of the 7 measures. The clinical file audit revealed the median use of outcome measures increased from 3 to 6 in the intervention group and 3 to 4 in the control group (Van Peppen et al., 2009).

An international study examining the use of outcome measures for stroke and low back pain surveyed 102 rehabilitation providers from Ireland, Germany, Italy, Austria and the Netherlands (Torenbeek, Caulfield, Garrett & Van Harten, 2001). Of those surveyed, 75% reported using one or more outcome measures, however most of the measures used were locally developed and unpublished (Torenbeek et al, 2001).

2.5.3 Clinical departments using outcome measures

Three studies examined outcome measure use by clinical departments as opposed to use by individual clinicians. A Scottish study surveyed 98 occupational therapy and 86 physiotherapy departments. This study found that 35% of occupational therapy and 44% of physiotherapy departments reported using standardised outcome measures (Chesson et al., 1996). Of 22 Irish physiotherapy departments surveyed, 29% reported using standardised measures (Stokes & O’Neill, 1999). A survey of 83 rehabilitation centres in the United Kingdom found 86% of centres used at least one standardised outcome measure as part of routine clinical practice, 72% of those using outcome measures reported assessing outcomes by recording achievement of set goals (Skinner & Turner-Stokes, 2006). Thus, it would appear use of standardised outcome measures by clinical departments has increased considerably in the last 7 to 10 years.

2.5.4 Efforts made to learn how to use standardised measures in practice

One study of North American occupational therapists, physiotherapists and therapy assistants used a survey to determine whether clinicians made an effort to learn how to use standardised
outcome measures. Of the 220 clinicians surveyed, 66% reported making some effort to learn how to use outcome measures in practice (Russek, Wooden, Ekedahl & Bush, 1997).

2.5.5 Limitations of previous research on outcome measure use
Whilst the 29 studies described above provide some useful insights into the outcome measurement behaviours of clinicians, the limitations and biases of these studies need to be considered. Some studies assumed that clinicians’ ability to name outcome measures equated to use, which is not the case (Akinpelu & Eluchie, 2006; Mayo et al., 1993; Kay et al., 2001). Several studies also had relatively small samples; therefore their findings must be interpreted with caution (Cook et al., 2007; Maher & Williams, 2005; Stokes & O’Neill, 1999; Stokes & O’Neill, 2008; Van Peppen et al., 2009). In addition, not all studies made the distinction between standardised, published measures and locally developed tools; as such there remains uncertainty about clinicians’ outcome measurement behaviours. Overall, the body of knowledge on clinicians’ outcome measurement behaviours is based almost entirely on self-report data. Self-report data are subject to bias, and therefore may provide an inaccurate, often inflated picture of actual practice behaviours (Adams, Soumerai, Lomas & Ross-Degnan, 1999; Bailey, 2008; Finkelstein et al., 2000). These limitations highlight the need for further rigorous, objective research in this area.

2.6 Barriers to outcome measure use
Despite the pressures and obvious benefits, it would appear few allied health clinicians are routinely measuring outcomes. A number of perceived barriers are believed to be the cause of this lack of routine measurement. These barriers have been well documented in the literature. Studies internationally and in Australia reveal there is a complex interplay of personal, professional, and organisational barriers that influence whether clinicians take up the challenge of measuring the outcomes of their clinical interventions or not (Bowman & Llewellyn, 2002; Cook et al., 2007; Skeat & Perry, 2008). Table 2.2 provides a summary of these barriers.
Table 2.2. Barriers to outcome measurement

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<thead>
<tr>
<th>Description of barriers to outcome measurement</th>
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<tbody>
<tr>
<td><strong>Personal Barriers</strong></td>
</tr>
<tr>
<td>- <strong>Lack of time</strong></td>
</tr>
<tr>
<td>Heavy client caseload</td>
</tr>
<tr>
<td>Short admission periods</td>
</tr>
<tr>
<td>Search for outcome measures</td>
</tr>
<tr>
<td>Administer, score, interpret, record and communicate results</td>
</tr>
<tr>
<td>- <strong>Knowledge and skill</strong></td>
</tr>
<tr>
<td>Identifying what to measure</td>
</tr>
<tr>
<td>Setting measurable goals</td>
</tr>
<tr>
<td>Selecting appropriate measurement instruments</td>
</tr>
<tr>
<td>Administering, scoring and interpreting the results of outcome measures</td>
</tr>
<tr>
<td>- <strong>Attitudes, values and beliefs</strong></td>
</tr>
<tr>
<td>Perception about professional roles and responsibilities</td>
</tr>
<tr>
<td>Perceived feasibility, suitability and usefulness of information obtained</td>
</tr>
<tr>
<td>Self confidence</td>
</tr>
<tr>
<td>Fear</td>
</tr>
<tr>
<td>- <strong>Lack of interest, motivation, self confidence and fear</strong></td>
</tr>
<tr>
<td>Not interested in or willing to use outcome measures</td>
</tr>
<tr>
<td>Feel frustrated and overwhelmed by the pressure to measure outcome</td>
</tr>
<tr>
<td>Feel ill-equipped to measure outcomes</td>
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<tr>
<td>Fear and suspicion regarding how outcome data will be used</td>
</tr>
<tr>
<td><strong>Professional Barriers</strong></td>
</tr>
<tr>
<td>- <strong>Professional standpoint</strong></td>
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<tr>
<td>Perceived value of outcome measurement</td>
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<tr>
<td>Perception of outcome measurement as an integral part of the clinical role</td>
</tr>
<tr>
<td>Time away from clinical work</td>
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<tr>
<td>- <strong>Lack of direction</strong></td>
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<tr>
<td>Influenced by whether professions collectively embrace outcome measurement</td>
</tr>
<tr>
<td>Poor systems in place to support outcome measurement</td>
</tr>
<tr>
<td>Lack of professional consensus about outcome measure use</td>
</tr>
<tr>
<td>- <strong>Lack of training, education and mentoring</strong></td>
</tr>
<tr>
<td>Inadequate access to training and education</td>
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<tr>
<td>Lack of training available on the use of specific outcome measures</td>
</tr>
<tr>
<td>Lack of access to a resource person or expert in outcome measurement</td>
</tr>
<tr>
<td><strong>Organisational Barriers</strong></td>
</tr>
<tr>
<td>- <strong>Culture</strong></td>
</tr>
<tr>
<td>General organisational culture</td>
</tr>
<tr>
<td>Outcome measurement culture</td>
</tr>
<tr>
<td>- <strong>Resources</strong></td>
</tr>
<tr>
<td>Lack of material resources (databases, computers, outcome measures, equipment and space)</td>
</tr>
<tr>
<td>Lack of administrative support</td>
</tr>
<tr>
<td>Lack of funding to attend education sessions, workshops and conferences</td>
</tr>
</tbody>
</table>

2.6.1 Personal barriers

Personal barriers to outcome measurement can be categorised into four groups: i) lack of time, ii) lack of knowledge and skill, iii) attitudes, values and beliefs toward outcome measurement, and iv) lack of motivation. The characteristics of each group will be discussed in turn.
2.6.1.1 Lack of time
The most common barrier identified was lack of time (Brangan & O’Neill, 1998; Cook et al., 2007; Copeland et al., 2008; Kay et al., 2001; Mayo et al., 1993; Monk, 2006; Stokes & O’Neill, 2008). Clinicians reported heavy client caseloads (Beattie, 2001; Bowman & Llewellyn, 2002; Cook et al., 2007; Huijbregts et al., 2002; Mayo et al., 1993; Skeat & Perry, 2008; Stapleton & McBrearty, 2009) and short admission periods (Brangan & O’Neill, 1998) as major limiting factors to the measurement of outcomes. Clinicians felt pressured to see as many clients as possible and as such did not want to engage in activities that impacted on direct clinical work (Bowman & Llewellyn, 2002; Copeland et al., 2008). Many clinicians believed they did not have sufficient time to search the literature to find appropriate measures for their clients (Abrams et al., 2006; Huijbregts et al., 2002). Nor did they have the time to administer, score and interpret these standardised instruments, document findings and discuss results with team members (Abrams et al., 2006; Garland et al., 2003; Hatfield & Ogles, 2004; Huijbregts et al., 2002; Stapleton & McBrearty, 2009).

2.6.1.2 Lack of knowledge and skill
Another frequently reported barrier is lack of knowledge and skill regarding the outcome measurement process (Abrams, et al., 2006; Akinpelu & Eluchie, 2006; Beattie, 2001; Blenkiron, 2005; Bowman, 2006; Bowman & Llewellyn, 2002; Copeland et al., 2008; Cook, et al., 2007; Hayes, 2000; Huijbregts, et al., 2002; Maher & Williams, 2005; Mayo, et al., 1993; McCluskey, 2003; Monk, 2006; Stapleton & McBrearty, 2009; Unsworth, 2000). Clinicians report that they do not have an adequate understanding of, or the skills to use, outcome measures within routine practice (Bowman, 2006). More specifically, clinicians report having difficulty: identifying what to measure; setting measurable goals; linking goals to interventions; selecting appropriate measurement instruments; administering, scoring and interpreting the results of outcome measures. Lack of adequate knowledge and skill in outcome measurement influences the low participation rate of clinicians (Bowman & Llewellyn, 2002; Cook et al., 2007; Hayes, 2000; Huijbregts et al., 2002). This lack of knowledge and skill often leads to feelings of guilt about not being able to participate in the outcome measurement process (Bowman & Llewellyn, 2002; Huijbregts et al., 2002). Most clinicians in one qualitative study felt they required additional education and training on use of outcome measures in clinical practice (Bowman, 2006).
However, no studies to date have objectively determined the specific areas of outcome measurement that clinicians find difficult.

**Identifying what to measure**

Clinicians have difficulty articulating clinical problems that require assessment and intervention (Cook et al., 2007; Stokes & O’Neill, 2008). Clinicians often wonder what functional impairments or activity and participation limitations should be assessed (Van Peppen et al., 2009). Clinicians find it difficult to isolate exactly what needs to be measured in terms of the core components of their interventions (Bowman & Llewellyn, 2002). More specifically, clinicians have difficulty identifying the unit of analysis for measurement (Bowman, 2006).

**Setting measurable goals**

Identifying a measurable goal is one of the first steps in the outcome measurement process (Unsworth, 2000). Therefore, without the knowledge and skill to do so, it is likely that the measurement process will be unsuccessful. Research has shown clinicians have difficulty setting specific measurable goals (Bowman, 2006). If clinicians are struggling to write measurable goals, this may explain why they are having difficulty measuring the effectiveness of their interventions (Bowman, 2006). Further, clinicians struggle to clearly link goals to interventions (Bowman, 2006).

**Selecting appropriate measurement instruments**

Many clinicians lack the skills necessary to search for and locate outcome measures (Copeland et al., 2008). The growing number of published measures is thought to add to the complexity of the search and selection process (Kay et al., 2001). As such, clinicians’ appear to be struggling to select appropriate instruments for their clients (Bowman, 2006; Bowman & Llewellyn, 2002; Huijbregts et al., 2002; Stokes & O’Neill, 2008). A number of studies have identified lack of familiarity with, and insufficient knowledge of available functional tests or suitable instruments as a major barrier to outcome measure use (Abrams et al., 2006; Akinpelu & Eluchie, 2006; Bowman, 2006; Brangan & O’Neill, 1998; Kay et al., 2001; Monk, 2006; Stapleton & McBrearty, 2009). As a result, many clinicians assess clinical change using subjective means such as observation, conjecture or by asking clients if they were satisfied with intervention
(Bowman, 2006). Further, most clinicians have difficulty identifying the purpose of outcome measures and do not know enough about reliability and validity to be able choose the best measures (Kay et al., 2001; Skeat & Perry, 2008).

**Administering, scoring, interpreting and reporting results**

Clinicians want help and guidance in the administration, scoring, interpretation and reporting of outcome measures (Huijbregts, Myers, Kay & Gavin, 2002; Stapleton & McBrearty, 2009). Clinicians did not know how to link information, how to compare scores to baseline levels across clients and overall, and what to do with the resulting information (Kay et al., 2001). Clinicians wonder when they need to monitor clients and how best to use outcome measures (Van Peppen et al., 2009). Clinicians often do not know what outcome measure scores mean (Greenhalgh et al., 2008). Moreover, clinicians have expressed that they have limited knowledge of how to interpret the results of outcome measures and the changes in scores (Abrams et al., 2006; Copeland et al., 2008; Garland et al., 2003; Kay, Myers & Huijbregts, 2001; Monk, 2006; Skeat & Perry, 2007; Wood-Dauphinee, Arsenault, & Richards, 1994; Van Peppen et al., 2009). Contributing to this problem, there is sometimes a lack of information available on how to interpret the results of outcome measures (Cook et al., 2007). For example, clinicians have reported that they were not sure if the measures they had used validly reflected changes in their client’s functioning because they could not read or understand the results (Garland, et al., 2003). As such, the lack of understanding of outcome measure results can create uncertainty about the effectiveness of interventions used (Abrams, et al, 2006) adding to the difficulty clinicians have in defining and communicating outcome measure findings (Stokes & O’Neill, 1999).

**2.6.1.3 Attitudes, values and beliefs**

There appears to be variability in clinicians’ attitudes toward, beliefs about and the extent to which they value outcome measure use in practice. Clinicians have made it clear they do not want measures imposed on them (Huijbregts et al., 2002). Some authors even suggest that unless mandated, most clinicians are not likely to use standardised measures to assess clients or evaluate progress in interventions (Garland et al., 2003). Some clinicians are still unable to see the need for outcome measurement (Skeat & Perry, 2008). Some clinicians are even ideologically opposed to the use of outcome measures. These ideological barriers are often the
most difficult to address when encouraging clinicians to use outcome measures (Copeland et al., 2008; Garland et al., 2003; Stokes & O’Neill, 1999). Some clinicians have identified the need to change their attitude to measuring clinical outcomes to embrace the challenge of demonstrating the effectiveness and efficiency of their services. However, it is acknowledged that attitude change is a slow process and often results in resistance (Bowman, 2006; Cook et al., 2007). Clinicians’ attitudes, values and beliefs about their professional roles and responsibilities, the feasibility, suitability and usefulness of outcome measures will be discussed in turn.

**Perception about professional roles and responsibilities**

Some research has identified that clinicians are confused about their roles and responsibilities, relative to those of researchers and administrators in outcome measurement (Huijbregts et al., 2002). Participants in one research study suggested that it was the role of senior clinicians to initiate, facilitate and coordinate outcome measurement whereas entry-level clinicians were expected to focus on consolidating their clinical skills (Bowman & Llewellyn, 2002). Another belief was that outcome measurement was something additional to clinical work, and is not an integral, or indeed necessary component of providing an effective or efficient service to clients (Bowman & Llewellyn, 2002). Some clinicians view outcome measurement as cumbersome and/or intrusive and as such a low priority (Garland et al., 2003; Stokes & O’Neill, 2008).

**Perceived lack of feasibility, suitability and usefulness**

Clinicians also have issue with the logistics and feasibility of using outcome measures (Garland et al., 2003). Some clinicians feel that outcome measurement adds an unnecessary burden on clients (Hatfield & Ogles, 2004). Many clinicians also question, or are concerned about the lack of suitable or relevant tools available (Copeland et al., 2008; Huijbregts et al., 2002; Skeat & Perry, 2008; Stapleton & McBrearty, 2009). Clinicians were often of the opinion that outcome measures did not meet their client’s needs (Copeland et al., 2008; Kay et al., 2001; Stokes & O’Neill, 2008). Clinicians also believed that all clients were individuals with their own unique set of problems, and therefore it was irrelevant to look for and use standardised outcome measures (Copeland et al., 2008). More specifically, clinicians believed many outcome measures did not account for cultural diversity (Copeland et al., 2008), nor were they holistic or client centred (Stapleton & McBrearty, 2009). Clinicians were also unconvinced about the
psychometric properties of outcome measures. Measures were thought to lack the specificity and sensitivity required to capture intervention outcomes (Stapleton & McBrearty, 2009); clinicians also had concerns about the validity and reliability of many instruments (Copeland et al., 2008). Beyond this, clinicians were worried about confidentiality, misuse or misinterpretation of outcome measure information by others (Hatfield & Ogles, 2004; Stokes & O’Neill, 1999). Some clinicians also see outcome measurement as a recipe oriented approach to practice, which interferes with practitioner autonomy, and ultimately does not add any value to what they already doing (Copeland et al., 2008; Skeat & Perry, 2008).

### 2.6.1.4 Lack of interest, motivation, self-confidence and fear
Factors such as lack of interest, motivation, self-confidence and fear have frequently been identified as reasons why health professionals do not engage in outcome measurement (Bowman & Llewellyn, 2002; Huijbregts et al., 2002; Mayo et al., 1993; Stokes & O’Neill, 1999). Research has highlighted that not all clinicians are interested in, or willing to engage in outcome measurement (Bowman & Llewellyn, 2002). Clinicians feel frustrated at being expected to engage in an activity they felt ill equipped for (Bowman & Llewellyn, 2002; Huijbregts et al., 2002). Further, clinicians feel overwhelmed by external and internal expectations that they should be measuring outcomes when they can barely cope with other aspects of their workloads (Huijbregts et al., 2002). There is also fear and suspicion that outcome measurement results may be used to challenge and change clinical practice and justify service or clinical positions (Bowman & Llewellyn, 2002; Copeland et al., 2008).

### 2.6.2 Professional barriers
Professional barriers to outcome measurement can be categorised into three groups: i) professional standpoint, ii) lack of direction, and iii) lack of training, education and mentoring.

#### 2.6.2.1 Professional standpoint
Professional standpoint appears to influence participation in outcome measurement in two ways. On the one hand, outcome measurement was given professional value as a means of providing evidence to support clinician decision-making. On the other hand, measuring outcomes was perceived as time away from clients, extra work and not an integral part of the clinical role.
Overall, the clinicians see themselves as intimately involved in clinical intervention and not equal to, or responsible for, the task of rigorously evaluating what they do (Bowman & Llewellyn, 2002).

2.6.2.2 Lack of direction
Engagement in outcome measurement appears to be influenced globally by whether a profession as a whole values outcome measurement as an integral component of the evidence needed to support clinician decision-making (Bowman & Llewellyn, 2002). In most countries health professionals are not satisfied with the current direction of, or the system in place to support measurement of outcomes (Torenbeek et al., Harten, 2001). In many instances, there is a clear lack of professional consensus about outcome measurement (Kay et al., 2001; Stokes & O’Neill, 2008). That is, there is little agreement amongst clinicians as to which outcome measures to use and what to do with the information once it is collected (Torenbeek et al., 2001).

2.6.2.3 Lack of training, education and mentoring
Many clinicians also believe they have inadequate access to training, education and support required to assist them to use outcome measures as part of their clinical practice. In house education is reported to be too general and too brief to assist clinicians to apply outcome measures to practice (Huijbregts et al., 2002). There is also believed to be a specific lack of training available in the use of functional tests and measures (Abrams et al., 2006; Cook et al., 2007). Many clinical environments lack a resource person with expertise in outcome measurement (Huijbregts et al., 2002) and as such, consultants need to be brought in to assist with the implementation, scoring and interpretation of outcome measure results (Huijbregts et al., 2002).

2.6.3 Organisational barriers
Organisational factors appear to influence clinician participation in the outcome measurement process. Specific organisational factors such as culture, lack of support from management in terms of assistance, funding, manageable caseloads and training programs have been identified as crucial factors influencing engagement in outcome measurement (Bowman & Llewellyn, 2002; Huijbregts et al., 2002; Kay et al., 2001; Mayo et al., 1993; Reilly, 2004; Robertson & Colborn, 2000; Stokes & O’Neill, 2008).
2.6.3.1 Culture
Organisational culture plays a key role in whether clinicians embraced outcome measurement to demonstrate the effects of their interventions (Bowman & Llewellyn, 2002). Clinicians employed in workplaces that lacked a distinct measurement culture appeared to struggle more to routinely use outcome measures in practice (Hanna et al., 2007).

2.6.3.2 Resources
Insufficient access to resources supporting outcome measurement was a problem in many work settings (Hatfield & Ogles, 2004; Monk, 2006). Lack of availability of outcome measures, equipment, scoring forms and space restrictions made it difficult for clinicians to effectively incorporate outcome measurement as part of their daily practice (Huijbregts et al., 2002; Stapleton & McBrearty, 2009; Stokes & O’Neill, 2008). In addition, inadequate infrastructure, such as limited access to databases, computers and administrative support further hindered clinicians’ attempts to use outcome measures in practice (Skeat & Perry, 2008; Stokes & O’Neill, 2008). Another key resource barrier, particularly within the public health system, was the lack of funding to support attendance at continuing education programs for skill development such as outcome measurement workshops (Bowman & Llewellyn, 2002).

Numerous studies have shown the impact personal, professional and organisational barriers can have on allied health clinicians’ use of outcome measures in practice. Clinicians need assistance to change their mindset to outcome measurement and engage in appropriate strategies to overcome these barriers.

2.7 Change
Personal, professional and organisational changes need to occur to facilitate clinicians’ routine use of outcome measures in practice. Clinicians will therefore require assistance to identify, address and overcome their perceived barriers to outcome measurement. Change in practice habits is a complex and challenging task for most clinicians. Organisational support and structure needs to be present to assist clinicians move through the change process. In an organisational context, change can be defined as the process of moving to a new and different
state of things (Smith, 2005). People often feel threatened by change that is imposed on them without adequate consultation, planning or preparation. It is also well known that individuals are generally motivated to change and adopt new practices if they perceive a benefit from change (Berwick, 2003). These critical elements of the change process can either facilitate or undermine the effectiveness of a change intervention (Armenakis, Harris & Mossholder, 1993; Lewin, 1951; Eby, Adams, Russell & Gaby, 2000). Many factors contribute to the effectiveness with which organisational changes are implemented (Armenakis et al., 1993). At the crux of organisational change are group members including employees (Tetenbaum, 1998; Wheatley, 1992). Employees are the real source of and vehicle for change and are the ones who will either embrace or resist change (Smith, 2005). Employees respond to what is happening in their environment and will make assumptions about the change process. Employees attempt to make sense of their world, and instil order in a system of chaos (Wheatley, 1992). Further, employees have perceptions regarding their organisation’s readiness for change. It is not uncommon that during organisational change employees experience uncertainty, ambiguity in roles and responsibilities and in many cases, information overload (Cummings & Huse, 1989; Eby et al., 2000). Therefore, if organisational change is to take hold and succeed then organisations and the people who work in them must be readied for the transformation (Smith, 2005). Even when change is perceived as beneficial, resistance may still occur. Theoretical models and theories can be useful to guide interventions to facilitate personal, professional and organisational changes. Theoretical models also provide a basis for understanding the behaviour of practitioners (McLaren, Ross, Redfern & Christian, 2002; NHS Centre for Reviews and Dissemination, 1999).

2.7.1 Resistance to change
As human beings have a characteristic fear of uncertainty, resistance to change is common (Wheatley, 1992; Eby et al., Gaby, 2000). People employed within organisations can be either the key to achieving effective change, or present the greatest barrier to success. The price of failed change efforts can be high and may include widespread loss of credibility on the part of leaders and managers, and entrenchment of employee opposition to future change efforts (Smith, 2005). Thus, perceived barriers and resistance to change must be overcome to mobilise positive and meaningful action (Wheatley, 1992; Lewin, 1951). A number of theories exist that help us to understand the concept of change and how individuals and organisations experience change.
2.7.2 Readiness to change

Readiness is associated with change (Dalton & Gottlieb, 2003). Readiness is defined as the cognitive precursor to the behaviours of either resistance to or support for a change effort (Armenakis et al., 1993; Eby et al., 2000). The concepts of readiness to change and resistance to change sit on a continuum. At one end, people or organisations can be viewed as capable of withstanding change and successfully adapting (high readiness to change). At the opposite end of the spectrum, people and organisations can be perceived as not ready to undergo change (low readiness for change) (Eby et al., 2000). Readiness can be described in terms of people’s beliefs, attitudes and intentions (Armenakis et al., 1993). Readiness is often conceptualised as a state where a person is assessed as ready or not ready (Dalton & Gottlieb, 2003). Readiness is based on a subjective feeling or perceived ability (Dalton & Gottlieb, 2003). Readiness for change can also be conceptualised as the extent to which an organisation is perceived to be ready to take on change (Eby et al., 2000). People within the same organisational context, experiencing a similar objective reality can hold very different perceptions (Spreitzer, 1996; Eby et al., 2000). Therefore, change readiness is not automatic, nor can it be assumed (Smith, 2005).

2.7.3 Assessing readiness for change

There is a high risk of failure if individual and organisational readiness for change is inadequate. Assessing overall change readiness before any attempt to implement change is a good investment. Assessment can reveal a path to success or warn of problems that may derail attempts at achieving change (Smith, 2005). A failure to assess individual and organisational readiness may result in managers spending significant time and energy dealing with resistance to change (Smith, 2005). A structured approach to assess readiness for change consists of four steps: 1) auditing the communication about the why, when and how of change; 2) observing the behaviour of employees to gain indications of likely reactions to change; 3) directly soliciting employee reaction to change via interviews and group discussions; and 4) applying a structured survey method to assess readiness to change (Armenakis & Harris, 2002; Smith, 2005). Whilst these steps highlight the importance of assessing readiness to change, at present, there is no way of determining clinicians’ readiness to change their outcome measurement behaviours.
2.7.4 Theories and models of change

Barriers at an individual and organisational level can negatively impact upon the change process. Such barriers can obstruct the implementation of new approaches to practice (Roberston & Jochelson, 2007). In order to overcome barriers and identify and develop strategies to promote change, it is necessary to understand how individuals and organisations experience change. A variety of theories and models exist which explain behaviour change. These theories and models often support the use of different interventions to facilitate modification to practice (Roberston & Jochelson, 2007). In addition, different disciplines also tend to favour use of different theories, models and interventions to support change of individual or organisational performance (Grol, Wensing, Hulscher & Eccles, 2005). While there is considerable overlap between some theories and models, to date, researchers have not put forward one unified theory of change that is applicable in all situations (Roberston & Jochelson, 2007; Smith, 2000).

Many of the popular theories used in healthcare have come from health promotion, where they were originally used to explain lifestyle changes, or from the organisational and management sciences that explain how organisations behave and change (Grol et al., 2007; Roberston & Jochelson, 2007). These theories and models were not originally designed to explain changing practice to improve client care or implementation of innovations or best practices (Grol, Wensing, Hulscher & Eccles, 2007).

Some theories and models focus on change at an individual level, some within the social setting and others within the organisational context (Grol et al., 2005). Theories and models that explain change in individual professionals focus on their choices and decision-making, knowledge and skills, attitudes and motivation or on their habits and routines in practice (Grol et al., 2005; Roberston & Jochelson, 2007). Theories that focus on change as a result of influences in the social setting generally discuss determinants of change such as interactions between the individual professional and others such as opinion leaders, social networks, clients, peers and leadership and cultural factors (Grol et al., 2005). Theories focusing on the organisational context are relevant to change in relation to structural, administrative, economic and culture and conditions (Grol et al., 2005).
2.7.4.1 Theories focusing on individual professionals

Cognitive Theories
Cognitive theories focus on the process of thinking and deciding of individuals. Decision-making theories assume individuals consider and balance the advantages and disadvantages of different alternatives. The provision of convincing information on the advantages and disadvantages is crucial to performance changes (Grol et al., 2005).

Behavioural Theories
Behavioural theory is based on the notion that human behaviour can be conditioned and controlled (Carlson, 1987; Pervin, 1970; Sdorow, 1998). People generally repeat behaviours that are followed by positive consequences, for example praise. Thus, the behaviour has been positively reinforced (Sdorow, 1998). Behaviour can also be influenced by external environmental stimuli before or after a specific action (Grol & Grimshaw, 1999; National Health and Medical Research Council, 2000). For example, if a person is reminded about an activity, they are more likely to perform that activity. Therefore, according to behavioural theory strategies or interventions that incorporate the principles of positive reinforcement, reminders, reviewing performance and feedback are more likely to effect change.

Educational theories
Underpinning educational theories is the notion that learning is an active, constructive cognitive process. Learning only happens when learners actively use new knowledge and link it to pre-existing knowledge (Grol, et al., 2005). Some educational theories however place more focus on the motivation to learn and less on cognition. For example, some adult learning theories suggest that individuals learn better and are motivated to change when they start from a problem they have experienced in practice, rather than abstract information (Grol, et al., 2005). Based on educational theories, strategies to facilitate change should take into consideration individual learning needs, personal motives and people’s unique learning styles. Therefore, strategies for change need to be tailored to the identified needs of learners (Grol et al., 2005).
**Attitudinal theories**

Attitudinal theories focus on the role of attitudes, perceptions and intentions toward the desired performance. The theory of planned behaviour purports that any given behaviour is influenced by the individual’s intention to perform a specific behaviour. Intentions are largely determined by attitudes concerning the behaviour, social norms, and perceived control relative to that behaviour. Attitude toward a specific behaviour is influenced by the expected outcomes of the behaviour and the resultant positive or negative appraisals of these outcomes. The perceived social norms are influenced by the behaviours seen in others and the importance attached to these behaviours. Perceived control and self-efficacy represent the belief that one is capable of and can achieve the desired behaviour change in the given situation (Bandura, 1986; Grol et al., 2005; Malibach & Murphy, 1995).

**Motivation or stages of change theories**

Motivation theories focus on differences in motivation or intention to change between individuals, or on the process of change and the steps individuals need to take to accomplish real change. Such theories suggest individuals need to go through specific phases in their motivation before they can move on to subsequent phases. Each phase requires different strategies for change. Motivation or stage theories categorise individuals according to their level of motivation to change (Grol et al., 2005).

**Transtheoretical Model of Change**

The Transtheoretical Model of Change developed by Prochaska and DiClemente (1983) is based on social cognition theory (NHS Centre for Reviews and Dissemination, 1999). The Transtheoretical Model was designed to integrate principles and processes of change from leading theories of psychotherapy and behaviour change (Prochaska, 2008; Prochaska & Norcross, 1979). The central organising construct of this model is the stages of change (Prochaska, 2008). Change from this perspective is viewed as a process that unfolds over time and involves progress through five stages: Pre-contemplation, Contemplation, Preparation, Action and Maintenance (Levesque, Gelles & Velicer, 2000; Prochaska, 2008; Prochaska & DiClemente, 1983). Table 2.3 below outlines the key features of each of the five stages.
### Table 2.3 Transtheoretical Model stages of change

<table>
<thead>
<tr>
<th>Individual's characteristics at each stage</th>
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<tbody>
<tr>
<td>Precontemplation</td>
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<tr>
<td>• Not motivated or has no plans to change</td>
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<tr>
<td>• Deny they have a problem</td>
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<tr>
<td>• Are resistant to change</td>
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<tr>
<td>• Are uninformed or under informed of the negative consequences of their behaviour</td>
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<tr>
<td>• Believe the consequences are insignificant</td>
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<tr>
<td>• Reading, talking or thinking about proposed new behaviour is avoided</td>
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<tr>
<td>• Have given up the thought of change as they are demoralised</td>
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<tr>
<td>Contemplation</td>
</tr>
<tr>
<td>• Are more likely to recognise the benefits of changing</td>
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<tr>
<td>• Pros and cons of new behaviour considered</td>
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<tr>
<td>• Continue to overestimate the costs of changing</td>
</tr>
<tr>
<td>• Are ambivalent and not quite ready to change</td>
</tr>
<tr>
<td>• Are seriously considering making a change within the next six months</td>
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<tr>
<td>Preparation</td>
</tr>
<tr>
<td>• Have decided to make a change in the immediate future</td>
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<tr>
<td>• Have already begun to take small steps toward the goal</td>
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<tr>
<td>• Generally has a plan of action</td>
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<tr>
<td>Action</td>
</tr>
<tr>
<td>• Has made specific, overt modifications to their behaviour</td>
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<tr>
<td>Maintenance</td>
</tr>
<tr>
<td>• Have been able to sustain change for at least 6 months</td>
</tr>
<tr>
<td>• Are actively striving to prevent relapse</td>
</tr>
<tr>
<td>• Confident of sustaining changes made</td>
</tr>
<tr>
<td>• Lasts until termination when there is negligible chance of relapse</td>
</tr>
</tbody>
</table>

Adapted from (Grol et al., 2005; Levesque, Gelles & Velicer, 2000; Prochaska, 2008).

Several longitudinal studies of change have found that individuals can effectively move through the five stages when modifying behaviour with the help of formal intervention (DiClemente & Prochaska, 1982; Prochaska & DiClemente, 1983). It is important however to be aware that for most people the change process is not linear, but spiral, with several relapses to the earlier stages before individual’s attain permanent behaviour change (Levesque et al., 2000; Prochaska & DiClemente, 1983, Prochaska & DiClemente, 1986). This model has been widely applied to analyse change in a range of areas, for example client health behaviours (Greene, Rossi, Rossi, Velicer, Fava & Prohaska, 1999; Marcus et al., 1998; Prochaska, DiClemente, Velicer & Rossi, 1993; Rakowski et al., 1998), professional practices of university employees (Levesque, Prochaska & Prochaska, 1999), and clinician practice behaviours (Levesque, Prochaska, Prochaska, Dewart, Hamby & Weeks, 2001; Main, Cohen & DiClemente, 1995; Prochaska, 2000). Further, research on a variety of health and professional behaviours has identified strategies and interventions that work best in each stage to facilitate change and minimise resistance (Cohen, Halvorsson & Gosselink, 1994; Levesque et al., 2000; Moulding, Silagy &
Weller, 1999) whilst others have criticised the lack of empirical support for this theory (Bandura, 1997; Weinstein, Rothman & Sutton, 1998).

2.7.4.2 Theories focusing on the social setting
Change theories that focus on the influence of others within the environment usually examine the interaction between an individual and others. For example, key individuals within the setting, such as opinion leaders, peers and clients, participation in social networks, leadership, and culture (Grol et al., 2005).

Social Cognitive Theory
Social cognitive theory or social learning theory is an extension of classic behavioural theories. This theory suggests an individual’s beliefs, attitudes and intentions are important influences in shaping behaviour (Bandura, 1977). Three particular beliefs are important in the adoption of new behaviours and magnitude of change. These beliefs are: 1) perceived barriers weighed against perceived benefits; 2) perceived attitudes of important others; and, 3) the individual’s belief that they are capable or incapable of performing the behaviour (NHS Centre for Reviews and Dissemination, 1999). More specifically, social learning theory explains the behaviour of individuals in terms of personal, behavioural and contextual factors (Grol et al., 2005). Personal factors are those concerned with the skill of the individual to learn by experience and through the observation of others (Grol et al., 2005). Behavioural factors include actually showing the desired performance; and contextual factors are those things in the setting that reinforce performance such as material or non-material rewards of others (Grol et al., 2005). So, interventions that promote self-efficacy, reward, learning from others and time for reflection are thought to best encourage behaviour change (Bandura, 1977; O’Brien, 2001).

Social Influences Theory
The study of social influence has been conducted primarily within the frameworks of the theories of reasoned action (Fishbein & Ajzen, 1975) and planned behaviour (Ajzen, 1985). Social influences theory proposes habit, socially accepted norms, peer opinion and the pressure individual’s perceive they are under from significant others to perform or not perform a behaviour can act as barriers or motivators to change (Mittman, Tonesk & Jacobson, 1992;
National Health and Medical Research Council, 2000; O’Brien, 2001; White, Smith, Terry, Greenslade & McKimmie, 2009). Also, the judgements of peers play a very important role in how an individual perceives and evaluates new information (Mittman et al., 1992; O’Brien, 2001). It has been suggested that a change in practice can be achieved through interaction with, and influence of other people (Grol, 1997; Grol & Grimshaw, 1999). Research however does show that subjective norms often only exert limited influence on an individual’s intentions (White, et al., 2009). Individuals appear to be especially prone to actively opposing being controlled by others (Callister & Wall, 2001; Hekman, Steensma, Bigley & Hereford, 2009; Scott, 1982; Starr, 1982; Zabusky & Barley, 1997). Therefore, the characteristics of an individual’s social environment play a part in promoting and reinforcing the attempted change (Goodpastor & Montoya, 1996; Haines & Donald, 1998). Interventions underpinned by social influences theory should include social support; outreach visits, peer review and use of local opinion leaders (National Health and Medical Research Council, 2000; O’Brien, 2001).

Diffusion of Innovations

The Diffusion of Innovations Model was developed by Rogers (1983). This model is based on the premise that new knowledge of practices (innovations) flow through a social system in a predictable manner as determined by the relationships within the system (Brown & Rodger, 1999). According to this model, an individual that adopts change moves through five key stages. These stages are: 1) knowledge, when the individual is exposed to a new idea; 2) persuasion, when an individual forms an attitude, either positive or negative; 3) decision, when an individual engages in activities that lead to a decision to adopt the innovation or not; 4) implementation, when an individual puts the new idea into practice; and 5) confirmation, when information is sought to reinforce the decision to adopt the innovation (Brown & Rodger, 1999). In the area of evidence-based practice, until recently, the spread of innovation was seen as a linear technical process at the level of the individual and as such was described as changes in the clinicians’ behaviour (Granados et al., 1997; Greenhalgh et al., 2004). Researchers subsequently recognised the implementation of new ways of practice, such as clinical guidelines requires changing the system and organisation as well as the individual (Greenhalgh et al., 2004; Grimshaw et al., 2004). Innovations that have a clear, unambiguous advantage in either effectiveness or cost-effectiveness are more easily adopted and implemented (Dirksen, Ament & Go, 1996;
Greenhalgh et al., 2004; Marshall, 1990; Meyer, Johnson & Ethington, 1997; Rogers, 1995). However, relative advantage alone does not guarantee widespread adoption (Denis, Herbert, Langley, Lozeau & Trottier, 2002; Fitzgerald, Ferlie, Wood & Hawkins, 2002; Grimshaw et al., 2004). It is likely with a model such as this that different interventions would be required to facilitate change at each of the various stages.

**2.7.4.3 Theories focusing on the organisational context**
Organisational theory focuses on the context within which an individual functions (Batalden & Stolz, 1993; Grol, 1997; NHS Centre for Reviews and Dissemination, 1999). The primary emphasis of this theory is on the organisational factors that hinder or facilitate changes in practice (National Health and Medical Research Council, 2000). The environment is viewed as influencing individual behaviour and individuals are seen to modify their environment (Batalden & Stolz, 1993; National Health and Medical Research Council, 2000). Thus, changes in individual practice are believed to be facilitated by appropriate changes to the environment, therefore reinforcing support for environmental changes (National Health and Medical Research Council, 2000). This theory of change provides a useful perspective such that organisational factors can help or hinder change. In addition to this, it is suggested that different people depend on each other to facilitate change within the organisation (Grol & Grimshaw, 1999). Lewin’s Model of Change (1951) was developed as a framework to describe how organisations experience change (Richardson & Droogan, 1999). While this model provides useful insights into the change process, it does not address the notion that in many cases change is an ongoing or continuous process (Keep, 2002). This model has also become unfashionable in the last twenty-five years (Burnes, 2004; Dawson, 1994; Hatch, 1997; Kanter, 1997). Social marketing theory has been adopted in health care to provide a framework to identify factors that drive change (Morris & Clarkson, 2009). Social marketing theory is explicitly focused on behaviour change; it also links problems to solutions and people to their environment. This theory is particularly useful when planning an intervention for change as it addresses the needs of the target group (Grol, 1997; Morris & Clarkson, 2009; O’Brien, 2001). The principles of each of the theories and models described above are brought to life through a range interventions and strategies designed to facilitate change at either the individual level, within the social setting or the organisational context (Grol et al., 2005).
2.8 Strategies that promote change

Interventions, based on the principles of the aforementioned theories, may encourage change in practice habits. These include: educational materials, educational interventions, educational outreach visits, opinion leaders, audit and feedback, reminders, consumer mediated interventions and multi-faceted interventions (Goodpastor & Montoya, 1996; Nutley, et al., 2000; Richardson & Droogan, 1999; Robertson & Jochelson, 2006). A variety of these interventions have been reported to be effective with different professional groups at different times. However, the majority of research reported in this area has focused on changing practice behaviours of doctors and nurses (Alvanzo, Cohen & Nettleman, 2003; Bauchner, Simpson & Chessare, 2001; Grimshaw et al., 2001; Grol, 2002; Smith, 2000). The focus of these studies has been on change in patient management and implementation of evidence-based clinical guidelines (Dicenso, 2003; Ganju, 2003; Grimshaw et al., 2004; Grol & Grimshaw, 2003; Jamtvedt, Young, Kristoffersen, O’Brien & Oxman, 2006; Richens, Rycroft-Malone & Morrell, 2004; Shirley, 2006), drug prescription and preventative health services (Nutley, et al., 2000; Bury, 1998). However, other health professions can benefit from the findings and lessons learnt from these studies (Bury, 1998).

2.8.1 Educational materials

Educational materials such as clinical guidelines, monographs and publications in peer-reviewed journals, audiovisual materials, web publications or educational computer programs are widely used to improve skills, knowledge, behaviour and attitudes and hence change professional practice (Farmer, 2003; National Health and Medical Research Council, 2000; Oxman, Thomson, Davis & Haynes, 1995; Robertson & Jochelson, 2006). Generally educational materials are a familiar concept to clinicians; they are also accessible, inexpensive, and convenient (Robertson & Jochelson, 2006). However, passive dissemination of educational materials, or when they are used in isolation, have been found to be ineffective in behaviour change (Alvanzo et al., 2003; Bauchner et al., 2001; Bero, Grilli, Grimshaw, Harvey, Oxman & Thomson, 1998; Freemantle, 2006; Freemantle, Mason, Haines, & Eccles, 1997; Grimshaw et al., 2004; Grimshaw et al., 2001; Grol, 2002; Grol & Grimshaw, 2003; Wensing & Grol, 2005). These findings were also supported by several systematic reviews (Effective Healthcare Bulletin, 1999; Oxman et al., 1995; Smith, 2000; Thomas, McCool, Cullum, Rousseau & Souter, 1999).
Some studies have found that the use of clinical guidelines can positively influence clinical behaviour change when used in a context conducive to change (Farmer et al., 2003; Grimshaw et al., 2004). It appears that educational materials are more effective when part of a multifaceted behaviour change strategy that includes a number of different interventions (Bauchner et al., 2001; Wensing & Grol, 2005).

2.8.2 Educational interventions

Educational interventions are different types of activities intended to increase the knowledge and skills of a target group in relation to an innovation such as adoption of clinical guidelines (Wensing & Grol, 2005). Traditionally educational interventions are the most common strategy used to facilitate change and improvement in the healthcare setting (Robertson & Jochelson, 2006; Wensing & Grol, 2005). Two forms of educational interventions have been described in the literature. Firstly, large-scale didactic educational interventions include conferences and lectures, where information is relayed to a passive audience (Robertson & Jochelson, 2006; Wensing & Grol, 2005). Secondly, smaller-scale educational interventions include forums such as workshops and training sessions that facilitate active participation in discussion and practical activities and learning (Bero et al., 1998; Oxman et al., 1995; Robertson & Jochelson, 2006). These interventions specifically aim to address gaps in participants’ knowledge and skill (National Health and Medical Research Council, 2000).

A number of studies have explored the effectiveness of educational interventions in changing health professionals’ behaviour. Generally large-scale educational interventions have been found to be ineffective in bringing about behaviour change (Berenholtz & Pronovost, 2003; Davis & Taylor-Vaisey, 1997; O’Brien et al., 2001; Oxman et al., 1995). This is particularly the case when the behaviour sought to be changed is complex; that is, the more complex the behaviour, the less effective the intervention (O’Brien et al., 2001). Several studies have shown that small-scale interactive workshops can result in moderate changes in practice (Bauchner et al., 2001; Berenholtz & Pronovost, 2003; Grol & Grimshaw, 2003; O’Brien et al., 2001; Oxman et al., 1995; Thomson-O’Brien, Freemantle et al., 2003). It is the level of interactivity, and the amount of practice, rehearsal and discussion components of workshops and training sessions that are thought to effect behaviour change (Bauchner et al., 2001; Bero et al., 1998; Robertson &
Jochelson, 2006). However, the optimal length of small-scale educational interventions is still unclear (Bauchner et al., 2001). Whilst small-scale interventions are more successful in effecting behaviour change compared to large-scale educational interventions, they are more expensive to implement and maintain (Berenholtz & Pronovost, 2003; Grol, 2001; Robertson & Jochelson, 2006) and it is also unclear whether short-term changes are sustained long-term (Robertson & Jochelson, 2006).

2.8.3 Educational outreach visits

Educational outreach interventions make use of trained individuals who meet with clinicians in their practice setting (Bury, 1998; Oxman et al., 1995; Roberts & Barber, 2001). During such meetings, the clinician is provided with information (verbal and written) designed to reinforce the desired change. The outreach worker also reinforces behaviour change by providing feedback and a follow-up visit (Bury, 1998; National Health and Medical Research Council, 2000; Richardson & Droogan, 1999; Wensing & Grol, 2005). Educational outreach has been shown to be a promising strategy for modifying professional behaviour, particularly when used in conjunction with other methods such as social marketing (NHS Centre for Reviews and Dissemination, 1999; Oxman et al., 1995; Qureshi, Allen & Hapgood, 2002; Roberts & Barber, 2001; Robertson & Jochelson, 2006; Thomson-O’Brien, Oxman, Davis et al., 2003; Welch, 2002). Feedback and reminders combined with outreach visits have also been found to have a positive effect (Wensing & Grol, 2005). However the effect of outreach visits on complex behaviours is unclear (Grol & Grimshaw, 1999; Robertson & Jochelson, 2006). Further, this intervention is expensive, time consuming and its cost effectiveness is yet to be established (Alvanzo et al., 2003; Bauchner et al., 2001; Robertson & Jochelson, 2006; Wensing & Grol, 2005). The long terms effects of visits are unknown as are the optimal number of visits (Alvanzo et al., 2003; O’Brien et al., 1997; Robertson & Jochelson, 2006). It has also been suggested that it may be the identity of the outreach worker may have an impact on effectiveness (Richens et al., 2004; Robertson & Jochelson, 2006).

2.8.4 Opinion leaders

Opinion leaders are nominated by their colleagues as credible experts who are seen to be educationally influential or authorities in their area practice (Bury, 1998; Roberts & Barber,
Opinion leaders use their respected influence to facilitate behaviour change through role modeling (Goodpastor & Montoya, 1996; Thomson-O’Brien et al, 2003). Opinion leaders, being members of the local community also have an understanding of local conditions, barriers, and available resources. However, research has found that opinion leaders have mixed effects on practice; therefore further research is required to establish the effectiveness of this intervention (Bero et al., 1998; Davis, Thomson, Oxman & Haynes, 2005; Effective Healthcare Bulletin, 1999; Grol & Grimshaw, 2003; O’Brien et al., 1999; Oxman et al., 1995; Thomson-O’Brien et al., 2003). It is also unclear exactly how opinion leaders are identified and in which situations opinion leaders are most effective (Greenhalgh et al., 2004; O’Brien et al., 1999).

2.8.5 Audit and feedback
Clinical audits are used to determine whether best practice is occurring, based on data derived from medical records, databases, patients or observation (National Health and Medical Research Council, 2000; Oxman, et al., 1995; Roberts & Barber, 2001). Audit is used to document performance before, during and after an intervention or change strategy (Wensing, Eccles & Grol, 2005). Data can be collected by internal audit whereby clinicians are actively involved in the process, or by external audit where independent people collect and collate the data (Robertson & Jochelson, 2006). Following audit, feedback is usually given to practitioners to prompt behaviour modification, if feedback indicates current practice is unacceptable (National Health and Medical Research Council, 2000; Jamtvedt, Young, Kristoffersen, Thomson-O’Brien, & Oxman, 2003; Nutley et al, 2000; Richardson & Droogan, 1999). Feedback usually details information on outcomes of care, specific elements of clinical performance, or cost of service provision (Robertson & Jochelson, 2006; Van der Weijden & Grol, 2005). Feedback may be comparative among peers or non-comparative (Van der Weijden & Grol, 2005). Audit and feedback is used to increase insight into specific actions or behaviours (Robertson & Jochelson, 2006). Audit and feedback has been effective in achieving small to moderate improvements in practice (Alvanzo et al., 2003; Bero et al., 1998; Bury, 1998; Freemantle, 2006; Grimshaw et al., 2001; Grimshaw et al., 2004; Grol & Jones, 2000; Grol & Grimshaw, 2003; Jamtvedt et al, 2003; Jamtvedt et al, 2006). Audit and feedback is best targeted in settings where adherence to recommended practice is low (Jamtvedt et al, 2003; Jamtvedt et al, 2006). There are no specific
guidelines regarding how audit and feedback should be implemented, however a Cochrane Systematic Review recommends the format should be based on pragmatic factors and local circumstances (Jamtvedt et al, 2006). The cost effectiveness of the audit and feedback is influenced by the source, volume and format of the data as well as the scale of the project (Robertson & Jochelson, 2006; Van der Weijden & Grol, 2005). Timely feedback is considered most effective (Davis & Taylor-Vaisey, 1997; Jamtvedt et al, 2006; Robertson & Jochelson, 2006; Van der Weijden & Grol, 2005). The person giving feedback should be respected by those receiving it (Robertson & Jochelson, 2006; Van der Weijden & Grol, 2005). Further, the effects of feedback may be larger if clinicians are actively involved in discussion of audit findings; particularly in small groups with their peers (Jamtvedt et al, 2006). However individual feedback may be more effective in situations where individuals do not realise their performance deviates from what is required (Robertson & Jochelson, 2006; Van der Weijden & Grol, 2005). Combining audit and feedback with educational interventions was found to be effective (Wensing & Grol, 2005).

2.8.6 Reminders

Reminders are any intervention that prompts clinician to perform a specific clinical action (Oxman et al., 1995; Richardson & Droogan, 1999; Van der Weijden & Grol, 2005). Reminders can be manual or computerised and include follow-up appointment systems, reminders about screening or preventative services, stickers on charts or posters in the work place (National Health and Medical Research Council, 2000; Oxman et al., 1995; Robertson & Jochelson, 2006; Van der Weijden & Grol, 2005). The purpose of reminder systems is to draw the clinician’s attention to the desired change in practice (Roberts & Barber, 2001). Reminders or decision support systems have been found to be moderately effective in changing practitioners’ behaviour in a variety of areas such as prescribing behaviour, the provision of preventative care, adherence to test ordering guidelines and disease management (Alvanzo et al., 2003; Bauchner et al., 2001; Bero et al., 1998; Bury, 1998; Davis & Taylor-Vaisey, 1997; Dijkstra et al., 2006; Effective Health Care Bulletin, 1999; Grimshaw et al., 2004; Grol & Grimshaw, 2003; Oxman et al., 1995; Richens et al., 2004; Smith, 2000; Thomas et al., 1999; Van der Weijden & Grol, 2005; Wensing et al., 2005). Reminders are thought to be most effective when addressing specific barriers to change (Robertson & Jochelson, 2006). Reminders also appear to have best effect if given at the
time of decision making. Further, more frequent reminders are likely to be more effective. The long term effect of reminders is unknown once reminders are ceased (Robertson & Jochelson, 2006; Smith, 2000; Van der Weijden & Grol, 2005). However some research has noted mixed effects (Alvanzo et al., 2003; Van der Weijden & Grol, 2005). Overall, reminder systems are simple to implement, generally inexpensive and have been shown to be effective for a range of behaviours (Grol & Grimshaw, 1999; NHS Centre for Reviews and Dissemination, 1999; Robertson & Jochelson, 2006).

2.8.7 Local consensus processes
The local consensus process involves clinicians meeting to discuss a clinical problem, developing a plan for managing the problem and taking action (Bury, 1998; Oxman et al., 1995). This process ensures that local health professionals are involved in solving local problems (National Health and Medical Research Council, 2000). Local health professionals are aware of barriers that may not be obvious to outsiders, and thus the issues discussed are relevant to local staff and tailored to their needs (Bury, 1998; National Health and Medical Research Council, 2000). The local consensus process demonstrated a moderate effect on performance when used in a study to generate criteria on optimal care (Putnam & Curry, 1985).

2.8.8 Client/consumer mediated interventions
Consumer-mediated interventions are used to change practice via the consumer (Bero et al., 1998; Oxman et al., 1995; Robertson & Jochelson, 2006). Consumers are provided with information regarding the effectiveness of an intervention, this is then used to influence clinicians practice and ultimately improve their own treatment (Bury, 1998). Examples of consumer-mediated interventions include: direct mailing to consumers, patient counselling delivered by others, media campaigns, and clinical information collected from consumers and given to the practitioner (Grilli, Ramsay & Minozzi, 2002; National Health and Medical Research Council, 2000; Oxman et al., 1995; Van der Weijden & Grol, 2005). Changes in performance have been demonstrated when used in conjunction with other interventions such as educational outreach visits (Bury, 1998; Oxman et al., 1995).
2.8.9 Multifaceted interventions

The most effective interventions to change professional behaviour are multifaceted (Bero et al., 1998; Bury, 1998; Davis & Taylor-Vaisey, 1997; Grimshaw et al., 2001; Grol & Grimshaw, 1999; Grol & Grimshaw, 2003; Oxman et al., 1995). Multifaceted interventions are a combination of two or more interventions. Use of multiple interventions can address barriers at a personal, professional and organisational level at the same time (Grimshaw et al., 2001; Robertson & Jochelson, 2006; Wensing & Grol, 2005). Format, content and type of intervention can be tailored to address specific barriers to change (Robertson & Jochelson, 2006). Use of a combination of interventions can also cater for different learning styles (Bauchner et al., 2001). Any combination of interventions being used to achieve the same goal should increase the likelihood of changing practice (National Health and Medical Research Council, 2000). The effectiveness of a multifaceted intervention is generally determined by the effectiveness of the individual interventions and the interaction between these interventions (Wensing & Grol, 2005). Various combinations have been documented in the literature; however, this variety makes it is difficult to draw generalisable results from research (Wensing & Grol, 2005b). Adding to this, most studies also fail to describe how and why they select different combinations of interventions (Grimshaw et al., 2004). One group of researchers suggest there is no evidence that multifaceted interventions work better than single interventions (Grimshaw et al., 2004; Robertson & Jochelson, 2006). They also find no evidence to support more interventions is better than a few (Grimshaw et al., 2004). However, these researchers acknowledge if multifaceted interventions are tailored to address specific barriers they may be more effective than individual interventions (Grimshaw et al., 2004). Whilst multifaceted interventions may be more effective, they are also more expensive (Robertson & Jochelson, 2006; Wensing & Grol, 2005).

2.9 Interventions used to increase outcome measure use

As previously mentioned, eight interventional studies have been conducted in an effort to increase allied health clinicians’ use of outcome measures. A critique of these studies will be presented, highlighting gaps in the current body of knowledge in this area. The eight studies used a variety of interventions to promote clinician behaviour change, some structured and prescriptive and others were made available for clinicians to access as they chose. Four studies
used multifaceted interventions (Abrams et al., 2006; Cook et al., 2007; Huijbregts et al., 2002; Kay et al., 2001) and the other four studies used single educational interventions (Cleary et al., 2002; Garland et al., 2003; Hefford et al., 2008; Van Peppen et al., 2009). The follow-up period post change intervention for each study has varied in length from three months up to six years. Six of the eight studies used subjective, self-report outcome measures to determine change (Abrams et al., 2006; Cleary et al., 2002; Cook et al., 2007; Garland et al., 2003; Huijbregts et al., 2002; Kay et al., 2001). Two of the eight studies opted for objective clinical file audits as outcome measures (Hefford et al., 2008; Van Peppen et al., 2009). Each of the eight studies will be briefly discussed below in chronological order.

A comparative survey conducted by Kay, Myers and Huijbregts (2001) aimed to examine and compare Canadian physiotherapist’s use of outcome measures from 1992 to 1998. Participants included clinicians (n=69) and professional practice leaders (n=20). In response to the 1992 survey, Health Canada and the Canadian Physiotherapy Association (CPA) commissioned the compilation of a book of rehabilitation measures (Finch et al., 2002). The CPA also conducted a series of introductory outcome measures workshops in nine Canadian cities between 1995 and 1996. Physiotherapists in Canada were encouraged to make use of these resources. Of the 143 physiotherapists surveyed in 1992, 20% identified at least one published instrument. In 1998, 97% of clinicians and 100% of professional practice leaders could identify at least one instrument. Whilst this study clearly demonstrates a greater proportion of physiotherapists surveyed in 1998 could name more outcome measures than those surveyed in 1992, this does not necessarily equate to an increase in the actual use of outcome measures.

A follow up qualitative study was conducted to explore physiotherapists’ perspectives regarding the use of outcome measures in clinical practice (n=42) (Huijbregts et al., 2002). In a demographics questionnaire completed by focus group participants, 80% of participants reported they had attended a conference or workshop on outcome measurement and 95% were familiar with the published book of outcome measures. Five focus groups were conducted ranging from six to 11 participants. Overall clinicians reported being aware of the importance of outcome measurement, but reported using measures in an informal manner to support their intuitive judgments. Time constraints, lack of confidence and insufficient knowledge were reported as
reasons for non-use of standardised measures. This study provides a more in-depth insight into the intervention needs of clinicians to assist them to incorporate outcome measurement into their practice. Findings of this study lend support to clinicians having access to resource personnel to assist them to make decisions about instrument selection, administration, scoring and interpretation of outcome measure results.

An Australian study conducted by Cleary, Jordan and Happell (2002) aimed to increase mental health nurses’ understanding and awareness of the importance of measuring outcomes and participating in outcomes studies. A before and after survey study design was used. Thirty-eight (N=38) nurses attended a one day educational workshop. Participants completed a 22-item self-report survey prior to the workshop, at the end of the workshop and three months after the workshop. The survey contained questions about knowledge regarding processes relating to outcomes and their level of knowledge and confidence when developing and conducting outcome studies. Pre-workshop data indicated 92% of nurses had been involved in quality improvement or research activities in the previous two years; 73% reported they needed help designing an outcomes focused project; and 90% of participants rated their knowledge of outcomes as basic. At the end of the workshop, 33 participants completed the self-report survey; 76% of these participants reported a substantial increase in their knowledge of outcome measurement; 91% reported the workshop had been helpful in relation to designing an outcomes focused project. Sixteen participants completed the final survey, three-quarters of respondents indicated that the information gained from the workshop had been used to inform outcome development in their workplace. Forty-four percent of respondents reported current involvement in quality improvement and research activities. Whilst this study provides some insight into mental health nurses understanding of outcome measurement, many of the survey questions appeared to be quite broad and thus open to misinterpretation. There also appears to be some blending of concepts related to the quality improvement process, health service accreditation mechanisms, outcome measurement and outcomes research. This too may have muddied data collected.

A mixed methods study conducted by Garland, Kruse and Aarons (2003) in North America aimed to explore mental health clinicians’ (counsellors, social workers, psychologists and others)
experiences with and perceptions of the utility, validity and feasibility of standardised outcome measures. Fifty clinicians participated in the study; 30 took part in individual, semi-structured interviews; 20 were involved in one of three focus group interviews; and all 50 participants completed a self-report questionnaire. All mental health clinicians in this study had attended a 4-hour training session on the use and interpretation of a state mandated mental health measure. Findings of this study revealed standardised outcome measures were the least frequently reported means of evaluating intervention effectiveness. Most clinicians reported using subjective reports from the client and their own intuition. Interestingly, 92% of participants stated they had never used the scores of the mandated measures in their clinical practice. Many participants expressed ideological opposition to outcome measurement; they believed outcome measures were not clinically useful. Others reported difficulty interpreting outcome measure scores, despite having received written guidelines for interpretation at the workshop. Those who reported difficulty in this area stated that they had not used the reference material provided to aid in scoring and interpretation. This study shows that ideological barriers to outcome measurement may be the most difficult to address and overcome; but they are critically important if successful adoption of standardised outcome measures is to take place.

An Australian study conducted by Abrams, Davidson, Harrick, Harcourt, Zylinski and Clancy (2006) assessed the use of standardised measures by physiotherapists over a six month period, following the implementation of strategies to improve outcome measurement. Implementation strategies included: adoption of a national position statement by the Australian Physiotherapy Association on treatment justification that restated the professional requirement to measure outcomes using valid and reliable instruments; a series of lectures and education seminars offered by the Australian Physiotherapy Association and the Transport Accident Commission on outcome measurement; access to educational material in both hard copy and electronic formats which included a range of standardised questionnaires; and peer support. This study was a longitudinal, postal survey. The survey was designed to collect information on the type and frequency of use of outcome measures. Physiotherapy providers to the Transport Accident Commission participated in the study. One hundred and fifty four (n=154) participants completed the first survey in March 2003. One hundred and sixty four (n=164) participants completed the second survey in September 2003. Findings suggest the percentage of participants
using outcome measures reportedly increased from 30% in March to 60% in September. There was a statistically significant ($p < 0.05$) increase in the reported use of seven outcome measures and a significant reduction in the perception of barriers to outcome measurement. Whilst these findings are based on self-report data, they do show a trend toward more objective measurement practices of physiotherapists and a positive influence of a multifaceted initiative to increase outcome measure use. It should also be noted; payment by the Transport Accident Commission to clinicians providing services to clients is now contingent on their use of outcome measures. It is likely, therefore, that this change to payment conditions has contributed to the increase in use of outcome measures in the study population.

A similar study was conducted with occupational therapists in Australia and funded by a Motor Accidents Authority (MAA) grant. The aim of the study was to develop and determine the effect of a one-day workshop, resource package of nine ready to use valid and reliable outcome measures and a four-month email and telephone follow-up support program on the use of outcome measures by occupational therapists in New South Wales. A secondary aim of the study was to determine factors that contributed to successful implementation of outcome measures in practice. The study targeted occupational therapists working in the area of injury management. A total of 37 volunteers participated in this study. This before and after study measured participants’ use of outcome measures at baseline (a seven page, self-report questionnaire) and again at four months after the workshop. At baseline 65.7% of participants reported use of outcome measures, compared to 91.4% of participants at four months post workshop, a statistically significant finding. The range of outcome measures used by participants increased from 15 measures pre-intervention to 18 measures post-intervention. At four months post workshop, all nine outcome measures were being used by some of the participants. Participants’ reasons for not using outcome measures prior to the workshop included: limited knowledge and skill and a perceived lack of occupational therapy measures. Participant’s reasons for not using outcome measures post workshop were: a high number of clients that required assessment only as opposed to intervention, outcome measures not being relevant to their clients at that particular time and a lack of information on interpreting the results of outcome measures. Participants identified four key factors they believed helped to effect change: participation in workshop discussions (89%); workshop presentations (86%); resource package of outcome measures
(86%); and workshop practical sessions (74%). This study provides a good starting point for further research. This study clearly presents the development and testing of a multifaceted intervention targeting specific barriers to outcome measurement. Findings show a positive trend toward the intervention increasing clinicians’ outcome measure use, but the small sample size and use of a self-report measure mean these results must be interpreted with caution.

A pilot study conducted by Hefford, Lodge, Elliot and Haxby (2008) in New Zealand aimed to determine whether it was feasible to measure, capture and report on outcomes across four university physiotherapy clinics in a simple and meaningful way. Clinic staff and students were asked to administer two standardised outcome measures, the Patient Specific Functional Scale (PSFS) and the Numerical Pain Rating Scale (NPRS) to all new clients at the initial assessment and at discharge during a three-month period. The study took place in 2005. An observational audit was conducted to determine compliance, relative change scores on the two outcome measures and the number of interventions provided for particular conditions. Four hundred and ten (N=410) clients were seen during the three-month period. The compliance rate for complete data at both baseline and follow-up was 70% (n=213). Overall the mean improvement in client function as measured by the PSFS was 71% (SD 12%) and the mean pain reduction was 75% (SD 9%). The mean number of interventions was 3.7 (SD 0.25). These findings suggesting that it is feasible to measure and report on outcomes across clinical settings in a meaningful way. This study provides useful information about how to improve efficiency of data collection. The researchers suggested to increase compliance, data collection forms must be simple and well designed; appropriate education provided to clinicians and students about the importance of measuring outcomes; and implement use of reminders in the workplace.

Finally, a study conducted in the Netherlands by Van Peppen, Schuurmans, Stutterheim, Lindeman and Van Meeteren (2009) aimed to evaluate the influence of tutor expertise on the uptake of an educational program intended to promote use of outcome measures with clients with stroke. A pilot randomised controlled trial was undertaken. Thirty (N=30) physiotherapists participated in the trial. Participants were randomised to two groups. Both groups attended five two-hour educational workshops over a 14-week period on outcome measurement. Group one was taught by a tutor experienced in stroke management, group two was taught by an in-
experienced tutor. The primary outcome of this study was actual outcome measure use. Secondary outcomes included self-reported use of outcome measures. Data was collected via client file audit and a 7-item self-report questionnaire. Actual use of outcome measures changed from a median of 3 to 6 in the expert tutor group, and from 3 to 4 in the non-expert tutor group ($p=.07$). At baseline, participants self reported they used a median of 4 out of 7 outcome measures. Post intervention, participants in the expert group reported an increase in outcome measure use to 6 out of 7. Participants in the non-expert group reported an increase in outcome measure use post intervention to 4 out of 7. Results of this study indicate tutor expertise does not influence actual use of outcome measures; however, this study should be replicated with a larger sample, ensuring the study is adequately powered so effect of tutor expertise can be determined. This study also highlights the potential biases of self-report data as physiotherapists tended to overestimate their self-reported use of outcome measures. This over estimation may have been caused by their tendency to give socially desirable answers, because recommendations in clinical practice guidelines and ethical professional requirements imply they are expected to use outcome measures.

**Summary**

Overall, these intervention studies have made a valuable contribution to the body of knowledge in this area. Each study has made an attempt to explore and address specific barriers to clinicians’ measurement of outcomes in practice. The lessons learned from each study will better equip clinicians and researchers to move forward and develop successful strategies to promote the routine use of outcome measures. It should be noted however, that some studies did not appear to systematically assess or “diagnose” clinicians’ barriers to outcome measurement prior to development or implementation of their intervention to facilitate change. Many studies also failed to present a rationale for their choice of intervention; and how this intervention would specifically address barriers to outcome measurement. Further, many authors provided a superficial description of the intervention, making replication for future programs or studies difficult. Finally, the use of quasi-experimental research designs and heavy reliance on self-report data means findings from these studies must be interpreted with caution and viewed conservatively.
2.10 Planning, implementing and evaluating a multifaceted intervention

There are a number of important issues that need to be addressed when planning, implementing and evaluating multifaceted education programs for adults. Firstly, adult learning theory should underpin the method of instruction. Adult learning theories generally describe the unique features attributed to adult learning and are helpful in implementing education programs designed to effect change (Engel, Blackwell & Miniard, 1990). Secondly, since the primary purpose of education is to produce change in the knowledge, skill, and behaviours of both individuals and groups (Knowles, Holton, & Swanson, 2005), the process of change must also be addressed. Models and theories are useful in guiding the implementation and evaluation of education programs. Theoretical models provide a basis for selecting methods of instruction (Engel et al., 1990) and understanding the complexities of the change process (NHS Centre for Reviews and Dissemination, 1999). Each of these will be outlined in turn.

2.10.1 Adult learning theory

Learning theory can be used to explain how human behaviour is changed and maintained. The basic premise of learning theory is that change is driven by internal motivation for competence (Fox, Mazmanian & Putnam, 1989; Grol, 1997). Thus, in order to effect change, individuals must be motivated to change (Fox et al., 1989; National Health and Medical Research Council, 2000; NHS Centre for Reviews and Dissemination, 1999). The probability of individuals taking on new behaviours tends to increase if the behaviour is followed by positive consequences, and decrease if followed by negative consequences (NHS Centre for Reviews and Dissemination, 1999). In addition to this, active participation of the individual in the change process is more likely to produce positive change. Therefore, interventions to facilitate change that are based on learning theory incorporate active participation of the learner and focus on stimulating personal motivation Grol, 1997; National Health and Medical Research Council, 2000). Examples of these interventions include interactive educational workshops, audit and feedback and local consensus processes (Grol & Grimshaw, 1999; Haines & Donald, 1998). A vast number of learning theories have been developed to assist in the design and implementation of education programs (Javis, 1995). Andragogy is defined as the art and science of teaching adults (Forrest & Peterson, 2006), as opposed to pedagogy, a model for teaching children. The theoretical underpinnings of andragogy emerged in the literature in the late 1960s and enhanced the efforts
to create a conceptual framework of adult learning. The theory was popularized by Malcolm Knowles who developed the andragogical model (Knowles, 1968).

2.10.2 Andragogy

The andragogical model offers a set of assumptions and core principles of adult learning. These core principles of adult learning are believed to enable those planning and implementing education programs to design effective learning processes for adults (Holton, Swanson, & Naquin, 2001). The core principles of adult learning are summarized in table 2.4. Over the past three decades, several expositions of the theory of andragogy and its implications for selecting effective methods of instruction have been presented in the literature (Knowles, 1970, 1973, 1984; Knowles, Holton, & Swanson, 1998; Knowles et al., 2005). Further to this, the application of the andragogical model has been cited in various disciplines including nursing education (Burnard, 1989), continuing medical education (Shannon, 2003), management education (Forrest & Peterson, 2006) and allied health education (McCluskey & Cusick, 2002). Despite the fact that andragogy has been widely adopted as a key theoretical underpinning in selecting methods of instruction in adult learning situations, a number of key criticisms of the theory has emerged in the literature.

The first of these key criticisms is that the andragogical assumptions claim to fit all adult learning situations and do not take into account the contextual differences in each learning transaction or the heterogeneous nature of adults (Darbyshire, 1993). Another key criticism is that the assumptions have never been empirically tested and therefore it is uncertain that these can apply to all adult learners (Shannon, 2003). Finally, andragogy has appeared in the literature as an elusive and commonly misinterpreted concept due to the fact that it lacks an operational definition (Rachal, 2002). The Andragogy in Practice Model developed by Knowles, Holton and Swanson (1998) addresses many of the criticisms cited in the literature. Following will be an outline of the Andragogy in Practice Model. The rationale for selecting the model as a key theoretical underpinning of this study will also be highlighted.
### Table 2.4 Andragogy core adult learning principles

<table>
<thead>
<tr>
<th>Core Adult Learning Principle</th>
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</thead>
<tbody>
<tr>
<td>1. Learner’s need to know</td>
</tr>
<tr>
<td>• Why</td>
</tr>
<tr>
<td>• What</td>
</tr>
<tr>
<td>• How</td>
</tr>
<tr>
<td><strong>Assumption:</strong></td>
</tr>
<tr>
<td>• Adults need to know why they need to learn something before undertaking to learn it.</td>
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<table>
<thead>
<tr>
<th>2. Self concept of the learner</th>
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</thead>
<tbody>
<tr>
<td>• Autonomous</td>
</tr>
<tr>
<td>• Self-directing</td>
</tr>
<tr>
<td><strong>Assumptions:</strong></td>
</tr>
<tr>
<td>• Adults have a self-concept of being responsible for their own decisions.</td>
</tr>
<tr>
<td>• Adults develop a psychological need to be seen and treated by others as being capable of self-direction.</td>
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</table>

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<tr>
<th>3. Prior life experience of the learner</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Resource</td>
</tr>
<tr>
<td>• Mental models</td>
</tr>
<tr>
<td><strong>Assumptions:</strong></td>
</tr>
<tr>
<td>• Adults come into an educational activity with both a greater volume and a different quality of experience by virtue of simply having lived longer.</td>
</tr>
<tr>
<td>• Adults will be heterogeneous in terms of background, learning style, motivation, needs, interests and goals.</td>
</tr>
<tr>
<td>• The richest resources for learning reside in the adult learners themselves.</td>
</tr>
<tr>
<td>• By accumulating experiences, adults tend to develop mental habits and biases that tend to close their minds to new ideas.</td>
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<tr>
<th>4. Readiness to learn</th>
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<tbody>
<tr>
<td>• Life related</td>
</tr>
<tr>
<td>• Developmental task</td>
</tr>
<tr>
<td><strong>Assumptions:</strong></td>
</tr>
<tr>
<td>• Adults become ready to learn those things they need to know and be able to do to cope effectively with their real-life situations.</td>
</tr>
<tr>
<td>• An especially rich source of “readiness to learn” is the developmental tasks associated with moving from one developmental stage to the next.</td>
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<tr>
<th>5. Orientation to learning</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Problem centred</td>
</tr>
<tr>
<td>• Contextual</td>
</tr>
<tr>
<td><strong>Assumptions:</strong></td>
</tr>
<tr>
<td>• Adults are life-centred in their orientation to learning.</td>
</tr>
<tr>
<td>• Adults are motivated to learn to the extent that they perceive learning will help them perform tasks or deal with problems that they confront in their life situations.</td>
</tr>
</tbody>
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<tr>
<th>6. Motivation to learn</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Intrinsic value</td>
</tr>
<tr>
<td>• Personal payoff</td>
</tr>
<tr>
<td><strong>Assumptions:</strong></td>
</tr>
<tr>
<td>• Adults are responsive to some external motivations.</td>
</tr>
<tr>
<td>• The most potent motivators are internal pressures.</td>
</tr>
</tbody>
</table>

*Adapted from (Knowles et al., 2005).*
2.10.3 Andragogy in Practice Model

The Andragogy in Practice Model is a transactional model of adult learning (Brookfield, 1986; Holton et al., 2001; Knowles et al., 2005). The model is therefore applicable to any adult learning situation or transaction. The Andragogy in Practice Model conceptually separates the goals and purposes of learning from the core andragogical principles of the learning transaction and explicitly accounts for individual and situational differences in the learning situation (Holton et al., 2001). As seen in Figure 2.1, the three rings of the model interact, allowing the model to offer a three dimensional process for understanding adult learning situations. These include: 1) the goals and purposes of learning (outer ring of the model); 2) individual and situational differences (middle ring of the model); and 3) andragogy’s core adult learning principles (Holton et al., 2001). Furthermore, the model recognises the lack of homogeneity among learners and learning situations, and illustrates that the learning transaction is a multifaceted activity (Holton et al., 2001). Therefore, the Andragogy in Practice Model has been selected as a key theoretical underpinning of this study as it provides a systematic framework of factors that should be considered when determining which andragogical principles are realistic when designing, implementing and evaluating an education program.
2.11 Research problem and study rationale
In a health care environment where increasing emphasis is being placed on evidence-based practice, outcome measurement is viewed as a fundamental component of the intervention process. Clinicians must measure outcomes, using valid and reliable measures. Clinicians need to demonstrate to themselves, clients and managers that the magnitude of change achieved through their intervention is clinically important and justifies cost and other resources involved. However measuring outcomes is a complex task. Whilst the importance and benefits of measuring outcomes have been clearly established, allied health clinicians still are not routinely measuring outcomes as part of their daily practice. Lack of knowledge and skill, resistance to change and
entrenched practice behaviours continue to be key barriers. Currently, it is also unclear whether clinicians are “ready to change” their outcome measurement behaviours and overcome perceived barriers. At present, there is no systematic or standardised means of assessing clinician readiness to change. Further, there are no specific methods or guidelines to ensure best fit of intervention strategies relative to clinicians’ needs in terms of readiness and overcoming barriers. As such, the task of carefully matching of strategies and interventions to level of readiness or barriers to change either does not occur, or it occurs in an ad hoc fashion. Further, there is limited evidence available regarding the best strategies and interventions to promote change in clinicians’ outcome measurement behaviours.

2.11.1 Rationale for study 1

The purpose of the first study was to develop and test the psychometric properties of an instrument to assess clinicians’ readiness to measure outcomes. This instrument was based on the Transtheoretical Model’s stages of change, a model which has been shown to be robust in its ability to explain and facilitate change across a broad range of health behaviours (Greene et al., 1999; Marcus et al., 1998; Prochaska et al., 1993; Rakowski et al., 1998). More recently the model has been applied to changing professional practices among university employees (Levesque et al., 1999); mental health workers (Prochaska, 2000); and physicians (Levesque et al., 2001; Main et al., 1995). Further, the Transtheoretical Model encapsulates the complex nature of change. That is, change is non-linear, change occurs slowly, and maintenance of behaviour change takes time. In addition to this, the model considers an individual’s motivation, attitudes, beliefs, and behaviours, as well as provides a time frame for achievement of behaviour change. Knowledge of clinicians’ readiness to change outcome measurement behaviours gained from this instrument was used to inform study 2. An understanding of clinician readiness underpinned the design of a multifaceted change intervention, selection of instructional methods and choice of educational content. Evaluation of the effectiveness of this multifaceted change intervention is discussed below.

2.11.2 Rationale for study 2

It is acknowledged that multifaceted interventions are believed to be the most effective strategy to change professional behaviours (Bero et al., 1998; Bury, 1998; Davis & Taylor-Vaisey, 1997;
Grimshaw et al., 2001; Grol & Grimshaw, 1999; Grol & Grimshaw, 2003; Oxman et al., 1995). However, in 2005 at the commencement of this study, there was limited high quality research evidence to demonstrate the effectiveness of such interventional strategies to facilitate clinicians’ use of outcome measures (Grimshaw et al., 2004). Previous intervention studies employed quasi-experimental designs and relied solely on self-report data to establish effectiveness of strategies used (Abrams et al., 2006; Cook et al., 2007; Huijbregts et al., 2002; Kay et al., 2001). As such, the purpose of study two was to develop and test the effectiveness of a multifaceted educational intervention that specifically addressed issues of clinicians’ readiness to change, and perceived barriers to outcome measurement. Previous studies have identified lack of knowledge and skill as a major barrier to outcome measure use. Furthermore, findings from a before and after study suggested that a brief educational intervention, with printed educational material and follow-up support could increase the percentage of clinicians using outcome measures from 65.7% to 91.4% in a period of 4 months (Cook et al., 2007), albeit based on self-report data. Prior to development of the educational intervention, readiness and barriers were systematically assessed via two self-report surveys (the Clinician Readiness to Measure Outcomes Scale and the Outcome Measurement Questionnaire). Clinicians’ learning needs in relation to the steps in the outcome measurement process were also identified using the Outcome Measurement Questionnaire. A multifaceted educational intervention, based on the principles of the Andragogy in Practice Model was developed. A randomised controlled trial was used to assess the effectiveness of this intervention to promote change in clinicians’ outcome measurement behaviours as randomised controlled trials are considered to be evidence of the highest grade (Concato, Shah & Horwitz, 2000). An objective clinical file audit was used as the primary outcome measure for this study in combination with the two subjective, self-report outcome secondary measures in an effort to provide a more accurate picture of allied health clinicians’ outcome measurement behaviours in practice.

2.12 Synopsis

This chapter presented a critique of the literature on allied health clinicians’ use of outcome measures in practice. The importance of outcome measure use in an evidence-based health care context has been discussed. Clinicians’ readiness to change their current outcome measurement behaviors, and
their perception of barriers to outcome measurement was presented as factors to be addressed if change efforts are to be successful. Strategies and interventions that promote use of outcome measures have been presented, with specific emphasis on the need to rigorously evaluate the effectiveness of these strategies. Chapter 3 will describe study 1, the development and psychometric testing of the Clinician Readiness for Measuring Outcomes Scale (CReMOS).
Chapter Three

Development and Psychometric Testing of the Clinician Readiness for Measuring Outcomes Scale (CReMOS)

This study has been published as:

3.1 Introduction

As previously established, allied health professionals are expected to demonstrate the outcomes of their intervention. Despite a number of relevant outcome measures being available allied health professionals do not routinely use outcome measures in practice (Beattie, 2001; Kay et al., 2001; Mayo et al., 1993). As outlined in Chapter 2, a number of perceived barriers are believed to cause this lack of routine engagement in outcome measurement. Barriers include: lack of knowledge, skill, time, and motivation, low self-confidence and absence of support from management; and personal values and beliefs (Bowman, 2006; Bowman & Llewellyn, 2002; Finch et al., 2002; Mayo et al., 1993). Strategies and interventions are needed to change clinicians’ attitudes and habits and require a shift from inconsistent, subjective client evaluation, to more routine, objective evaluation. Such changes in practice will be difficult for most clinicians, and will involve change at a personal and organisational level. Change is a gradual process. Individuals often need to move through several stages before new attitudes and behaviours are adopted and maintained. There is growing recognition that the success of interventions (such as educational programs) may depend in part on individual readiness to change (Armstrong, Reyburn, & Jones, 1996; Cantillon & Jones, 1999; Davis et al., 1995;
Levesque, Prochaska, Prochaska, Dewart, Hamby, & Weeks, 2001). An understanding of clinicians’ readiness to change may help educators to tailor education programs to suit clinicians’ differing needs.

3.2 Aims
The aims of this study were to:

1) Develop a self-report survey instrument, the Clinician Readiness for Measuring Outcomes Scale (CReMOS) able to quantify allied health clinicians’ readiness for measuring outcomes (see Appendix B), and

2) Establish content and construct validity, and test internal consistency and temporal reliability (or stability) of the CReMOS.

3.3 Methods
Application of established principles of instrument construction were employed in the development of the CReMOS (American Educational Research Association, 1985, 1999; Cohen & Swerdlik, 2005; Comrey, 1998; Jackson, 1970, 1971). The process of instrument development occurred in four stages: 1) instrument conceptualisation, 2) instrument construction, 3) instrument analysis and 4) instrument revision. Development and psychometric testing of the CReMOS were conducted between September 2005 and August 2006.

3.3.1 Instrument conceptualisation
In 2005 at the commencement of this study, there was no published instrument available to measure clinicians’ readiness for measuring outcomes. The Clinician Readiness for Measuring Outcomes Scale (CReMOS) was developed to address this research gap. The conceptualisation of the CReMOS was based on the Transtheoretical Model of Change (Prochaska & DiClemente, 1983), key steps in the outcome measurement process and barriers to outcome measurement in clinical practice.
As established in chapter 2, for the past 25 years the Transtheoretical Model of Change has been used to describe and explain human behavior change in a wide variety of areas. This model has previously been used to explain clinicians’ readiness for, and response to change in practice behaviours such as program planning and outcome measurement (Parker & Parikh, 2001) continuous quality improvement (Levesque et al., 2001) and organisational change in general (Prochaska, Prochaska & Levesque, 2001). The Transtheoretical Model of Change (Prochaska & DiClemente, 1983) proposes that individuals move through five stages when considering and implementing behaviour change. These stages are: Pre-contemplation, Contemplation, Preparation, Action and Maintenance (Levesque et al., 2000; Prochaska & DiClemente, 1983). Figure 3.1 outlines the key features of each stage. These five stages are the central organising construct of the Transtheoretical Model of Change.

**Figure 3.1. Transtheoretical Model stages of change**

<table>
<thead>
<tr>
<th>Individual’s characteristics at each stage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Precontemplation</strong></td>
</tr>
<tr>
<td>• Not motivated or has no plans to change</td>
</tr>
<tr>
<td>• Deny they have a problem</td>
</tr>
<tr>
<td>• Are resistant to change</td>
</tr>
<tr>
<td>• Are uninformed or under informed of the negative consequences of their behaviour</td>
</tr>
<tr>
<td>• Believe the consequences are insignificant</td>
</tr>
<tr>
<td>• Reading, talking or thinking about proposed new behaviour is avoided</td>
</tr>
<tr>
<td>• Have given up the thought of change as they are demoralised</td>
</tr>
<tr>
<td><strong>Contemplation</strong></td>
</tr>
<tr>
<td>• Are more likely to recognise the benefits of changing</td>
</tr>
<tr>
<td>• Pros and cons of new behaviour considered</td>
</tr>
<tr>
<td>• Continue to overestimate the costs of changing</td>
</tr>
<tr>
<td>• Are ambivalent and not quite ready to change</td>
</tr>
<tr>
<td>• Are seriously considering making a change within the next six months</td>
</tr>
<tr>
<td><strong>Preparation</strong></td>
</tr>
<tr>
<td>• Have decided to make a change in the immediate future</td>
</tr>
<tr>
<td>• Have already begun to take small steps toward the goal</td>
</tr>
<tr>
<td>• Generally has a plan of action</td>
</tr>
<tr>
<td><strong>Action</strong></td>
</tr>
<tr>
<td>• Has made specific, overt modifications to their behaviour</td>
</tr>
<tr>
<td><strong>Maintenance</strong></td>
</tr>
<tr>
<td>• Have been able to sustain change for at least 6 months</td>
</tr>
<tr>
<td>• Are actively striving to prevent relapse</td>
</tr>
<tr>
<td>• Confident of sustaining changes made</td>
</tr>
<tr>
<td>• Lasts until termination when there is negligible chance of relapse</td>
</tr>
</tbody>
</table>

Adapted from Grol et al., 2005; Levesque, Gelles & Velicer, 2000; Prochaska, 2008.
An in-depth analysis of literature was used to systematically identify the steps in the outcome measurement process and barriers to engaging in outcome measurement. Literature searched included textbooks, scholarly journals, reference lists of book chapters and journal articles and Internet websites. This broad search approach was used to increase the validity and reliability of findings. The steps in the outcome measurement process (Table 2.1) and barriers to outcome measurement (Table 2.2) were described in detail in Chapter 2.

3.3.2 Instrument construction

3.3.2.1 Type of instrument
The CReMOS was designed as a criterion referenced instrument. Criterion referenced instruments are used to compare examinees’ accomplishments to a pre-determined standard (Gregory, 2007), and no comparison is made to other individuals. Criterion referenced instruments focus on what the examinee can do rather than on comparisons to the performance levels of others. As a criterion referenced instrument, a total item score will be used to indicate how ready clinicians are to measure outcomes as part of their clinical practice.

3.3.2.2 Scaling method
The purpose of developing an objective measurement instrument such as the CReMOS was so that numbers could be assigned to responses so the examinee could be judged to have more or less of the trait being measured (Cohen & Swerdlik, 2005; Gregory, 2007). In this instance, the author wanted to develop a test that would determine whether allied health clinicians were more or less ready to measure outcomes in clinical practice. With this in mind, a Likert scale was selected as the best method suited to measurement of the trait (Cohen & Swerdlik, 2005; Gregory, 2007).

3.3.2.3 Likert scale
The Likert scale (1932) is a simple, straightforward and generally reliable method for scaling attitudes such as “readiness” and is widely used by researchers and instrument developers (Cohen & Swerdlik, 2005; Gregory, 2007). A Likert scale presents the
examinee with five to seven responses ordered on a continuum from strongly agree to strongly disagree (for example, see Figure 3.2) and results in ordinal level data (Cohen & Swerdlik, 2005). Depending on wording of individual items, an extreme answer of “strongly agree” or “strongly disagree” will indicate the most favorable response on the underlying attitude being measured by the instrument (Gregory, 2007).

**Figure 3.2. Example Likert scale**

<table>
<thead>
<tr>
<th>Strongly agree</th>
<th>Agree</th>
<th>Undecided</th>
<th>Disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
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</table>

A six point Likert scale was used ranging from “strongly agree” to “strongly disagree”. This format was used to avoid mid scale or “fence sitting” responses such as “neutral”. A score of 6 was assigned to the extreme positive response and a score of 1 was assigned to the extreme negative response and scores of 2, 3, 4 and 5 for the intermediate responses. The total scale score for the CReMOS can be obtained by adding scores from individual items on the scale; as such the CReMOS is a summative scale (Gregory, 2007). An adapted matrix style presentation of the Likert scale was used to enhance clarity (see Figure 3.3) (de Vaus, 1995).

**Figure 3.3. CReMOS Likert Scale**

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Mildly agree</th>
<th>Mildly disagree</th>
<th>Disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
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</tr>
</tbody>
</table>

### 3.3.2.4 Instrument domains

“Clinicians’ readiness to measure outcomes” was the focal construct for this instrument. From the outset, the Transtheoretical Model stages of change (Prochaska & DiClemente, 1983), steps in the outcome measurement process and barriers to outcome measurement (Bowman & Llewellyn, 2002; Cook et al., 2007; Finch et al., 2002; Skeat & Perry, 2008; Unsworth, 2000) were used as theoretical and empirical support for construction of this
instrument. The five stages of change were selected as the domains for this instrument. The five domains are: 1) Pre-contemplation; 2) Contemplation; 3) Preparation; 4) Action; and 5) Maintenance (see Appendix B, CREMOS instrument domains and related items). Steps in the outcome measurement process and barriers to outcome measurement need to be expressed in terms of the stages of change.

3.3.2.5 Constructing items
The five domains of the CREMOS provided the structure for item development and categorisation. Items were designed to correspond to features of content expressed in individual domains, that is, the specific features of each of the stages of change. Steps in the outcome measurement process and barriers that were most commonly reported in the literature were prioritised for inclusion in items (see Appendix B, CREMOS instrument domains and related items). A potential item universe was mapped out according to the five stages of change (CREMOS domains), the six steps in the outcome measurement process and key barriers to outcome measurement. Mapping assisted in item generation of sufficient breadth, quality and quantity (Comrey, 1988; Domholdt, 2000; Haynes, Richard & Kubay, 1995).

3.3.2.6 Wording of items
Items were carefully worded to ensure clarity (American Educational Research Association, 1985, 1999; Cohen & Swerdlik, 2005; Comrey, 1988; Gregory, 2007; Jackson, 1970, 1971). Items were constructed in a straightforward way, using appropriate language to avoid vagueness, ambivalence, and digressions of everyday speech (Czaja & Blair, 2005). Items were short and to the point. Approximately one third of the 30 questionnaire items (n=9, 30%) were written in a negative direction to control for participant response sets (de Vaus, 1995).

3.3.2.7 Instrument structure and format
Thirty items were selected for inclusion on the basis of clarity of expression, perceived lack of redundancy with other items, and the degree to which items conceptually represented the five domains or stages of change. Six items represented each of the five
stage domains. Item order was determined using Microsoft Excel’s random number function to “spread” items in order to avoid an acquiescent response set. Layout of the CReMOS was clear and un-cluttered to encourage respondents to complete the questionnaire (de Vaus, 1995; Jolliffe, 1987). Simple instructions were placed at the top of the questionnaire, outlining the purpose, the number of items, and the estimated time to complete the questionnaire. Questions were printed on one side of the paper only to avoid questions being missed (see 30-item CReMOS in Appendix B) (de Vaus, 1995; Frazer & Lawley, 2000).

3.3.3 Instrument analysis
Comprehensive testing of the CReMOS involved five studies: 1) content validity testing; 2) construct validity testing; 3) internal consistency reliability testing; 4) temporal reliability testing; and 5) predictive validity testing. Participants were formally qualified allied health professionals. All participants were involved in the provision of clinical services to clients, and worked in Australia. Ethical approval was obtained from the relevant university HREC 06/030 and industry partner human research ethics committees prior to testing. Informed consent was gained from all study participants.

3.3.3.1 Study 1: Content validity testing process
Content validity refers to the extent to which an instrument has an appropriate sample of items for the construct being measured (Kaplan, Bush, & Berry, 1976; Polit & Beck, 2006; Tilden, Nelson, & May, 1990). Content validation must occur before any other psychometric testing can begin as it verifies the relevance and comprehensiveness of the instrument (Haynes, et al., 1995; Streiner & Norman, 2003). Furthermore, instruments that have recognised content validity generally require fewer revisions in the evaluative stage of instrument development (Rubio, Berg-Weger, Tebb, Lee, & Rauch, 2003). Content validity testing of the CReMOS was conducted according to published procedures (Clemson, Fitzgerald & Heard, 1999; Haynes et al., 1995; Lynn, 1986; Rubio, Berg-Wegner, Tebb, Lee, & Rauch, 2003; Waltz & Bausell, 1981). The aim was to ensure that instrument content was relevant and thoroughly represented the concepts and
characteristics of readiness to change, use of outcome measures in practice (steps in the outcome measurement process), and the barriers to outcome measurement.

Content validity testing is an evaluation of an instrument’s domains and items (Domholdt, 2005; Law, 1987; Tilden, et al., 1990). The content validity process consisted of five steps:

1) Selection of an expert panel and recruitment
2) Development of a content validity package
3) Content validity testing
4) Analysis of results
5) Refinement of the CReMOS

Selection and recruitment of an expert panel
There is no specific criterion or objective measure for determining whether an instrument is content valid (Wynd, Schmidt, & Atkins Schaefer, 2003). Content validity is determined by the subjective judgment of experts about the degree of relevance of constructs in an instrument (Ghiselli, 1964; Nunnally & Bernstein, 1994). The panel must consist of persons with expertise, qualifications and training specific to the area being measured in order to be able to make judgements regarding the aptness of the instrument (Grant & Davis, 1997). There is no consensus among authors regarding number of content experts necessary for a panel. A minimum of five experts in the field is recommended to judge the content domains of an instrument (Law, 1987; Lynn, 1986; Rubio, et al., 2003; Wynd, et al., 2003). The current study aimed to recruit a minimum of five experts.

Inclusion criteria
Clinicians, academics and researchers were invited to form the expert panel. To be eligible, the experts needed to fulfil all of the following criterion: 1) hold professional qualifications in allied health fields including Occupational Therapy, Physiotherapy, Speech Pathology, Psychology, Social Work and Podiatry, 2) be actively engaged in outcome measurement in their professional field, 3) have published literature on outcome
measurement and/or evidence-based practice, 4) have presented at conferences on outcome measurement and/or evidence-based practice and, 5) have conducted outcome measurement and evidence-based practice workshops locally, nationally or internationally.

**Recruitment strategy**

Potential participants were identified using the specified inclusion criteria. Initial contact was made via email to prospective participants (N=17). The email explained to potential study participants that they had been identified as an expert in the field of outcome measurement and as such were invited to partake in the testing of a newly developed instrument (see Appendix C). Participants were asked to send a return email to the author, indicating their willingness to be involved in the study. Participants who agreed to be involved in the content validity testing process were asked to complete the content validity package (CVP), which was attached to the original email, and return it by email to the author. Consent was obtained by participants’ acceptance of the invitation, and return of the completed the CVP. The author was the only person with access to completed CVPs, ensuring the confidentiality of the participant’s opinions.

**The content validity package**

A content validity package was developed for testing of the CReMOS. The CVP provided an introduction to the study, background to the development of the instrument, its purpose, the importance of assessing content validity of a newly developed instrument and the role of the expert in the content validity process. The CVP included details of the three tasks participants were required to complete. The tasks included:

1) Assessment of CReMOS domains
2) Assessment of CReMOS items
3) Global critique of the CReMOS

**Content validity testing**

Panel members were instructed to assess structural elements of the instrument such as item content and wording, and the overall comprehensiveness of the instrument (Grant &
The evaluation of each of these structural elements addresses whether the individual items in the instrument adequately represent the content domain (Grant & Davis, 1997). Participants were required to assess the relevance of CReMOS items to the constructs of the Transtheoretical Model’s stages of change in relation to steps in the outcome measurement process and barriers to outcome measurement. Relevance was assessed using a four-point Likert scale. A Likert scale was selected as it is one of the most commonly used methods to measure the strength of agreement or disagreement (Hicks, 2004). The Likert scale provided a means of measuring the attitudes of the expert panel members in an objective and quantifiable way, as it allows assignment of numbers to differing opinions (Hicks, 2004). Panel members were asked to view CReMOS items and select a response on the Likert scale that reflected how relevant they believed the item was to clinician measurement of outcomes in clinical practice (Portney & Watkins, 2009). Figure 3.4 illustrates the Likert scale used to rate CReMOS items. The degree of relevance of CReMOS items was rated using a 4 point Likert scale. Each response was assigned a point value; a score of ‘4’ indicated the highest achievable score and ‘1’ indicated the lowest; allocating values to responses assisted in the calculation of the CVI scores (Wynd, et al., 2003).

**Figure 3.4. Rating the degree of relevance of CReMOS items**

<table>
<thead>
<tr>
<th>Scale</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>4. Essential</td>
<td>Item is essential and must be included in the CReMOS</td>
</tr>
<tr>
<td>3. Important</td>
<td>Item is important and should be included in the CReMOS</td>
</tr>
<tr>
<td>2. Marginally relevant</td>
<td>Item is marginally relevant and does not need to be included in the CReMOS</td>
</tr>
<tr>
<td>1. Not relevant</td>
<td>Item is not relevant and should not be included in the CReMOS</td>
</tr>
</tbody>
</table>

(Adapted from Clemson, Fitzgerald & Heard, 1999; Ebel, 1979)

A disadvantage of using a Likert scale is that it limits expert’s responses to only one of four options and does not allow for the expansion of ideas (Hicks, 2004). To overcome this weakness, space was provided on the rating forms for experts to offer comments. Experts therefore had the opportunity to comment on several issues such as the wording,
relevance and meaning of items within the instrument. Experts were also asked to suggest revisions for instrument items that were not representative of the instrument domains including steps in the outcome measurement process and barriers to outcome measurement. The experts were also asked to comment if they believed anything was lacking and should be included in the CReMOS (Clemson et al., 1999).

**Analysis of expert feedback**

Content validity for both the individual items and the overall instrument was quantitatively ascertained using the Content Validity Index (CVI) (Lynn, 1986; Polit & Beck, 2006). The criterion used to validate items and the instrument as a whole was the degree of relevance of items to clinicians’ readiness to measure outcomes (Clemson et al., 1999; Imle & Atwood, 1988; Tilden et al., 1990). Percentage agreement for each item was established using the Content Validity Index (CVI) which measures the proportion of items judged to be content valid (Waltz & Bausell, 1981). Standard error of proportion was used to correct for chance agreement. Overall, a CVI of 0.78 at 0.05 level of significance was considered to demonstrate acceptable content validity (Lynn, 1986). The CVI of an entire instrument is typically calculated by averaging the CVI for each item (Rubio et al., 2003). Items were accepted or deleted based on the level of agreement between experts. Despite its wide use, the CVI has been criticised by authors who argue that the chance of random agreement between the experts is high and therefore a CVI score is not an accurate indication of content validity (Lynn, 1986; Wynd, et al., 2003). This limitation however can be minimised by utilising a minimum of five experts for the assessment (Lynn, 1986). As such, 17 experts were invited to participate in the study to increase the accuracy of the CVI.

Qualitative feedback received from individual experts was collated by the author and returned to the panel to provide opportunity for review of accuracy and further comment or feedback (Haynes et al., 1995; Clemson et al., 1999). The second round of qualitative feedback were again collated and analysed to identify problems with wording or meaning, and redundancy or relevance of items. Initial refinements to the CReMOS were based on finding of the content validity testing process.
Psychometric testing of the CReMOS

Snowball sampling was used to recruit participants for studies two to five. Snowball sampling is useful when many participants are required or when the population of interest is difficult to reach (Portney & Watkins, 2009). To be eligible to take part in studies two to five, participants had to meet the following inclusion criteria: 1) have recognized qualifications (diploma, undergraduate or postgraduate degree) in an allied health field; 2) provide direct clinical intervention or service to clients; and 3) be of working age (18 years or older). Both males and females were eligible to participate. Allied health clinicians were excluded if they were not working in a clinical position. Sampling was carried out in two stages. In the first stage, potential participants (who met the eligibility criteria) were identified by the author and invited by email to take part in the study (see Appendix D). The second stage required those identified in the first stage to forward the email to others who met the required eligibility (Portney & Watkins, 2009). This process was continued until an acceptable sample size was reached. Sample size is discussed in the next section in relation to construct validity testing. A limitation of the snowball technique is that it impossible to determine the amount of people that received the survey and therefore a response rate is unable to be established (Streiner & Norman, 2003). The CReMOS was made available to participants as an email attachment. Return of completed surveys to the author either as an email attachment, via facsimile or by post was accepted as consent to participate in the study. Additional participants were recruited from The Spastic Centre of New South Wales, Sydney, Australia. These allied health clinicians had consented to participate in the randomised controlled trial, presented in chapter four, which evaluated the educational program to increase outcome measure use.

3.3.3.2 Study 2: Construct validity testing

Construct validity is defined as the extent to which a instrument measures a theoretical construct or trait (Anastasi & Urbina, 1997). Evaluation of construct validity occurs when a researcher compares results using the target measure with expected results based on theory. If instrument results do not conform to theory, it is usually assumed that the measure rather than the theory is flawed (de Vaus, 1995). Construct validity testing can
be conducted using Classical Test Theory or using more contemporary approaches such as Item Response Theory or Rasch Analysis.

**Classical Test Theory**

There is a large body of research and supporting theoretical assumptions that guide the development of valid and reliable testing instruments. Classical Test Theory (CTT) has been the basis for test development throughout most of the twentieth century (Feldt & Brennan, 1989; Gregory, 2007; Gulliksen, 1950; Kline, 1986; Lord & Novick, 1968; Spearman, 1904). CTT is based on the premise that test scores result from the influence of two factors: those that contribute to consistency, and those that contribute to inconsistency. Factors that contribute to consistency are the entirely stable attributes of the individual that the examiner is wanting to measure. Factors that contribute to inconsistency include characteristics of the individual, test or situation, that have nothing to do with the attribute being measured, but affect test scores (Gregory, 2007). It is assumed that once a test has been developed, the instrument undergo psychometric testing to ascertain its ability to measure what it is supposed to (Schultz & Whitney, 2004). CTT is used by researchers to understand and improve the reliability of tests. Further, CTT provides researchers with important information about the amount of error in test scores and influence of test length on reliability and validity (Hambleton, 2000). CTT is also used assess item difficult and applicability to all test-takers independent of previous knowledge and/or ability (Schultz & Whitney, 2004). CTT provides a detailed understanding of how test scores are used as descriptors of examinee ability across a range of areas (Hambleton, 2000).

Factor analysis provides an empirical test of construct validity of an instrument (Gandek & Ware, 1998; Nunnally & Bernstein, 1994). There are two discrete classes of factor analysis: exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) (Kline, 2002; Thompson, 2004). In EFA, whilst the researcher may have expectations regarding the number of underlying constructs or factors, EFA does not require the researcher to declare these expectations, nor is the analysis influenced by these expectations (Kline, 2002; Thompson, 2004). The aim of EFA is to explore or discover
the main constructs within the data (Kline, 2002). EFA was therefore used in the initial item selection phase (Conway & Huffcutt, 2003). Clearly, EFA is an essential first step in the investigation of complex areas of human psychology such as readiness to change (Kline, 2002). Confirmatory factor analysis (CFA) was used to validate the proposed structure of the CReMOS. Using CFA it is possible to test hypotheses (Kline, 2002; Thompson, 2004). In CFA, based on previous studies or relevant theory, factor loadings for variables are hypothesised. CFA proceeds to fit these loadings into a target matrix as closely as possible. Goodness of fit is also measured using this technique (Kline, 2002).

Exploratory factor analysis was conducted using SPSS 13.0, to assist in the final selection of items for the CReMOS. Data from a pilot sample of 45 participants’ attending one of two workshops on outcome measurement were used for this purpose. A Maximum Likelihood solution with Direct Oblimin and Kaiser normalisation was generated. Maximum Likelihood with Direct Oblimin attempts to extract the smallest number of correlated factors that account for the largest amount of variance. A precedent cut-off of 0.3 was specified for acceptable factor loadings, and items with a loading of 0.3 or above were retained (Chou, Boldy & Lee, 2003; Deary, Hepburn, MacLeod & Frier, 1993). Exploratory factor analysis was also conducted on data from 396 participants to explore the structure of the data and suggest a model for further testing with CFA.

To conduct confirmatory factor analysis, Amos 5.0 was used. Confirmatory factor analysis is a theory-testing model, whereas exploratory factor analysis is a theory-generating method. In this study, it was hypothesised that the CReMOS data would contain five factors derived from the Transtheoretical Model’s five Stages of Change (Prochaska & DiClemente, 1983). Using this model, the author also specified the variables which were hypothesised to be correlated with certain factors and identified which factors were correlated (Stevens, 1996).

Fit statistics test how well competing models fit the data. The most common index is the $\chi^2$ statistic. Significant $\chi^2$ values reflect deviation between the implied and observed covariance matrices, indicating a poor fit to the data. A root mean square error of
approximation (RMSEA) of “about 0.05 or less” is typically regarded to indicate a close fit to the model in relation to degrees of freedom (Browne & Cudeck, 1992; Browne & Cudeck, 1993). It is also recommended when evaluating model fit that a range of incremental indices are reported (Marsh, Balla & McDonald, 1988; Hoyle, 1995). The most common incremental indices reported include the Goodness-of-Fit Index (GFI) (Joreskog & Sorbom, 1989; Stapleton, 1997), Tucker-Lewis Index (TLI) and the Comparative Fit Index (CFI) (Bentler, 1990), 0.90 is widely accepted as a reasonable minimum value which these indices must exceed to indicate satisfactory fit between the model and the data from which it is estimated (Chou, Boldy & Lee, 2002; Yamamura, Takehira, Kawada, Katayama, Nishizawa & Hirano, 2005). There is no universal agreement regarding which indices should be reported in the assessment of CFA models. Therefore the author will report a range of indices in assessing fit of the CFA models presented.

**Item Response Theory**

Item response theory (IRT) (Lord, 1980) is a rival model to CTT and some authors believe it is slowly replacing CTT as a basis for test development (Cohen & Swerdlik, 2005; Gregory, 2007). IRT is also known as latent-trait theory, the latent-trait model and the Rasch model (Embretson, 1996; Gregory, 2007; Hambelton, Swaminathan & Rogers 1991; Lord & Novick, 1968; Rasch, 1960). Latent traits are variables such as knowledge, abilities, or personality traits that are not directly measurable (Cohen & Swerdlik, 2005; Tennant, McKenna & Hagell, 2004). An estimate of the amount of the trait is obtained through tests. Presumably all items on a test measure the trait of interest. However, most outcome measures used in health care are ordinal in nature, thus precluding arithmetic operations (Svensson, 2001; Tennant et al., 2004). These measures give a “manifest score” of the trait or construct being measured. Consequently, most outcomes are expressed as ordinal manifest scores, indicating some rank on a perceived underlying latent trait. Although there is a substantial body of non-parametric statistics to analyse such information, the importance of the calculation of change scores in clinical trial analysis and attributes of measurement such as effect size (Kaziz, Anderson & Meenan, 1989; Tennant et al., 2004) which require normally distributed interval level
measurement gives urgency to achieving a quality of measurement that will sustain arithmetic operations (Tennant et al., 2004). The Rasch model is a unidimensional model that has two main assertions: 1) that the easier the item is, the more likely it will be passed; and 2) the more able the person, the more likely they will pass an item compared to a less able person (Tennant et al., 2004). The foundational elements of IRT include item response functions (IRFs), information functions, and the assumption of invariance (Gregory, 2007; Reise, Ainsworth & Haviland, 2005). The Rasch model offers a way to model the probability that a person with X ability will perform at a level of Y (Bond & Fox, 2007; Cohen & Swerdlik, 2005).

CReMOS raw scores for each participant underwent Rasch analysis using Winsteps Version 3.61 (Linacre, 2006). The latent trait in this instance is the person’s readiness to measure outcomes. Readiness to measure outcomes is considered latent as it is unable to be directly observed. Readiness to measure outcomes is assumed to manifest itself through a set of observable behaviours. For instance, a person’s readiness to measure outcomes is considered to be high if they engage in behaviours consistent with the six steps in the outcome process as described in Chapter 2. These behaviours are measured on the polytomous Likert scale (1 to 6) of the CReMOS. Rasch analysis allows testing of “how much” of the latent trait can be inferred from these observed behaviours. The amount of trait is conventionally referred to as the participant’s ability, whilst the amount of trait represented by a given item (or a score on that item) is referred to as item difficulty. Fit statistics from each participant and item show how well data from participants responding to CReMOS items meet the assumptions of the Rasch model (Clemson, Bundy, Cumming, Kay & Luckett, 2008). The following psychometric properties of the CReMOS were examined using statistics derived from the Rasch analysis:

1) Item fit and item difficulty. Examination of individual item fit and difficulty was undertaken to determine consistency with assumptions of the Rasch model (Bond & Fox, 2007). Two aspects of fit are examined: item infit and item outfit and are expressed as mean square and standardised statistics (Bond & Fox, 2007;
Infit statistics give more weight to the performances of persons closer to the item value. It is assumed persons whose ability is close to the item’s difficulty provide more insight into that item’s performance. Outfit statistics are not weighted and are more sensitive to the influence of outlying scores. Mean square fit statistics between 0.5 and 1.5 are indicative of acceptable fit with concomitant Z scores between -2 and 2 (Bond & Fox, 2007; Clemson et al., 2008). Item difficulty was calculated, as was each individual participant’s ability. Item difficulty and participant ability are expressed in logit units and are presented on a hierarchy map (Bond & Fox, 2007; Wright & Masters, 1982). More positive (higher) persons are more able, and more positive items (higher) are more difficult. Conventionally a 0 logit score is assigned to the mean item difficulty (Bond & Fox, 2007).

2) **Category function analysis.** Category function analysis was used to establish whether the CReMOS rating scale was being used in the expected manner by participants. The following criteria were applied assess this parameter: a) at least 10 counts per category; b) even distribution of the use of categories; c) monotonic increase in average measures across the rating scale categories (structure calibrations); d) category outfit statistics less than 2; e) threshold differences higher than 1.4 logits and less than 5 logits. Categories were collapsed based on these guidelines (Franchignoni, Ferriero, Giordano, Guglielmi & Picco, 2007; Linacre, 1999).

3) **Reliability.** Reliability was evaluated in terms of separation (Bond & Fox, 2007; Franchignoni et al., 2007). Separation is the ratio of the true spread of measures with their measurement error (Bond & Fox, 2007; Franchignoni et al., 2007; Wright & Masters, 1982). The item separation index gives an estimation of the spread of items along the measurement continuum; the person separation index gives an index of the spread of persons along the measurement continuum. A separation of 2.0 is considered good (Wright & Masters, 1982). A minimum of
three levels of separation are preferred (Clemson et al., 2008; Franchignoni et al., 2007).

4) **Unidimensionality.** An unrotated principal component factor analysis (PCA) of residuals was conducted to confirm unidimensionality of the CReMOS. For the CReMOS to be considered unidimensional, a small number of factors must explain most of the variance (70% or more). The presence of only a small number of factors demonstrates the scale is not dominated by more than one construct and thus has a solid internal structure. Eigenvalues less than three were expected (Clemson et al., 2008; Franchignoni et al., 2007).

**Use of both Classical Test Theory and Item Response Theory**
This study used both Classical Test Theory and Item Response Theory methods to assess construct validity of the CReMOS. These complementary methods provide information that is useful in the construction of a robust instrument. Within CTT, the standard error of measurement is assumed to be a constant that applies to all examinee scores regardless of the ability level of a particular respondent. However, within IRT the standard error of measurement becomes substantially larger at both extremes of ability. That is, the IRT model concludes that test scores are more reliable for individuals of average ability and increasingly less reliable for people with very high or low ability (Gregory, 2007). In CTT, it is assumed that longer tests are more reliable than shorter tests. However, when IRT models are used, shorter tests can be found to be more reliable than longer tests, especially when there is a good match between item difficulty and level of proficiency of the examinee (Gregory, 2007). A good fit between these parameters allows for a reliable estimate of ability using a smaller number of items (Gregory, 2007). As such, a combination of these methods was used to develop a short, yet psychometrically sound instrument capable of quantifying clinician readiness to measure outcomes.

**3.3.3.3 Study 3: Internal consistency reliability**
Internal consistency is defined as the extent to which sub-parts of an instrument measure the same attribute or dimension, and represents an index of an instrument’s reliability
Internal consistency is a measure of homogeneity (Anastasi & Urbina, 1997) and is usually measured using Cronbach’s alpha, which indicates how well a set of items measures a single unidimensional latent construct (Anastasi & Urbina, 1997; Polit et al., 2001). Since the CReMOS was an assembly of interrelated items designed to quantify readiness to measure outcomes, it was important to know whether all items consistently measured the same construct. For the purposes of this study, alpha ≥ 0.6 was considered acceptable for the composite (total) score of the CReMOS as a self report instrument (Nunnally & Bernstein, 1994). Data from the 396 participants were used to test internal consistency reliability. Underlying theoretical constructs suggested a positive correlation should be expected between all items; therefore one-tailed tests for significance were used. Standard error of measurement (SEM) was also calculated on the overall instrument score to provide an estimate of reliability, independent of the group on which it was computed (Anastasi & Urbina, 1997).

3.3.3.4 Study 4: Temporal reliability (or stability)

Temporal reliability measures the extent to which an instrument provides equivalent scores over time in the sense of “ordering” individuals consistently (Hartmann, 2005). Test-retest correlations are used to determine the stability of a trait or behaviour. Temporal stability is negatively correlated with the length of time between assessments (Hartmann, 2005). The simplest way to assess the stability of instrument scores is to re-administer the test to the same respondents on two separate occasions. The reliability coefficient (r_{tt}) is the correlation between scores obtained by the respondents on the two administrations of the instrument. The error variance corresponds to the random fluctuations of one test session to the other. Retest reliability demonstrates the extent to which scores on a instrument can be generalised over different occasions. Generally, the higher the reliability, the less susceptible the scores are to random daily changes in the condition of the test takers or the testing environment (Anastasi & Urbina, 1997). When retest reliability is reported, the time interval between test occasions should be specified (Anastasi & Urbina, 1997).
Temporal reliability (or stability) of the CReMOS was established using a group of 70 allied health clinicians with a one month retest interval. Participants originally recruited using snowball sampling via email were invited to participate. Of the 122 participants who agreed to be involved, 70 (57%) returned retest surveys. The intraclass correlation coefficient derived from a mixed model (ICC 3,1) was used to compute an average correlation between the two instrument administrations (Portney & Watkins, 2007). For the purposes of this study, ICC 0.81 was considered as evidence of acceptable test retest reliability for a criterion-referenced assessment (Hopkins, 2000).

3.3.3.5 Study 5: Predictive validity testing
Predictive validity is used to establish whether a measure will be a valid predictor of some future criterion score (Portney & Watkins, 2007). In this case, testing was used to determine whether CReMOS scores were a valid predictor of clinicians’ use of outcome measures. Outcome measure use was then quantified through clinical file audit (refer to chapter 4). Spearman’s Rho was used to determine the predictive validity of the CReMOS at 3 months post intervention, the primary endpoint. A correlation coefficient of 0.70 represents an acceptable level of validity, and 0.90 or higher represents excellent predictive validity (Portney & Watkins, 2007).

3.4 Results
3.4.1 Study 1: Content validity testing
Ten allied health clinicians and researchers participated in content validity testing. All were considered experts in their field. The disciplines of occupational therapy, physiotherapy, speech pathology, social work, psychology and podiatry were represented (see participant demographic details in Table 3.1).
Table 3.1. Expert panel demographic details

<table>
<thead>
<tr>
<th>Expert no.</th>
<th>Profession/Role</th>
<th>Highest Qualification</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Occupational Therapist</td>
<td>PhD</td>
</tr>
<tr>
<td>2</td>
<td>Occupational Therapist</td>
<td>Masters</td>
</tr>
<tr>
<td>3</td>
<td>Speech pathologist</td>
<td>Bachelor</td>
</tr>
<tr>
<td>4</td>
<td>Physiotherapist</td>
<td>PhD</td>
</tr>
<tr>
<td>5</td>
<td>Physiotherapist</td>
<td>Masters by research</td>
</tr>
<tr>
<td>6</td>
<td>Social Worker</td>
<td>Masters</td>
</tr>
<tr>
<td>7</td>
<td>Counsellor</td>
<td>Post graduate diploma</td>
</tr>
<tr>
<td>8</td>
<td>Psychologist</td>
<td>PhD</td>
</tr>
<tr>
<td>9</td>
<td>Psychologist</td>
<td>Masters</td>
</tr>
<tr>
<td>10</td>
<td>Podiatrist</td>
<td>Bachelor</td>
</tr>
</tbody>
</table>

* 1 = Academic, 2 = Clinician

CVI scores were calculated by determining the proportion of items given a score of three or four by all raters (Waltz & Bausell, 1981). Twenty items on the CReMOS were given a score of 3 or 4 by all 10 raters. Seven items were given a score of 3 or 4 by nine out of the 10 raters. Three items were given a score of 3 or 4 by eight out of the 10 raters. See Table 3.2. All 30 items of the CReMOS were scored as having a CVI of 0.80, \( p=0.05 \) or above. The CVI of the entire CReMOS instrument was 0.96.

All 30-items of the CReMOS had a CVI over 0.80, therefore all items were retained. Minor modifications were made to the wording of five items (8, 10, 19, 21, 30), based on the experts' opinions (Yaghmaie, 2003). Minor wording changes were made to six of the 30 CReMOS items (items 9, 15, 16, 18, 21, and 30) in response to the second round of feedback from the expert panel. Overall, the expert reviewers' responses were similar in nature, with no noteworthy variance. The CReMOS was, therefore, thoroughly critiqued and refined as part of the content validity testing process (Clemson et al., 1999; Imle & Atwood, 1988; Tilden et al., 1990).
Table 3.2. Content Validity Index (CVI) related to relevance of CReMOS items

<table>
<thead>
<tr>
<th>Item</th>
<th>CVI of individual items</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1.0</td>
</tr>
<tr>
<td>2</td>
<td>1.0</td>
</tr>
<tr>
<td>3</td>
<td>1.0</td>
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<tr>
<td>4</td>
<td>1.0</td>
</tr>
<tr>
<td>5</td>
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<td>6</td>
<td>0.9</td>
</tr>
<tr>
<td>7</td>
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<tr>
<td>8</td>
<td>0.9</td>
</tr>
<tr>
<td>9</td>
<td>0.9</td>
</tr>
<tr>
<td>10</td>
<td>0.9</td>
</tr>
<tr>
<td>11</td>
<td>1.0</td>
</tr>
<tr>
<td>12</td>
<td>1.0</td>
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<tr>
<td>13</td>
<td>1.0</td>
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<td>14</td>
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<td>15</td>
<td>1.0</td>
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<tr>
<td>16</td>
<td>1.0</td>
</tr>
<tr>
<td>17</td>
<td>1.0</td>
</tr>
<tr>
<td>18</td>
<td>0.9</td>
</tr>
<tr>
<td>19</td>
<td>0.8</td>
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<tr>
<td>20</td>
<td>1.0</td>
</tr>
<tr>
<td>21</td>
<td>0.8</td>
</tr>
<tr>
<td>22</td>
<td>0.9</td>
</tr>
<tr>
<td>23</td>
<td>1.0</td>
</tr>
<tr>
<td>24</td>
<td>1.0</td>
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<tr>
<td>25</td>
<td>1.0</td>
</tr>
<tr>
<td>26</td>
<td>1.0</td>
</tr>
<tr>
<td>27</td>
<td>0.9</td>
</tr>
<tr>
<td>28</td>
<td>1.0</td>
</tr>
<tr>
<td>29</td>
<td>1.0</td>
</tr>
<tr>
<td>30</td>
<td>0.8</td>
</tr>
</tbody>
</table>

3.4.2 Study 2: Construct validity testing

For the purposes of establishing construct validity of the CReMOS, the desired sample size (n=300) was calculated based on 10 cases per variable (Bryant & Yarnold, 1995). First, 271 participants were recruited within Australia, using an email snowball sampling method. Second, 125 participants were recruited from the Spastic Centre of NSW.
Overall, a total of 396 participants were recruited (90.2% female; 9.8% male). Nine allied health professional groups were represented, with occupational therapists representing 57% of the sample, followed by physiotherapists (15%) and then speech pathologists (12%). These three groups accounted for 84% of the sample. Other groups represented include psychologists (6%), social workers, welfare workers and counsellors (4%), other non specified allied health professionals (4%) and podiatrists (2%). This inequality in representation of the various professional groups will impact upon generalisability of results. The majority had qualified with an undergraduate degree (75.3%), with 24.7% of participants having a postgraduate qualification. The majority of participants also had more than five years clinical experience (67.2%), with only 9.3% having less than one year of clinical experience. Data from these participants was also used to establish internal consistency reliability and predictive validity.

3.4.2.1 Classical Test Theory

The results of the EFA (Maximum likelihood solution with direct oblimin rotation and Kaiser normalisation) are presented in Table 3.3. The initial EFA solution generated in the absence of a priori factor specification, produced a five factor solution for these data, which is consistent with the five stages of change described (Prochaska & DiClemente, 1982). However, 12 items load on factor one, four items on factor two, eight items on factor three, four items on factor four, and only two items on factor five. In addition, cross loadings on the EFA suggest that several items (1, 10, 12, 13 and 26) have elements in common which require further investigation. It should be noted that the instrument was designed so that six items would load on each factor.
3.4.2.2 Confirmatory factor analysis

Initially a five factor theoretical model was tested to reflect the five stages of change and the model generated by the EFA. However, a Maximum Likelihood solution for this model provided poor fit to the data ($\chi^2 = 988.348$, $df = 379$, $p < 0.01$, $\chi^2/df = 2.608$, GFI = 0.855, RMSEA = 0.64 (0.059, 0.069), TLI = 0.890, CFI = 0.904) (see Figure 3.5).
There was no rationale to run a four factor solution for this data (i.e., no theoretical precedence within the literature and no statistical rationale); the data did not suggest any two factors were more correlated than the others.

A three factor model was then proposed combining the pre-contemplation and contemplation factors ($r=0.86$), and the preparation and action factors ($r=0.96$), leaving
the maintenance factor unchanged. The decision to combine factors was based on high
between factor correlations, indicating the presence of single factors and the fact that
other empirical studies have presented a three factor model (Miller & Tonigan, 1996).
However when this model was tested, it also provided a poor fit to the data ($\chi^2$
$=1105.515$, $df = 386$, $p < 0.01$, $\chi^2/df = 2.864$, GFI = 0.845, RMSEA = 0.069 (0.064,
0.073), TLI = 0.873, CFI = 0.887).

A two factor model\(^1\) was then proposed combining the maintenance factor with the
preparation/action factor, again due to a high correlation between factors ($r=0.94$). At this
point four items with low loadings (< 0.3) were dropped (items 13, 16, 18 and 28).
Modification indices suggested that model fit could be improved by correlating error
terms (see Figure 3.6). This model yielded satisfactory fit statistics ($\chi^2 = 527.529$, $df =
280$, $p < 0.001$, $\chi^2/df = 1.884$, GFI = 0.905, RMSEA = 0.048 (0.042, 0.055), TLI = 0.941,
CFI = 0.955). A moderate correlation was observed between the two factors ($r=0.57$)
suggesting these factors share approximately 32% ($R^2 = 32.49$) of the variance.

\(^1\) The two factor model presented in this chapter has undergone further refinement since publication in the
Journal of Evaluation in Clinical Practice.
Figure 3.6. Confirmatory factor analysis – CReMOS two factor model

\( \chi^2 = 527.529, \, df = 280, \, p < 0.001, \, \chi^2/df = 1.884, \, \text{GFI} = 0.905, \, \text{RMSEA} = 0.048 \ (0.042, \ 0.055), \, \text{TLI} = 0.947, \, \text{CFI} = 0.955 \).

A single factor model was also tested as the most parsimonious option. However, this model provided poor fit to the data \( \chi^2 = 1428.602, \, df = 389, \, p < 0.01, \, \chi^2/df = 3.672, \, \text{GFI} = 0.756, \, \text{RMSEA} = 0.082 \ (0.078, \ 0.087), \, \text{TLI} = 0.818, \, \text{CFI} = 0.837 \).
3.4.2.3 Item Response Theory

Item fit and item difficulty

The hierarchy map of participants and items (Figure 3.7) demonstrated redundancy within the scale, with a number of items at the same level of difficulty (that is, items 8, 13, 18, 20, 25, 27 were all at the same level of difficulty and did not differentiate between participants; as were items 1, 4, 11, 16, 17, 22, 29; items 12 and 28; and items 2 and 30). Twenty five of the 30 CReMOS items fitted the construct that the scale was intended to measure (Mean Square between 0.5 and 1.5). Items 13, 16, 18, 28 and 30 were misfitting and/or redundant so were dropped (see Table 3.4).

Figure 3.7. Hierarchy map of participant ability and difficulty of items

More ready | Less commonly observed outcome measurement behaviours

90 + (Difficult items with which to agree)

80

70 # T

60 # S

50 M I0012 10028

40 . + I0006

30 .

Less ready | More commonly observed outcome measurement behaviours

(Mean items with which to agree)

M mean; S standard deviation; T two standard deviations
# equivalent to 4 persons; . less than 4 persons
### Table 3.4. Misfitting and/or redundant items

<table>
<thead>
<tr>
<th>Item Number</th>
<th>Item</th>
<th>Infit MnSq (ZStd)</th>
<th>Outfit MnSq (ZStd)</th>
<th>Point Biserial Correlation Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>13</td>
<td><em>I am measuring and reporting some client outcomes, but there are still times when I am tempted not to bother</em></td>
<td>1.93 (9.9)</td>
<td>2.35 (9.9)</td>
<td>0.07</td>
</tr>
<tr>
<td>16</td>
<td><em>I can see the point of measuring outcomes, but I don’t know how to get started</em></td>
<td>3.06 (9.9)</td>
<td>4.18 (9.9)</td>
<td>0.54</td>
</tr>
<tr>
<td>18</td>
<td><em>Outcome measures don’t capture the small changes I see with my clients</em></td>
<td>1.39 (6.0)</td>
<td>1.58 (8.1)</td>
<td>0.21</td>
</tr>
<tr>
<td>28</td>
<td><em>My clinical caseload is so heavy I don’t have time to measure outcomes</em></td>
<td>1.11 (1.7)</td>
<td>1.13 (2.0)</td>
<td>0.40</td>
</tr>
<tr>
<td>30</td>
<td><em>Measuring outcomes would be good if it didn’t mean spending time doing extra paperwork</em></td>
<td>1.19 (3.2)</td>
<td>1.27 (4.1)</td>
<td>0.39</td>
</tr>
</tbody>
</table>

### 3.4.2.4 Category function analysis

Rating scale diagnostics showed levels 3 and 4 of the 6 level rating scale (1-6 points) of the CReMOS did not comply with the criteria for category functioning (Figure 3.8A). Preset criteria were met by combining levels 3 (“mildly disagree”) and 4 (“mildly agree”) into a single category, so obtaining a new 5 level rating scale (0-4 points).
As shown in Figure 3.8A and B, the y-axis represents the probability (0 to 1) of responding to one of the rating categories and the x-axis represents the different performance values (participant ability minus the item difficulty) in logits. The “0” curve declines as the participant’s ability increases; the crossing point (where 0 and 1 are equally probable) is the first “threshold”. The same applies for the other curves. The plot should look like a range of hills as shown in Figure 3.8B, each with an “emerging” top. It can be seen from Figure 3.8A that the probability of using category 3, is never higher than that of adjacent ratings. Conversely in Figure 3.8B, it can be seen that the probability of selecting each of the five revised rating scales (0-4) is now a clear function of the level of ability shown by the participant in the x-axis. Correspondingly, the “thresholds” are ordered as expected (e.g., a greater ability is required when the most likely response is 1 rather than 0, 2 rather than 1 and so on).

### 3.4.2.5 Reliability

The person separation index indicates the extent that the measure separates individuals into different levels of ability. The model expectation is three or more (Bond & Fox, 2007; Linacre, 1999). The person separation index for the final CReMOS (25-item scale) was 3.78 (separation reliability = 0.93).
3.4.2.6 Unidimensionality

To examine dimensionality, a principal component analysis (PCA) of residuals was conducted on the refined CReMOS. The empirical variance was acceptable at 77.5%. The unexplained variance in the first contrast had an eigenvalue of 3.6, which exceeded an acceptable value of 3, indicating that the index had sub-dimensions. The first contrast distinguished items 5, 21, 6, 15, 3, 29, 9, 14, 26 against items 22, 11, 20, 24, 7, 17, 10, 8, 12, 25, 4, 19, 27, 2, 23 (See table 3.5). These findings are consistent with the subscales proposed by confirmatory factor analysis of the CReMOS.

Table 3.5. Contrast 1 from principal component analysis of standardised residual correlations for items (sorted by loading)

<table>
<thead>
<tr>
<th>Subscale 1</th>
<th>Loading</th>
<th>Subscale 2</th>
<th>Loading</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>0.66</td>
<td>1</td>
<td>-0.51</td>
</tr>
<tr>
<td>21</td>
<td>0.62</td>
<td>22</td>
<td>-0.42</td>
</tr>
<tr>
<td>6</td>
<td>0.60</td>
<td>11</td>
<td>-0.37</td>
</tr>
<tr>
<td>15</td>
<td>0.58</td>
<td>20</td>
<td>-0.35</td>
</tr>
<tr>
<td>3</td>
<td>0.46</td>
<td>24</td>
<td>-0.34</td>
</tr>
<tr>
<td>29</td>
<td>0.46</td>
<td>7</td>
<td>-0.32</td>
</tr>
<tr>
<td>9</td>
<td>0.45</td>
<td>17</td>
<td>-0.31</td>
</tr>
<tr>
<td>14</td>
<td>0.34</td>
<td>10</td>
<td>-0.25</td>
</tr>
<tr>
<td>26</td>
<td>0.17</td>
<td>8</td>
<td>-0.24</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12</td>
<td>-0.19</td>
</tr>
<tr>
<td></td>
<td></td>
<td>25</td>
<td>-0.15</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4</td>
<td>-0.15</td>
</tr>
<tr>
<td></td>
<td></td>
<td>19</td>
<td>-0.14</td>
</tr>
<tr>
<td></td>
<td></td>
<td>27</td>
<td>-0.13</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
<td>-0.11</td>
</tr>
<tr>
<td></td>
<td></td>
<td>23</td>
<td>-0.11</td>
</tr>
</tbody>
</table>

3.4.2.7 CReMOS item characteristics

A detailed report of traditional and Rasch statistics for individual CReMOS items is located in Appendix E. In summary, based on results of Classical Test Theory and Item Response Theory methods used to assess construct validity, items 13, 16, 18, 28 and 30 were dropped creating a 25-item scale. Further, the Likert scale was modified by collapsing the “mildly agree” and “mildly disagree” categories into one category renamed
as “neutral”. The scoring system for the Likert scale was also modified from a 1 to 6 point scale to a 0 to 4 point scale. The range of scores possible on the CReMOS is 0 to 100 (see Appendix F).

3.4.3 Study 3: Internal consistency reliability
Item-total correlations were calculated. Internal consistency for the 25-item CReMOS was high (α=0.94). The standard error of measurement (SEM) was 5.19.

3.4.4 Study 4: Temporal reliability (or stability)
The temporal (stability) reliability of CReMOS total scores was high (ICC, 3,1) 0.857 (single measures) and 0.923 (average measures), p=0.0001.

3.4.5 Study 5: Predictive Validity Testing
The ability of a CReMOS score to predict clinicians’ use of outcome measures in the present study was poor, rho = 0.126 (p=0.023).

3.5 Discussion
The purpose of this study was to develop a self-report questionnaire, the CReMOS, to assess clinicians’ readiness to measure outcomes. A new questionnaire was developed based on the Transtheoretical Model’s stages of change and known barriers to outcome measurement. The CReMOS includes 25 items (total score ranging from 0 to 100) that measure the five constructs of pre-contemplation, contemplation, preparation, action, and maintenance. The aim of the CReMOS is to provide researchers, educators and managers with a better understanding of allied health clinicians’ knowledge, skill and educational requirements in relation to their current use of outcomes measures and if and how these domains change over time.

Psychometric testing of the CReMOS was conducted using a sample of 396 allied health clinicians. The instrument demonstrated good content and construct validity and good internal consistency and temporal reliability. However, the predictive validity of the
CReMOS for this study population was poor. Participant completion of the CReMOS should provide researchers, educators and managers with an objective measure of clinicians’ readiness to measure outcomes. The range of responses and minimal missing data (6 items in total) suggest that clinicians are willing and able to provide data regarding their readiness to measure outcomes. The CReMOS is also useful for differentiating between those clinicians who are ready and those not yet ready to measure outcomes.

3.5.1 Study 1: Content validity testing

When developing a new instrument researchers need to have a clear conceptualisation of the target construct (Clark & Watson, 1995). Without established content validity users cannot be confident that variance in obtained scores is due to the latent construct, in this case, clinician readiness to measure outcomes (Haynes et al., 1995). High agreement between experts regarding relevance of items is used as evidence of strong content validity (CVI = 0.96, \( p = 0.05 \)). Users of the CReMOS can be confident about clinical inferences drawn from the data (Haynes et al., 1995). Changes in CReMOS scores should reflect change in a clinician’s level of readiness to measure outcomes.

Content validity of instruments such as the CReMOS can degrade over time as new data are acquired and/or theories about change or clinician readiness to measure outcomes evolve (Cronbach, 1971; Haynes et al., 1995). Therefore, good instrument construction should be an iterative process involving ongoing conceptual development and psychometric analysis (Clark & Watson, 1995).

3.5.2 Study 2: Construct validity testing

Exploratory factor analysis suggested the presence of five factors which provide preliminary confirmation of fit with the five stages of change of the Transtheoretical Model. However, not all items loaded on the anticipated factors. Further, the five items with cross loadings (See Table 3.3), suggest that some items may have elements in common and require revision. The cross loadings may partly explain the correlated errors in the CFA. The CFA findings do not support a five factor model in this data. A two
factor model (Pre-contemplation/Contemplation and Preparation/Action/Maintenance) provides best fit to this data, presenting a more parsimonious account of the stages of change. These findings suggest that clinicians in the study could be categorised into one of two groups according to their level of readiness to measure outcomes. The first group, representing the pre-contemplation and contemplation stages included those clinicians with little or no interest in measuring outcomes. The second group, representing the preparation, action and maintenance stages included clinicians who measure outcomes with their clients to varying degrees of consistency.

Rasch analysis of item fit and item difficulty was largely consistent with findings from the CFA. Items 13, 16, 18, 28 and 30 were identified as misfitting or redundant and were consequently dropped from the original 30-item scale. Rasch analysis also provided a valuable tool for testing rating scale diagnostics (Bond & Fox, 2007; Franchignoni et al., 2007; Tesio, 2003). Based on this analysis, respondents were unable to discern between the categories of “mildly agree” and “mildly disagree”, so these two categories were collapsed to form one “neutral” category. The five resulting categories representing the following levels: 4 – “strongly agree”, 3 – “agree”, 2 – “neutral”, 1 – “disagree”, and 0 – “strongly disagree”. The person separation index highlights the CReMOS is able to reliably quantify how much people differ on the measure of interest, that is, readiness to measure outcome (Bond & Fox, 2007). Results of the PCA to assess unidimensionality of the CReMOS were consistent with CFA findings. Two subscales were identified: Pre-contemplation/Contemplation and Preparation/Action/Maintenance. According to PCA, item 26 loaded on the Pre-contemplation/Contemplation subscale whereas CFA suggested item 26 loaded on both subscales.

These findings are consistent with previous research which suggests that the five stages of change are not always discernable in empirical data. For example, Robbins and colleagues (Robbins, Levesque, Redding, Johnson, Prochaska, Rohr & Peters, 2001) used a 14 item telephone survey to assess family members’ motivational readiness and decision making for consenting to cadaveric organ donation. They identified a two factor model, accounting for 48.5% of the total item variance using principal components
analysis. Other public health researchers assessed motivation for change in problem drinkers, using the 19-item Stages of Change Readiness and Treatment Eagerness Scale (SOCRATES) (Miller & Tonigan, 1996). They reported a three factor model, accounting for 44% of the total item variation, using alpha extraction and varimax rotation. Further, stroke rehabilitation researchers developed and tested the 23-item, self-report Motor Readiness Questionnaire for Stroke (Page & Garner, 2005), and identified a four factor model, accounting for 45% of the total item variation, using principal components alpha factor analysis with varimax rotation. All of these studies employed exploratory factor analysis methods to identify the number of factors representing the stages of change. Perhaps if confirmatory factor analysis had been used, the number of factors identified may have been lower. Further empirical studies are required to confirm this trend.

3.5.3 Study 3: Internal consistency reliability
The internal consistency of the CReMOS was high (α=0.94) in this sample of allied health professionals. Cronbach’s alpha reflects the proportion of variance accounted for by an instrument. Hence the CReMOS accounts for 94% of the variance. General rules of thumb suggest “good” scales require an alpha of 0.80 (Aletras, Papadopolous & Niakas, 2006; Helfrich, Li, Mohr, Meterko & Sales, 2007), meaning that a person’s total score should only vary by 5.19 points (or 3.3%) with repeated measurement.

3.5.4 Study 4: Temporal reliability (stability)
The temporal (stability) reliability of the CReMOS was found to be very good (ICC 3,1) = 0.857, p = 0.0001). This is an important finding, as the CReMOS was designed to measure change over time and will be administered at different points in time. If the CReMOS did not demonstrate temporal stability, users cannot be confident that the change in scores represents change in the construct of readiness to measure outcomes rather than measurement error. These findings indicate that the CReMOS is capable of measuring clinician readiness to measure outcomes with consistency (Portney & Watkins, 2007).
3.5.5 Study 5: Predictive validity testing

The ability of a CReMOS score to predict clinicians use of outcome measures in the present study was poor, rho = 0.126 (p = 0.023). Other readiness to change surveys have also been found to be poor predictors of behaviour change. For example, none of the five original subscale scores of the URICA demonstrated predictive validity as assessed by the percentage of days abstinent from both alcohol or cocaine or number of treatment weeks completed (Carey et al., 1999; Pantalon, Nich, Frankforter & Carroll, 2002). Some readiness to change surveys have undergone preliminary testing for predictive validity and have shown promising results. For example, the Pain Stages of Change Questionnaire (Biller, Arnstein, Caudill, Federman & Guberman, 2000) was reported to have predictive potential related to identifying people for inclusion to, or exclusion from a cognitive-behavioural pain therapy program. The Stage of Change Questionnaire (Derisley & Reynolds, 2000), developed to predict premature termination, attendance and alliance in psychotherapy programs has shown that patient’s readiness to become actively involved in the treatment process is a crucial factor in predicting attendance, however more research is required. Other instruments however have been found to be good predictors of behaviour change. The Anorexia Nervosa Stage of Change Questionnaire (ANSOCQ) designed to assess individual readiness to recover from anorexia nervosa (Reiger, Touyz, Schotte, Beaumont, Russell, Clarke, Kohn & Griffiths, 2000) was found to be a good predictor of weight gain in the early stages of hospital admission. The Readiness to Change Questionnaire (Heather, Rollnick & Bell, 1993) was also found to have good predictive validity for predicting changes in drinking behaviour over time. The predictive potential of the CReMOS requires reinvestigation as the instrument is further developed.

3.6 Limitations of the study

This study, like any research, has limitations that should be considered before generalising results. Participants self selected, and as such may have had greater interest in, or experience using, outcome measures than those who chose not to participate. Further, occupational therapists, physiotherapists and speech pathologists represented 84.6% of the study sample. These three professional groups comprised only 47% of the
Australian allied health workforce in 2001 (Australian Health Workforce Advisory Committee, 2006). These three groups may be overrepresented in this study. In addition, as this research was conducted solely in Australia, further research is required to establish whether findings are representative of other developed countries and their allied health care professionals. Finally, self report questionnaires such as the CReMOS may be prone to some inaccuracy due to poor participant recall, lack of understanding of content, and discomfort with self disclosure.

3.7 Conclusion

The CReMOS is the first instrument of its kind to assess clinicians’ readiness to measure outcomes. The 25-item version of the CReMOS is psychometrically sound and capable of discriminating between clinicians with little or no interest in measuring outcomes, and those who are already measuring outcomes to varying degrees. Use of this instrument may lead to the development of education programs and strategies that target a diverse range of values, beliefs, knowledge and skills related to the outcome measurement process.

Further research to enhance clinical utility of the CReMOS should focus on sampling methods and sample mix. The current study employed convenience sampling. Future studies should endeavour to use random sampling whenever possible. Further research should also establish whether similar results are obtained with other allied health professional groups and nurses, and in other countries. Additional psychometric testing should focus on the ability of the CReMOS to predict clinicians’ use of outcome measures in other health professional groups.
Chapter Four

The effect of a multifaceted educational intervention on allied health clinicians’ outcome measurement behaviours: A randomised controlled trial

4.1 Introduction
Routinely measuring clinical outcomes is a challenge for allied health professionals. There is insufficient evidence on whether educational strategies recommended to increase outcome measurement behaviours are effective. The rationale for the randomised controlled trial presented in this chapter was informed by literature presented in Chapter 2 and more particularly a study conducted by Cook, McCluskey and Bowman (2007). This chapter describes the methods and findings of a randomised controlled trial that investigated the effectiveness of interactive educational workshops and follow-up support in increasing allied health clinicians’ measurement of clinical outcomes.

4.2 Background
Health professionals are expected to demonstrate that their interventions are cost-effective, and achieve outcomes that clients consider clinically important (Foto, 1998; Gutman & Mortera, 1997; Landry & Mathews, 1998; Rogers & Holm, 1994). In spite of this expectation, literature available indicated that at the end of 2005 when this study commenced, only 8 to 50% of allied health professionals were routinely measuring clinical outcomes (Garland et al., 2003; Mayo et al., 1993; Stokes & O’Neill, 1999). Since then, further studies exploring clinicians’ outcome measure use have reported between 8 and 100% utilisation (Abrams et al., 2006; Akinpelu & Eluchie, 2006; Cook et al., 2007; Garland et al., 2003; Hanna et al., 2007; Kay et al., 2001; Mayo et al., 1993; Stokes & O'Neill, 1999; Stokes & O'Neill, 2008). All of these figures are based on studies that have used subjective, self-report measures to assess clinicians’ outcome
measurement behaviours and professional groups in specific clinical contexts. It is widely accepted within the scientific community that self-report data are subject to bias and often provides an unrealistic, inflated picture of actual practice behaviours (Adams et al., 1999; Bailey, 2008; Finkelstein et al., 2000). Therefore, the actual number of allied health professionals routinely measuring outcome may be even lower. As highlighted in Chapter 2, the low numbers of clinicians currently measuring outcomes is a significant problem in the current evidence-based health care environment. It is now assumed that clinical effectiveness can only be achieved if evidence is carefully and conscientiously used by clinicians in clinical decision-making with individual clients (Sackett et al., 1996; Cusick & McCluskey, 2000). Evidence base practice approaches assume that clinicians have knowledge of research methods and utilisation (Alsop, 1997; Kitchen, 1997), particularly skills related to searching and appraising the literature, using research in assessment or intervention, or using research approaches to evaluate the effectiveness of service outcomes (Cusick & McCluskey, 2000). This means clinicians must be able to competently employ all steps in the evidence based practice process, including measurement of clinical outcomes as described in Chapter 2.

Key reasons have been suggested for this low level of clinician participation in outcome measurement. Clinicians consistently report that they do not possess the knowledge, skills or time to undertake measurement activities (Abrams et al., 2006; Akinpelu & Eluchie, 2006; Austin & Clark, 1993; Beattie, 2001; Bowman, 2006; Bowman & Llewellyn, 2002; Cook et al., 2007; Gutman & Mortera, 1997; Taylor & Mitchell, 1990; Unsworth, 2000; Waine, Magill-Evans, & Pain, 1997). As education programs are commonly used to address lack of knowledge and skills, research is needed to determine the effectiveness of education programs to increase clinicians’ use of outcome measures. Knowledge gained from such research findings will assist educators to improve strategies to facilitate clinicians’ use of outcome measures in clinical practice.
4.3 Context of the study
The current study builds on research undertaken by the author and others in Australia in 2004/05 (Cook, McCluskey, & Bowman, 2006; Cook et al., 2007). In this earlier study, 36 occupational therapy clinicians attended a one-day workshop on outcome measurement and were provided with telephone and email support for four months. A before-and-after design was used. There was an increase in the proportion of therapists reporting use of outcome measures from 65.7% at baseline (23 of 36 participants) to 91.4% at four months post workshop (32 of 35 participants). Although the proportion of therapists reporting use of outcome measures improved by 25.7% after four months, this study had some obvious methodological biases. First, the study did not have a control group and findings were compared to a one-off assessment at baseline. Second, the study used un-validated self-report outcome measures rather than objectively measuring participants’ change in practice. Third, it is not known if outcome measurement behaviours were maintained long term. As a result, more rigorous testing of this intervention was required to establish effectiveness.

4.4 Aim
The aim of the present study was to determine the effectiveness of a multi-faceted education program on the outcome measurement behaviours of allied health clinicians.

4.5 Research questions
Does an interactive educational workshop, combined with printed educational materials and follow-up support increase:

1) The proportion of participants who measure outcomes? (primary outcome)
2) The frequency with which outcome measures are used by participants? (secondary outcome)
3) The variety of outcome measures used by participants? (secondary outcome)
4) Participants’ knowledge and skills of outcome measurement? (secondary outcome)
5) Participants’ readiness to measure outcomes? (secondary outcome)

4.6 Methods
The present study used a randomised controlled trial (RCT) design. Randomisation of participants to comparison groups was used to eliminate the systematic tendency to produce an unequal distribution of factors that could influence the outcome of the intervention (Jadad, 1998; Jadad & Enkin, 2007).

Ethics approval to conduct this study was granted by the University of Western Sydney Human Research Ethics Committee (date of approval 21 October 2005, HREC 05/181) and The Spastic Centre of New South Wales (date of approval 22 November 2005). The study was registered with the Australian New Zealand Clinical Trials Registry (ACTRN12606005005550), which meets the requirements of the International Committee of Medical Journal Editors (ICMJE) for trial registration.

4.6.1 Participants
The study was undertaken in collaboration with the Spastic Centre of New South Wales. The Spastic Centre employs a variety of allied health clinicians who provide services to children and adolescents with cerebral palsy, physical and intellectual disability and autism (http://www.thespasticcentre.org.au). All allied health clinicians (N=126) employed by The Spastic Centre’s urban and rural services were invited to participate in the study. The discipline mix of allied health clinicians at the time of recruitment (November 2005, N=126) was as follows: occupational therapists (n=46), physiotherapists (n=30), speech pathologists (n=26), social / welfare workers (n=13), early educators (n=6) and psychologists (n=5).

4.6.2 Inclusion and exclusion criteria
Participants had to meet the following inclusion criteria to be included in the study:

i. Be employed by The Spastic Centre New South Wales;
ii. Hold a professional qualification (diploma, undergraduate degree or postgraduate degree) in one of the following allied health disciplines: occupational therapy, physiotherapy, speech pathology, psychology, social work, social welfare, counselling, special education or early education;

iii. Be of working age (between 18 and 65 years); and

iv. Be in a role where they actively treated clients and could measure client progress and evaluate the outcomes of their interventions using outcome measures.

4.6.3 Recruitment

Allied health clinicians were recruited using a mail-out information package. In order to protect the privacy of potential participants, the information package was addressed and posted by an independent administrative assistant (LM) employed by The Spastic Centre of New South Wales. The information package contained a flier (see Appendix G), an introductory letter (see Appendix H), a participant information sheet (see Appendix I), a consent form (see Appendix J) and two surveys (see Appendices F and K). The author (JB) was contacted via telephone by two potential participants seeking further information about the study. Completed consent forms and baseline surveys (the CReMOS and the Outcome Measures Questionnaire) were then returned by mail to the independent administrative assistant (LM).

4.6.4 Randomisation

Following receipt of signed consent forms and completion of baseline surveys, participants were allocated to groups by computer-generated random numbers using Microsoft Excel. Random numbers were generated by a third person (JR) not employed by The Spastic Centre. The allocation sequence was housed in an opaque envelope in a locked filing cabinet at The Spastic Centre of New South Wales. Due to the small sample size, stratified randomisation was performed (Altman & Bland, 1999; Jadad, 1998; Jadad & Enkin, 2007; Pocock, 1983). Groups were stratified by profession (occupational therapy, physiotherapy, speech pathology, social/welfare work, psychology and early education). Participants were enrolled in the study to either the intervention group or the control group based on the allocation sequence. In order to eliminate selection bias,
enrolment was carried out by a research assistant (NS) at The Spastic Centre who had no clinical or supervisory relationship to the participants (Jadad, 1998). All participants were contacted via email and telephone by the research assistant (NS) to inform them of their allocation. Group allocation was concealed from the author (JB).

4.6.5 Blinding
This trial used single blinding with assessors blinded to group allocation. The author (JB) presenting the workshop intervention became aware of group allocation on the day of the workshop. Participants were aware of their allocation one week prior to the one-day workshop. Assessors collecting primary outcome data (IN, SM, NS, JP & SH) were unaware of the group allocation. The research assistant (AB) responsible for data entry was blind to group allocation. Primary outcome measure data were returned to the author (JB) in a sealed archive box which was given to the data entry research assistant (AB). Secondary outcome data were returned to the author (JB) in sealed envelopes, with participants identifiable only by study recruitment number. The sealed envelopes were then given to the research assistant (AB) entering the data. Participants were identified on the study database by allocation number only. The two study groups were initially designated as group “A” and group “B” on the database rather than “control” and “intervention” group.

4.6.6 Intervention
A one-day multifaceted educational workshop on the use of outcome measures in clinical practice took place at a conference venue in the central business district of Sydney in November, 2005. A one-day workshop was deemed to be an appropriate format to provide participants with an adequate level of knowledge and skill to encourage use of outcome measures without too much time away from direct service provision to clients. A one-day workshop was also representative of usual allied health practices for continuing professional education. The multifaceted educational intervention used in this study was based on an intervention used in a previous study (Cook et al., 2007). Further, this study was designed to reflect current Australian practice in continuing professional education for allied health clinicians to ensure applicability of results.
Workshop content was developed based on literature about the knowledge and skill needs of clinicians related to outcome measures (Abrams et al., 2006; Akinpelu & Eluchie, 2006; Beattie, 2001; Bowman, 2006; Bowman & Llewellyn, 2002; Cook et al., 2007; Huijbregts et al., 2002; Mayo et al., 1993; Unsworth, 2000), and the barriers and challenges that clinicians experience when attempting to use outcome measures in practice (Abrams et al., 2006; Akinpelu & Eluchie, 2006; Bowman, 2006; Bowman & Llewellyn, 2002; Cook et al., 2007; Garland et al., 2003; Huijbregts et al., 2002; Kay et al., 2001; Mayo et al., 1993; Unsworth, 2000). Workshop content for the previous study was reviewed by a steering committee (n=5) which included academics, members of a professional practice association, and both private and public sector service providers. The steering committee advised on the workshop content and structure. Workshop content was refined according to participant feedback from the previous study (Cook et al., 2007). Finally, to tailor the workshop content to the specific needs of the participants from The Spastic Centre, an advisory panel from the study site (The Spastic Centre of New South Wales) was formed. The advisory panel included two research fellows who regularly conducted staff training, four allied health clinical consultants (occupational therapist, physiotherapist, speech pathologist and social worker) and a research assistant.

The objective of the multifaceted educational intervention was to provide participants with knowledge and skills about outcome measurement and strategies to incorporate outcome measurement into their clinical practice. Workshops were taught and facilitated by the author and two experienced academic lecturers (Dr Catherine Cook and Dr Annie McCluskey). The workshop used a combination of didactic lectures, small group activities, and practical sessions. Content covered included an introduction to outcome measures, setting SMART (Specific, Measurable, Activity based, Review and Timeframe) (Bowman & Mogensen, 2010) goals, the outcome measurement process, strategies to successfully implement outcome measures, information on nine specific outcome measures relevant to people with cerebral palsy, autism and physical and intellectual disability and their carers, matching client limitations with outcome measures, reporting outcome measure results and clinical decision making. Practical sessions
allowed participants to use the outcome measures and provide and receive in-situ feedback via small group discussion (see workshop program, Appendix L).

The nine outcome measures covered in the workshop were selected collaboratively by the researchers and The Spastic Centre advisory panel (see Table 4.1). The outcome measures had to be quick to administer, accessible to all participants in the study, have established validity and reliability, have instructions regarding use of the measure and scoring guidelines and not require external training. The measures chosen addressed the areas of body structure and function, activity limitation and participation according to the International Classification of Functioning Disability and Health (World Health Organisation, 2001). Participants received a resource folder containing notes from lectures and small group discussion activities. Also contained in this folder was a package of the nine outcome measures and copies of the score sheets ready for use. The package included a summary and critique of each outcome measures and included information on the authors, access to the measure, cost, copyright, a description of the measure, administration, scoring and interpretation, suitable populations, languages the measure is published in, International Classification of Functioning, Disability and Health (ICF) level/s targeted by the measure, psychometric properties and relevant references.
<table>
<thead>
<tr>
<th>Name of measure &amp; author</th>
<th>Purpose of measure</th>
<th>Type of measure</th>
<th>Client group</th>
<th>Administration time</th>
<th>Scoring time</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Goal Attainment Scale (GAS)</strong>&lt;br&gt;Kiresuk &amp; Sherman (1968)</td>
<td>Evaluates services according to the attainment of a number of client-specific goals.</td>
<td>Performance or self-report</td>
<td>Paediatrics, brain injury, chronic pain, community, frail elderly, general rehabilitation, home based rehabilitation, nursing home patients.</td>
<td>Up to 30 minutes (interview format)</td>
<td>10 minutes</td>
</tr>
<tr>
<td><strong>Individually Prioritised Problem Assessment (IPPA)</strong>&lt;br&gt;Wessels et al (1999)</td>
<td>Measures the extent to which problems identified by an individual in daily activities have been diminished as a result of the provision of assistive technology.</td>
<td>Performance or self-report</td>
<td>Individuals with a disability and the elderly.</td>
<td>Up to 30 minutes (interview format)</td>
<td>10 minutes</td>
</tr>
<tr>
<td><strong>Perceived Stress Scale (PSS-10)</strong>&lt;br&gt;Cohen, Kamarck &amp; Mermelstein (1983)</td>
<td>Used to determine whether “perceived” stress is a causative factor in behavioural disorders or disease.</td>
<td>Self-report (10-items)</td>
<td>General community with at least a junior high school education.</td>
<td>5 minutes</td>
<td>10 minutes</td>
</tr>
<tr>
<td><strong>Activity Scale for Kids (ASK)</strong>&lt;br&gt;Young (1995)</td>
<td>Measures limitations in physical activity due to musculoskeletal disorders.</td>
<td>Self-report (30-items)</td>
<td>Children 5 to 15 years to with musculoskeletal disorders.</td>
<td>10-30 minutes</td>
<td>10 minutes</td>
</tr>
<tr>
<td><strong>Depression Anxiety Stress Scales (DASS)</strong>&lt;br&gt;Lovibond &amp; Lovibond (1995)</td>
<td>Measures the severity of the core symptoms of depression, anxiety and stress.</td>
<td>Self-report (21 or 42-item versions)</td>
<td>“Normal” adolescents and adults.</td>
<td>5-15 minutes</td>
<td>10 minutes</td>
</tr>
<tr>
<td><strong>Strengths and Difficulties Questionnaire (SDQ)</strong>&lt;br&gt;Goodman (1997)</td>
<td>Measures emotional and behavioural disorders; emotional symptoms, conduct problems, hyperactivity/inattention, peer relationship problems and pro-social behaviour.</td>
<td>Self-report or informant report (25-items)</td>
<td>Children between 4 and 16 years.</td>
<td>5 minutes</td>
<td>10 minutes</td>
</tr>
<tr>
<td><strong>Gross Motor Function Measure (GMFM)</strong>&lt;br&gt;Russell et al (2002)</td>
<td>Measures change in gross motor function.</td>
<td>Performance (66 or 88-items)</td>
<td>Children aged 5 months to 16 years with cerebral palsy, Down syndrome, and osteogenesis imperfecta. Also used, but not tested for developmental delay, acquired brain injury, and acute lymphoblastic leukaemia.</td>
<td>45-60 minutes</td>
<td>10-15 minutes</td>
</tr>
<tr>
<td><strong>Family Function Styles Scales (FFSS)</strong>&lt;br&gt;Trivette et al (1994)</td>
<td>Measures family strengths and competencies.</td>
<td>Self-report (26-items)</td>
<td>Adults.</td>
<td>5 minutes</td>
<td>5 minutes</td>
</tr>
</tbody>
</table>
At completion of the one-day workshop, participants were provided with three months of email and telephone follow-up support. Email was a contemporary, cost effective means of providing participants with ongoing support and assistance on outcome measure use. All participants in the intervention group received one group email per week. The purpose of the email was to encourage clinicians to use outcome measures in their daily practise, and provide them with additional information on outcome measures. The author responded to all individual emails within 24 hours and telephone calls within 72 hours (to account for weekends). At the workshop, participants were requested not to share information obtained at the educational workshop with their colleagues in the control group, to avoid contamination.

The design of the one-day workshop and follow-up support program was congruent with the Andragogy in Practice Model (Knowles et al., 2005) and the financial constraints of the current health care environment. An educational intervention that could be replicated with limited resources was important, particularly if it was found to be effective. In accordance with the principles outlined in the Andragogy in Practice Model, the workshop: assisted clinicians to understand why they needed to learn about outcome measures, promoted the self-direction in the learning process, drew upon the prior experiences of participants in discussion and reflection activities, highlighted Spastic Centre organisational policy and documents which specified the need of participants to routinely measure client outcomes, facilitated the development of knowledge, skills and competencies related to outcome measurement, and used strategies to promote intrinsic motivation for measuring outcomes.

The control group did not receive any educational intervention from the author throughout the course of the study. The control group participated in a one-day interactive workshop on evidence-based practice (focusing only on critical appraisal skills) facilitated by Spastic Centre staff. This workshop attended by the control group followed similar learning format to the intervention workshop, including lectures, small group work and discussion. Participants also received printed handouts of lecture notes and critical appraisal guidelines. No formal follow-up support was provided. The
researchers met with Spastic Centre staff facilitating the evidence-based practice workshop to ensure there was no overlap of content between the workshops. The control group participated in an alternative workshop to reduce the risk of a placebo effect (Taylor, 2000). At the completion of the trial, those recruited to the control group had the opportunity to attend the outcome measures workshop in August 2006 at no cost to participants.

4.6.7 Study outcomes
Study outcomes were measured at baseline, then 3 months and 6 months post intervention. An audit tool (see Appendix M) was used as the primary outcome measure to objectively measure change in clinicians’ outcome measurement use. Audit was used to systematically identify clinicians’ documentation of outcome measure use in clinical files. Two self-report questionnaires, The Outcome Measures Questionnaire and the CReMOS were used as the secondary outcome measures (see Appendices F and K). Self-report, subjective surveys were used to contrast to objective audit data and provide insight into clinicians’ perceptions about their outcome measurement behaviours as well as their knowledge and skill related to the outcome measurement process.

An audit of the participants’ clinical files was used to measure:

- Change in the proportion of participants who measured outcomes
- Change in the frequency of used outcome measures
- Change in the variety of outcome measures used by participants

The self-report Outcome Measures Questionnaire was used to measure:

- Change in the proportion of participants who measured outcomes
- Change in the frequency of use of outcome measures
- Change in the variety of outcomes used by participants
- Change in participants’ knowledge and skill in outcome measurement
The Clinician Readiness for Measuring Outcomes Scale (CReMOS) was used to measure:

- Participants’ readiness to change their current practice behaviours and measure outcomes

4.6.8 Primary study outcome

Audit data were obtained from 10% of each participant’s clinical files. The audit tool was designed to capture: 1) whether the file audited was an individual or group record; 2) the number of occasions that a participant had written in the clinical file during the audit period; 3) the outcome measures the participant had used (variety); 4) the dates when the outcome measures were used (frequency); and 5) the participants reporting practices such as including the outcome measure score sheet in the file, recording the outcome measure score in the notes, and whether the participant had interpreted the outcome measure score in terms of change over time and/or functional implications.

All Spastic Centre files that were audited were de-identified by an employee of The Spastic Centre who had authority to handle client files in accordance with the Privacy and Personal Information Protection Act 1998 (http://www.lawlink.nsw.gov.au/lawlink/privacynsw/ll_pnsw.nsf/vwPrint1/PNSW_03_pipact). Staff at The Spastic Centre not involved in the RCT undertook the audit. These procedures were put in place to ensure: 1) privacy of The Spastic Centre clients; 2) confidentiality of participant information; and 3) blinding for the RCT data collectors and managers. Information about The Spastic Centre client (the child or adult about whom the study participant has documented) was not collected on the audit tool. Audit data was collected from all urban and rural clinical service providers of The Spastic Centre throughout New South Wales. Spastic Centre service providers are located at: Allambie Heights (Sydney), Ryde (Sydney), Prairiewood (Sydney), Penrith (Sydney), Croudace Bay (Hunter region), Glenning Valley (Central Coast), Orange (Central West), Moruya (Far South Coast), Nowra (South Coast), Coffs Harbour (Far North Coast), Armidale (New England region), Dubbo and Wagga (Far West).
Participants involved in this study were unaware that client files were to be audited. Participants were not informed of the file audit, as knowledge of the file audit was highly likely to bias or contaminate data collected (Campbell, Maxey, Watson, 1995; Lied & Kazandjian, 1998; Zinman, Bethune, Camfield, Fitzpatrick, Gordon, 1996). It has been well established that the Hawthorne Effect (the phenomenon of altered behaviour or performance resulting from awareness of being a part of an experimental study) has an influence on the documentation practices of medical and paramedical clinicians when they are advised of a research project involving documentation, or are notified of a quality-improvement audit paramedic documentation (Campbell, Maxey & Watson, 1995; Lied & Kazandjian, 1998; Zinman, Bethune, Camfield, Fitzpatrick & Gordon, 1996). Based on previous research findings, the scientific validity of the audit outcome data would have been substantially compromised if participants were made aware that their documentation was to be audited. At the completion of the study participants were informed that the file audit had taken place by email. At all times the participants maintained the right to withdraw their audit data from the research, including after they were informed that the file audit had taken place. This right was explicitly stated to participants during disclosure.

4.6.9 Secondary study outcomes

The Outcome Measures Questionnaire (see Appendix K) for this study was based on the self-report questionnaire developed for an earlier study (Cook et al., 2007). The Outcome Measures Questionnaire contained demographic items, specific questions about values and beliefs, knowledge and skill and current usage of outcome measures. Perceived barriers were specifically explored to establish the steps in the outcome measurement process where clinicians believed they required assistance. Further, in the final questionnaire, clinicians were asked to disclose whether they had shared information with participants in the control group in an attempt to establish whether inter group contamination had occurred.

The 25-item CReMOS, as described in chapter 3, is also a self-report questionnaire. This instrument was used to assess clinicians’ readiness to measure outcomes. The CReMOS
is a psychometrically sound instrument capable of discriminating between clinicians with little or no interest in measuring outcomes, and those who are already measuring outcomes to varying degrees (Bowman et al., 2009). The CReMOS also provides an understanding of allied health clinicians’ knowledge, skill and educational requirements in relation to their current use of outcomes measures.

In addition to these three outcome measures, data on follow-up support data were systematically collected over the three month period following the workshop. Emails exchanged between the author and individual participants were printed and kept in a folder and stored in a locked filing cabinet in the author’s office. Emails were also stored electronically in a folder on the author’s computer which had password protection. The date, time and content of telephone conversations as well as group and individual meetings were recorded in a log book and stored in a locked filing cabinet in the author’s office. Data collected focused on the number of emails sent and received, the proportion of participants accessing the follow-up support program and the step/s in the outcome measurement process that participants were requesting assistance for.

4.6.10 Methods to enhance primary endpoint data quality

Written instructions outlining how to use the audit form and a one-hour training session with the author were provided to auditors to reduce variability in data collection. The four auditors were then required to independently audit 10 client files prior to data collection for the RCT. Data from the pilot audit of files allowed inter-rater reliability of the audit tool to be established. Inter-rater reliability was calculated using an intraclass correlation coefficient ICC (2,1). Intraclass correlation coefficients range from 0.00 to 1.00, with values above 0.75 indicating good reliability and values above 0.90 indicating excellent reliability (Portney & Watkins, 2000). The audit tool for this study has excellent agreement between raters, ICC (2,1)= 0.995 (95% CI 0.998 to 0.999).

To further enhance quality and accuracy of the data, 12 audit forms (10% of the sample), Outcome Measure Questionnaires and CReMOS surveys from each measurement period of the RCT (baseline, three and six months) were randomly selected to reduce bias using
Microsoft Excel’s random number generation function for double data entry. Double data entry was used to check for errors. No errors were found for the baseline period, one data entry error was found for the three month period and no errors were found for the six month period.

This study was registered on the Australian New Zealand Clinical Trials Registry (ACTRN 12606000500550) (Bowman, Cook, McCluskey, & Lannin, 2006) which meets the requirements of the International Committee of Medical Journal Editors for trial registration (DeAngelis et al., 2005).

4.6.11 Power analysis and sample size
The data available on the proportion of clinicians reported to use outcome measures (up to and including the year 2005) pre any type of intervention to increase outcome measure use was between 8 to 50% (Garland et al., 2003; Mayo et al., 1993; Stokes & O’Neill, 1999). Due to the range in the proportion of clinicians reportedly using outcome measures, a 30% improvement or change in clinician behaviour beyond that seen in the control group was set as the expected outcome and used in the power calculation. Based on a change of 30%, alpha set at 5%, power of 80% and drop-out rate of 20%, it was anticipated that a sample size of 54 participants per group would be necessary to detect a clinically worthwhile effect. Therefore, a total of 108 participants were required. The Spastic Centre of New South Wales employed 126 allied health professionals at the time of this study, thus meeting sample size requirements. The minimum clinically important change (30% effect on the primary outcome, the proportion of clinicians measuring outcomes) was determined after consideration of the anticipated financial cost of planning, preparing and running a one-day workshop versus clinician attendance at the workshop and time away from client service delivery.

4.6.12 Statistical analysis
Descriptive statistics were used to compare the between group difference in proportion, frequency and variety of outcome measures used by participants in the intervention and
control groups. Survey data from the Outcome Measures Questionnaire (measured on a Likert scale) were transformed into dichotomous outcomes, for example, those who did and those who did not measure outcomes (Cochrane Collaboration, 2002). Dichotomous outcomes were quantified in terms of the proportion of participants who experienced the event under question (Herbert, 2000), hence participants were categorised into one of two mutually exclusive groups. The chi-square test for independence was used to examine the association between dichotomous, nominal variables (Hicks, 2004) and determine whether there was a statistical difference between groups at baseline. Yates correction for continuity was applied to data to prevent overestimation of statistical significance, due to the small sample size (Haviland, 1990).

Mean differences between groups and the corresponding 95 percent confidence intervals were calculated using ordinary least squares (OLS) regression for continuous outcomes (Altman, 2005; Cockburn, 2006; Sinclair & Bracken, 1994). Confidence intervals were used to judge whether or not the intervention produced a clinically important difference between groups (Cockburn, 2006; Sinclair & Bracken, 1994), rather than a traditional focus on statistical significance. Odds ratios (Cockburn, 2006; Sinclair & Bracken, 1994) and numbers needed to treat (Bewick et al., 2004; Cassady, 2005; Cockburn, 2006) were used to calculate the precision of the estimate of effect size for dichotomous outcomes using binary logistic regression.

All outcomes were analysed with adjustment for baseline characteristics (covariates) (Hernandez, Steyerberg, & Habbema, 2004). Adjusted estimate effects were used to take into account the heterogeneity of participants, chance differences in baseline characteristics between groups and to improve study power without inflation of type I error (Hernandez et al., 2004). Statistical significance was predetermined at the conventional level of $p<0.05$. Where possible, outcome data were obtained for all participants. Each participant's data were analysed in the group to which they had been allocated in accordance with the intention to treat principle (Hollis & Campbell, 1999; Lachin, 2000). All data analysis was conducted using the Statistical Package for Social Sciences 14.0 (SPSS). Number needed to treat was calculated using the Number Needed
Email and telephone data generated during the three months of follow-up support were examined using content analysis to systematically and objectively identify occurrences of specific information or topics within the data related to the outcome measurement process (Liamputtong, 2009; Liamputtong & Ezzy, 2005; Patton, 2002). Key words and phrases representing steps in the outcome measurement process were specified, recorded and coded (Hinds, 2000; Liamputtong, 2009). These words and phrases included: SMART\(^2\) goals, selecting outcome measures, implementing or using outcome measures, scoring outcome measures, reporting outcome measure results. Topic codes were initially recorded on the hard copies of the data and then entered into a database. The frequency of each code was counted and tallies made (Hinds, 2000). Enumerative content analysis was also used to identify the number of participants that made use of the follow-up program, the number of emails sent to, or telephone calls to the author; and the number of emails sent by, or telephone calls made by the author. Statistical analyses were performed using SPSS.

4.6.13 Effect size

The primary focus of this study was to explore the relationship between an educational intervention (independent variable) and the proportion of clinicians measuring outcomes (dependent variable). Therefore, it was important to measure of the effect size, that is, magnitude of an intervention effect and the relationship between two variables. The larger the between groups difference the greater the effect of the intervention (independent variable). Effect sizes were determined for continuous data using means or correlations, or for dichotomous data with relative risk and odds ratios. Effect size statistics help researchers and clinicians to determine whether the difference observed is both statistically and clinically important (Portney & Watkins, 2009).

\(^2\) S = Specific, M = Measureable, A = Activity based, R = Review, T = Timeframe
4.6.14 Confidence intervals
Confidence intervals provide a range of normally distributed values (such as means, proportions and odds ratios), which include the true value of a parameter at a defined level of probability (Altman, 2005; Cockburn, 2006). Confidence intervals describe the precision around a summary statistic, such as the difference between study groups (Peat, Barton & Elliot, 2008). Confidence intervals are usually quoted as 95% confidence intervals, which means the range of values that have a 95% chance of including the true value (Altman, 2005; Glasziou, Del Mar & Salisbury, 2003). The narrower the CI, the greater the precision of the sample mean as an estimate of the population mean (Sim & Reid, 1999). Researchers and clinicians use confidence intervals to judge whether or not an intervention has been shown to produce a difference which they would regard as clinically important (Cockburn, 2006; Sinclair & Bracken, 1994).

4.6.15 Odds ratio
An odds ratio (OR) is the odds of a specified event occurring in the intervention group, divided by the odds of it occurring in the control group (Cockburn, 2006; Sinclair & Bracken, 1994). The odds ratio is a statistically valid way of expressing the association between intervention group and outcome. Odds ratios are commonly used in multivariate analyses undertaken to control for confounding arising from baseline differences in randomised groups (Bewick, Cheek, & Ball, 2004; Schechtman, 2002; Sinclair & Bracken, 1994). When interpreting the meaning of an odds ratio, values greater than one (>1.0) indicate the event occurred more in the intervention group, values equal to one (=1.0), the event occurred equally in both groups, and values between zero and one (0 and 1), the event occurred more often in the control group (Cockburn, 2006; Schechtman, 2002). Caution should be taken when interpreting odds ratios as values are asymmetric. That is, ratios greater than one can extend to infinity, whilst values less than one lie between zero and one. Odds ratios are also usually expressed as percentages, so may suggest an overestimate of the benefit of intervention (Bewick et al., 2004; Cockburn, 2006; Sinclair & Bracken, 1994).
4.6.16 Number needed to treat
The number needed to treat (NNT), is a measure of effectiveness of an intervention (Bewick et al., 2004). It estimates the number of participants who would need to be treated to obtain the specified outcome in one participant (Bewick et al., 2004; Cassady, 2005; Cockburn, 2006). NNT provides an estimate of the absolute benefit of an intervention (Rajkumar, Sampathkumar, & Gustafson, 1996). The smaller the NNT, the more effective the intervention (Bewick et al., 2004; Cassady, 2005). Like other measures, the NNT is an estimate of the true value. It is therefore recommended to report confidence intervals or limits within which we can confidently state the true NNT lies (Cassady, 2005). Number needed to treat was calculated using the Number Needed to Treat Calculator developed by Dr Iain Buchan of the School of Public Health Informatics at the University of Manchester. The calculator is available at http://www.phsim.man.ac.uk/nnt/.

4.7 Results
Results are presented in the following order: (a) demographic characteristics of participants (see Table 4.2); (b) participant flow diagram (see Figure 4.1); (c) baseline measures, and (d) comparison of effectiveness across the two groups (primary outcome followed by secondary outcomes).

4.7.1 Demographic characteristics
Baseline characteristics of participants in both groups were very similar (see Table 4.2). Female represented the majority of participants in both groups (97% in the control group and 95% in the intervention group). Occupational therapists accounted for the greatest proportion of participants in each group, followed by speech pathologists and physiotherapists. An undergraduate degree was the most common level of professional qualification, and the majority of participants had more than 5 years clinical experience (control group 69%, intervention group 77%). Approximately a quarter of participants in each group held postgraduate qualifications, and less than 10% in each group were currently enrolled in postgraduate study. The majority of participants’ primary work role
was that of a clinician, employed on a full time basis, who worked in Sydney metropolitan settings. Only 13-15% of participants reported having no previous knowledge of outcome measurement, with the greatest proportion from each group indicating their knowledge was gained at an undergraduate level (47% in the control group and 48% in the intervention group). The study groups were equivalent at baseline on key demographic variables (Cresswell, 2003).
Table 4.2 Participant demographics

<table>
<thead>
<tr>
<th>Variable</th>
<th>Control Group (n)</th>
<th>Intervention Group (n)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>2 (3%)</td>
<td>3 (5%)</td>
<td>0.480</td>
</tr>
<tr>
<td>Female</td>
<td>58 (97%)</td>
<td>57 (95%)</td>
<td>0.885</td>
</tr>
<tr>
<td>Profession</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Occupational Therapy</td>
<td>23 (38%)</td>
<td>21 (35%)</td>
<td>0.726</td>
</tr>
<tr>
<td>Speech Pathology</td>
<td>16 (27%)</td>
<td>14 (23%)</td>
<td>0.572</td>
</tr>
<tr>
<td>Physiotherapy</td>
<td>13 (22%)</td>
<td>14 (23%)</td>
<td>0.882</td>
</tr>
<tr>
<td>Social / Welfare Work</td>
<td>2 (3%)</td>
<td>6 (10%)</td>
<td>0.053</td>
</tr>
<tr>
<td>Early Education</td>
<td>3 (5%)</td>
<td>3 (5%)</td>
<td>1</td>
</tr>
<tr>
<td>Psychology</td>
<td>3 (5%)</td>
<td>2 (3%)</td>
<td>0.480</td>
</tr>
<tr>
<td>Level of initial qualification</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diploma</td>
<td>16 (27%)</td>
<td>12 (20%)</td>
<td>0.307</td>
</tr>
<tr>
<td>Degree</td>
<td>42 (70%)</td>
<td>47 (78%)</td>
<td>0.511</td>
</tr>
<tr>
<td>Other</td>
<td>2 (3%)</td>
<td>1 (2%)</td>
<td>0.655</td>
</tr>
<tr>
<td>Time since graduation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 1 year</td>
<td>7 (12%)</td>
<td>2 (3%)</td>
<td>0.020</td>
</tr>
<tr>
<td>≥ 1 but &lt; 3 years</td>
<td>2 (3%)</td>
<td>5 (8%)</td>
<td>0.132</td>
</tr>
<tr>
<td>≥ 3 but &lt; 5 years</td>
<td>9 (15%)</td>
<td>7 (12%)</td>
<td>0.564</td>
</tr>
<tr>
<td>≥ 5 but &lt; 10 years</td>
<td>11 (18%)</td>
<td>11 (18%)</td>
<td>1</td>
</tr>
<tr>
<td>≥ 10 but &lt; 20 years</td>
<td>14 (23%)</td>
<td>13 (22%)</td>
<td>0.882</td>
</tr>
<tr>
<td>≥ 20 years</td>
<td>17 (28%)</td>
<td>22 (37%)</td>
<td>0.264</td>
</tr>
<tr>
<td>Postgraduate qualifications (%)</td>
<td>16 (27%)</td>
<td>13 (22%)</td>
<td>0.475</td>
</tr>
<tr>
<td>Enrolled postgraduate study (%)</td>
<td>5 (8%)</td>
<td>4 (7%)</td>
<td>0.796</td>
</tr>
<tr>
<td>Paid employment status (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Full time</td>
<td>36 (60%)</td>
<td>33 (55%)</td>
<td>0.641</td>
</tr>
<tr>
<td>Part time (≤ 25 hours)</td>
<td>21 (35%)</td>
<td>23 (38%)</td>
<td>0.726</td>
</tr>
<tr>
<td>Other</td>
<td>3 (5%)</td>
<td>4 (7%)</td>
<td>0.564</td>
</tr>
<tr>
<td>Geographical area*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sydney Metropolitan</td>
<td>39 (59%)</td>
<td>34 (49%)</td>
<td>0.336</td>
</tr>
<tr>
<td>Regional City/Town</td>
<td>13 (20%)</td>
<td>18 (26%)</td>
<td>0.376</td>
</tr>
<tr>
<td>Rural</td>
<td>14 (21%)</td>
<td>17 (25%)</td>
<td>0.590</td>
</tr>
<tr>
<td>Primary work role (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clinician/Practitioner</td>
<td>56 (93%)</td>
<td>52 (87%)</td>
<td>0.655</td>
</tr>
<tr>
<td>Manager</td>
<td>0 (0%)</td>
<td>2 (3%)</td>
<td>0.083</td>
</tr>
<tr>
<td>Consultant</td>
<td>4 (7%)</td>
<td>5 (8%)</td>
<td>0.796</td>
</tr>
<tr>
<td>Other</td>
<td>0 (0%)</td>
<td>1 (2%)</td>
<td>0.317</td>
</tr>
<tr>
<td>Knowledge of outcome measurement*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No previous knowledge</td>
<td>8 (13%)</td>
<td>9 (15%)</td>
<td>0.705</td>
</tr>
<tr>
<td>Undergraduate</td>
<td>28 (47%)</td>
<td>29 (48%)</td>
<td>0.916</td>
</tr>
<tr>
<td>Postgraduate</td>
<td>8 (13%)</td>
<td>6 (10%)</td>
<td>0.532</td>
</tr>
<tr>
<td>Attendance at workshops</td>
<td>16 (27%)</td>
<td>19 (32%)</td>
<td>0.515</td>
</tr>
<tr>
<td>Attendance at conferences</td>
<td>12 (20%)</td>
<td>18 (30%)</td>
<td>0.157</td>
</tr>
<tr>
<td>Self taught</td>
<td>9 (15%)</td>
<td>8 (13%)</td>
<td>0.705</td>
</tr>
</tbody>
</table>

Note. Values are counts (± percentages)
Categories are not mutually exclusive
‡ Statistically significant, p<0.05
4.7.2 Participant flow details

One hundred and thirty three allied health professionals employed by The Spastic Centre of New South Wales underwent eligibility screening. Of this group 126 were eligible for participation (eligibility fraction\textsuperscript{3} for the study was 94.7%). Of the 126 allied health clinicians invited to participate in the study, 120 met the eligibility criteria and agreed to take part. The 120 people were enrolled and completed baseline measurements (enrolment fraction\textsuperscript{4} was 95.2%). Baseline data were not collected from non-participants.

Three months after the baseline assessment (primary endpoint), 116 participants remained in the study (96.7% retention rate). Four participants (n=4) in the control group did not have clinical files available to be audited. Six months after baseline assessment (secondary endpoint), 110 participants remained in the study (91.7% retention rate). Six participants (n=6) from the control group and four (n=4) participants from the intervention group did not have clinical files available to be audited. Despite this, the study remained adequately powered at both the primary and secondary endpoints. Figure 4.1 presents the participant flow diagram.

\textsuperscript{3} The proportion of participants deemed eligible for the study of all potential participants screened is termed the \textit{eligibility fraction} (Jones, Jones, McCowan, Montgomery & Fahey, 2009).

\textsuperscript{4} The proportion of eligible people who enrol in the study of those who were eligible for participation is termed \textit{enrolment fraction} (Jones, Jones, McCowan, Montgomery & Fahey, 2009).
Figure 4.1. Participant flow diagram

Allied Health Professionals invited to participate (n=126)

Consent forms returned (n=120)

Baseline measurements (n=120)
1) File Audit; 2) CReMOS; & 3) Outcome Measures Survey

Concealed, random allocation (n=120)

Intervention Group (n=60)
Outcome Measures Workshop

Participated in “Outcomes” workshop (n=60)

3 months follow-up support (n=60)

Primary Endpoint (3 month) measurements (n=60)
Dropouts: n=0
Audit data not available: n=0
1) File Audit; 2) CReMOS; & 3) Outcome Measures Survey

Secondary Endpoint (6 month) measurements (n=56)
Dropouts: n=0
Audit data not available: n=4
1) File Audit; 2) CReMOS; & 3) Outcome Measures Survey

Primary outcome data not available. Reasons behind audit data not being available: resigned n=4.

Control Group (n=60)
Evidence Based Practice Workshop

Participated in “Evidence Based Practice” workshop (n=50)

Primary Endpoint (3 month) measurements (n=56)
Dropouts: n=0
Audit data not available: n=4
1) File Audit; 2) CReMOS; & 3) Outcome Measures Survey

Secondary Endpoint (6 month) measurements (n=54)
Dropouts: n=0
Audit data not available: n=6
1) File Audit; 2) CReMOS; & 3) Outcome Measures Survey

Primary outcome data not available. Reasons behind audit data not being available: resigned n=5; maternity leave n=3.

Reasons behind refusal to consent:
- Leaving The Spastic Centre of NSW (n=1);
- did not believe they had suitable caseload for using outcome measures (n=5)

Reasons behind non-attendance at control workshop:
- illness (n=3);
- conference leave (n=1);
- not specified (n=6)

Reasons behind audit data not being available:
- resigned n=3;
- maternity leave n=1.

Primary outcome data not available. Reasons behind audit data not being available: resigned n=3; maternity leave n=1.
4.7.3 Baseline comparability - primary outcome

At baseline, five clinical files for each participant were randomly selected and audited by research assistants blinded to group allocation (see Table 4.2). A total of 300 client files were audited for the control group and 300 client files were audited for the intervention group. The proportion of clinicians who measured outcomes at baseline (that is, those clinicians who had used at least one outcome measure with at least one client in the 3 month baseline period) was 13% (8 of 60) for the control group and 32% (19 of 60) for the intervention group. The difference between groups in the proportion of clinicians who measured outcomes at baseline was statistically significant ($p=0.034$).

4.7.4 Baseline comparability - secondary outcomes

There were no statistically significant differences between groups on secondary outcomes, that is, frequency of outcome measures used or variety of outcome measures used captured by audit data (see Table 4.2). There were no statistically significant differences in responses on the self-report Outcome Measures Questionnaire between the intervention and control groups for proportion of clinicians who measure outcomes, the frequency of use of outcome measures, the variety of outcome measures used and knowledge and skill (see Table 4.4). Differences on the CReMOS were small and insignificant with both groups demonstrating an almost identical level of readiness to measure outcomes (see Table 4.4).
Table 4.3. Primary outcome measure: File audit

<table>
<thead>
<tr>
<th>Outcome Measure</th>
<th>Control Group* n (%)</th>
<th>Intervention Group* n (%)</th>
<th>Adjusted estimate of effect (difference between groups) †</th>
<th>p value‡</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Proportion of participants who measured outcomes (primary outcome)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline (n=60; n=60)</td>
<td>8 (13%)</td>
<td>19 (32%)</td>
<td></td>
<td>0.034</td>
</tr>
<tr>
<td>3 months (n=56; n=60)</td>
<td>14 (25%)</td>
<td>22 (37%)</td>
<td>Odds Ratio: 0.66 (95% CI .014 to 2.9) NNT: 8.57 (95% CI 3.58 to 18.83)</td>
<td>0.591</td>
</tr>
<tr>
<td>6 months (n=54; n=56)</td>
<td>9 (17%)</td>
<td>22 (39%)</td>
<td>Odds Ratio: 2.50 (95% CI 0.97 to 6.4) NNT: 4.42 (95% CI 2.61 to 16.99)</td>
<td>0.057</td>
</tr>
<tr>
<td><strong>Frequency of use of outcome measures (secondary outcome)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline (n=300; n=300)</td>
<td>0.32 (0.81; 3)</td>
<td>1.30 (2.7; 14)</td>
<td></td>
<td>0.441</td>
</tr>
<tr>
<td>3 months (n=280; n=300)</td>
<td>0.65 (1.58; 7)</td>
<td>0.80 (1.8; 9)</td>
<td>-0.17 (95% CI -0.76 to 0.41)</td>
<td>0.553</td>
</tr>
<tr>
<td>6 months (n=270; n=280)</td>
<td>0.47 (1.44; 7)</td>
<td>1.20(2.3; 10)</td>
<td>0.15 (95% CI -0.11 to 0.22)</td>
<td>0.094</td>
</tr>
<tr>
<td><strong>Outcome measure score sheet in file</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline (n=300; n=300)</td>
<td>0.30 (0.81; 3)</td>
<td>0.58 (1.0; 4)</td>
<td></td>
<td>0.765</td>
</tr>
<tr>
<td>3 months (n=280; n=300)</td>
<td>0.48 (1.09; 5)</td>
<td>0.55 (1.1; 4)</td>
<td>-0.12 (95% CI -0.47 to 0.21)</td>
<td>0.466</td>
</tr>
<tr>
<td>6 months (n=270; n=280)</td>
<td>0.29 (0.89; 4)</td>
<td>0.73 (1.5; 7)</td>
<td>0.29 (95% CI -0.12 to 0.72)</td>
<td>0.175</td>
</tr>
<tr>
<td><strong>Outcome measure score reported in file</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline (n=300; n=300)</td>
<td>0.09 (0.34; 2)</td>
<td>0.17 (0.52; 3)</td>
<td></td>
<td>0.874</td>
</tr>
<tr>
<td>3 months (n=280; n=300)</td>
<td>0.29 (0.78; 3)</td>
<td>0.32 (0.93; 4)</td>
<td>-0.04 (95% CI -0.32 to 0.23)</td>
<td>0.747</td>
</tr>
<tr>
<td>6 months (n=270; n=280)</td>
<td>0.21 (0.68; 3)</td>
<td>0.52 (1.13; 5)</td>
<td>0.26 (95% CI -0.08 to 0.59)</td>
<td>0.129</td>
</tr>
</tbody>
</table>

4 Across 5 client files
**Discusses change in outcome measure score over time**

<table>
<thead>
<tr>
<th></th>
<th>Baseline (n=300; n=300)</th>
<th>3 months (n=280; n=300)</th>
<th>6 months (n=270; n=280)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.02 (0.13; 1)</td>
<td>0.10 (0.3; 1)</td>
<td>0.818</td>
</tr>
<tr>
<td></td>
<td>0.25 (0.86; 5)</td>
<td>0.18 (0.57; 3)</td>
<td>1.07 (95% CI 0.42 to 1.71) 0.001*</td>
</tr>
<tr>
<td></td>
<td>0.11 (0.49; 3)</td>
<td>0.18 (0.7; 4)</td>
<td>1.36 (95% CI 0.67 to 2.05) 0.0001#</td>
</tr>
</tbody>
</table>

**Discusses functional implications of outcome measure score**

<table>
<thead>
<tr>
<th></th>
<th>Baseline (n=300; n=300)</th>
<th>3 months (n=280; n=300)</th>
<th>6 months (n=270; n=280)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.02 (0.13; 1)</td>
<td>0.15 (0.5; 3)</td>
<td>0.753</td>
</tr>
<tr>
<td></td>
<td>0.21 (0.71; 3)</td>
<td>0.22 (0.9; 5)</td>
<td>-0.09 (95% CI -0.38 to 0.19) 0.530</td>
</tr>
<tr>
<td></td>
<td>0.11 (0.49; 3)</td>
<td>0.23 (0.9; 5)</td>
<td>-0.056 (95% CI-0.21 to 0.32) 0.676</td>
</tr>
</tbody>
</table>

**Variety of outcome measures used** *(secondary outcome)*

<table>
<thead>
<tr>
<th></th>
<th>Baseline (n=300; n=300)</th>
<th>3 months (n=280; n=300)</th>
<th>6 months (n=270; n=280)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.32 (0.80; 3)</td>
<td>0.62 (1.2; 6)</td>
<td>0.757</td>
</tr>
<tr>
<td></td>
<td>0.77 (1.63; 6)</td>
<td>1.10 (1.9; 7)</td>
<td>-0.12 (95% CI -0.46 to 0.22) 0.502</td>
</tr>
<tr>
<td></td>
<td>0.43 (1.25; 6)</td>
<td>0.92 (1.6; 7)</td>
<td>0.34 (95% CI -0.16 to 0.84) 0.182</td>
</tr>
</tbody>
</table>

* Mean (sd; range) unless otherwise stated
† Between group differences were adjusted for the baseline value of the outcome
‡ p-value calculated using OLS regression for continuous items and binary logistic regression for categorical items
# Significant at p<0.05

---

5 Across 5 client files
4.7.5 Primary and secondary outcomes: Effect of education on outcome measure use

The primary study outcome, the proportion of participants who measured outcomes, showed no statistically significant difference between groups as recorded by the file audit at either 3 or 6 months post intervention (see Table 4.3). Audit data revealed between group differences were statistically significant for only one secondary outcome. That is, the file audit identified that frequency of outcome measure use, in terms of discussion of change in outcome measure score over time was statistically significant at both 3 and 6 months post intervention. After 3 months, more participants in the intervention group discussed change in outcome measure scores over time in their client files. Discussion of outcome measure scores increased by a mean of 1.07 occasions (95% CI 0.42 to 1.71) across five client files per participant in the intervention group when compared to the control group (p=0.001). After 6 months, discussion of change in outcome measure score over time in client files further increased by a mean of 1.36 occasions (95% CI 0.67 to 2.05) across five client files per participant in the intervention group when compared to the control group (p=0.001). Whilst these between group differences were statistically significant, the actual changes in behaviour were small. There were no clinically important or statistically significant differences between groups on the variety of outcome measures used (see Table 4.2).

4.7.6 Secondary outcomes

The Outcome Measures Questionnaire revealed a clinically important and statistically significant difference between groups in relation to the proportion of participants who reported measuring outcomes at 3 months, but not at 6 months. After 3 months, the odds of clinicians in the intervention group reporting they measured outcomes was 3.67 times greater than the odds of participants in the control group reporting they measured outcomes (OR 3.67, 95% CI 1.20 to 11.10) (p=0.021). An NNT analysis revealed that for one clinician to report measuring outcomes, 4 clinicians would need to participate in the intervention program (4.38, 95% CI= 2.61 to 15.22). There was no significant between groups difference with regard to the average percentage of the participant’s client caseload where outcome measures are used. There was however a significant difference
between the groups in relation to the variety of outcome measures used by the intervention and control group at 3 and 6 months. After 3 months, the variety of outcome measures used increased by a mean of 1.7 measures (1.7, 95% CI 0.7 to 2.6) in the intervention group when compared to the control group ($p=0.001$). After 6 months, the variety of outcome measures used increased by a mean of 2.1 measures (2.1, 95% CI 1.0 to 3.3) in the intervention group when compared to the control group ($p=0.0001$). In terms of the participants’ knowledge and skill there was a significant difference between the groups related to writing measurable goals (3 months), specifically identifying the desired outcome of intervention (3 and 6 months), selecting the most appropriate outcome measure (3 and 6 months), administering the outcome measure (3 months), interpreting and reporting outcome measure results (3 months) (See Table 4.4). All statistically significant differences between groups were in favour of the intervention group.

CReMOS data revealed a significant difference between the control and intervention group with regard to clinician readiness to measure outcomes at both 3 and 6 months post intervention as reported by the CReMOS. After 3 months, clinician readiness to measure outcomes increased by a mean of 5.99 points (95% CI 2.93 to 9.06) in the intervention group when compared to the control group ($p=0.0001$). After 6 months, clinician readiness to measure outcomes increased by a mean of 6.08 points (95% CI 2.17 to 10.00) in the intervention group when compared to the control group. This finding was also statistically significant ($p=0.003$).
Table 4.4. Secondary outcome measures

<table>
<thead>
<tr>
<th>Outcome Measures Questionnaire</th>
<th>Control group (n)</th>
<th>Intervention group (n)</th>
<th>Adjusted estimate of effect (difference)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Proportion of participants who report measuring outcomes</strong> n (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline (n=60; n=60)</td>
<td>29 (48%)</td>
<td>38 (63%)</td>
<td>OR: 3.67 (95% CI 1.20 to 11.10)</td>
</tr>
<tr>
<td>3 months (n=57; n=57)</td>
<td>35 (61%)</td>
<td>48 (84%)</td>
<td>OR: 1.70 (95% CI 0.61 to 4.70)</td>
</tr>
<tr>
<td>6 months (n=47; n=53)</td>
<td>34 (72%)</td>
<td>44 (83%)</td>
<td></td>
</tr>
<tr>
<td><strong>Frequency of use of outcome measures with clients</strong> mean (% of client caseload); (sd; range)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline (n=60; n=60)</td>
<td>25.95% (37.3; 100)</td>
<td>24.935 (30.9; 100)</td>
<td></td>
</tr>
<tr>
<td>3 months (n=57; n=57)</td>
<td>26.96% (31.23; 100)</td>
<td>30.60% (28.7; 100)</td>
<td>4.14% (95% CI -5.43 to 13.71)</td>
</tr>
<tr>
<td>6 months (n=47; n=53)</td>
<td>28.23% (29.87; 100)</td>
<td>30.70% (30.9; 100)</td>
<td>4.16% (95% CI -6.47 to 15.51)</td>
</tr>
<tr>
<td><strong>Variety of outcome measures used by clinicians</strong> mean (sd; range)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline (n=60; n=60)</td>
<td>2.46 (2.87; 11)</td>
<td>3.0 (2.8; 10)</td>
<td></td>
</tr>
<tr>
<td>3 months (n=57; n=57)</td>
<td>3.16 (3.40; 13)</td>
<td>5.2 (3.1; 11)</td>
<td>1.7 (95% CI 0.7 to 2.6)</td>
</tr>
<tr>
<td>6 months (n=47; n=53)</td>
<td>3.53 (3.60; 12)</td>
<td>5.8 (3.9; 22)</td>
<td>2.1 (95% CI 1.0 to 3.3)</td>
</tr>
<tr>
<td><strong>Knowledge and skill</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Requires assistance to write measurable goals n (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline (n=60; n=60)</td>
<td>57 (95%)</td>
<td>53 (88%)</td>
<td></td>
</tr>
<tr>
<td>3 months (n=57; n=57)</td>
<td>51 (89%)</td>
<td>38 (67%)</td>
<td>OR: 0.32 (95% CI 0.11 to 0.92)</td>
</tr>
<tr>
<td>6 months (n=47; n=53)</td>
<td>39 (83%)</td>
<td>37 (70%)</td>
<td>OR: 0.63 (95% CI 0.25 to 1.58)</td>
</tr>
<tr>
<td>Requires assistance to specifically identify the desired outcome of intervention n (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline (n=60; n=60)</td>
<td>49 (82%)</td>
<td>47 (78%)</td>
<td></td>
</tr>
<tr>
<td>3 months (n=57; n=57)</td>
<td>36 (63%)</td>
<td>23 (40%)</td>
<td>OR: 0.38 (95% CI 0.17 to 0.87)</td>
</tr>
<tr>
<td>6 months (n=47; n=53)</td>
<td>29 (62%)</td>
<td>20 (38%)</td>
<td>OR: 0.40 (95% CI 0.17 to 0.95)</td>
</tr>
<tr>
<td>Requires assistance to identify available outcome measures - n (%)</td>
<td>Baseline (n=60; n=60)</td>
<td>58 (97%)</td>
<td>60 (100%)</td>
</tr>
<tr>
<td>3 months (n=57; n=57)</td>
<td>53 (93%)</td>
<td>47 (82%)</td>
<td></td>
</tr>
<tr>
<td>6 months (n=47; n=53)</td>
<td>44 (94%)</td>
<td>42 (79%)</td>
<td>OR: 0.26 (95% CI 0.07 to 1.03)</td>
</tr>
</tbody>
</table>

| Requires assistance to select the most appropriate outcome measure - n (%) | Baseline (n=60; n=60) | 56 (93%) | 58 (97%) | OR: 0.07 (95% CI 0.01 to 0.56) | 0.852 |
| 3 months (n=57; n=57) | 54 (95%) | 45 (79%) | NNT: 2.64 |
| 6 months (n=47; n=53) | 43 (91%) | 38 (72%) | OR: 0.18 (95% CI 0.05 to 0.68) | 0.011 |

| Requires assistance to administer outcome measurement tools | Baseline (n=60; n=60) | 57 (95%) | 53 (88%) | OR: 0.30 (95% CI 0.10 to 0.93) | 0.703 |
| 3 months (n=57; n=57) | 50 (88%) | 39 (68%) | NNT: 5.19 |
| 6 months (n=47; n=53) | 37 (79%) | 34 (64%) | OR: 0.56 (95% CI 0.21 to 1.45) | 0.232 |

| Requires assistance to interpret and report outcome measure results - n (%) | Baseline (n=60; n=60) | 57 (95%) | 54 (90%) | OR: 0.35 (95% CI 0.13 to 0.96) | 0.776 |
| 3 months (n=57; n=57) | 49 (86%) | 39 (68%) | NNT: 5.64 |
| 6 months (n=47; n=53) | 38 (81%) | 37 (70%) | OR: 0.60 (95% CI 0.23 to 1.59) | 0.307 |

| CReMOS | (0 – 100) mean (sd; range) |
| Clinician readiness to measure outcomes (Secondary outcome) | Baseline (n=60; n=60) | 50.8 (12.6; 57) | 49.6 (12.6; 56) | OR: 0.99 (95% CI 2.93 to 9.06) | 0.906 |
| 3 months (n=57; n=57) | 50.9 (14.5; 67) | 55.9 (12.7; 60) |
| 6 months (n=47; n=53) | 50.7 (12.7; 64) | 56.0 (13.7; 91) | OR: 6.08 (95% CI 2.17 to 10.00) | 0.003 |

# Significant at p<0.05
4.7.7 Content analysis of follow-up support data

Throughout the three month follow up period, 45% (27 out of 60) of participants in the intervention group sent one or more emails requesting support during the 3 month follow-up period. A total of 14 group emails were sent to all participants in the intervention group. Sixty-eight individual emails were received and 84 individual emails were sent by the author in response to participants’ questions and requests for information. Content analysis of email data revealed enquires regarding setting and writing SMART goals, selecting appropriate outcome measures, implementation of outcome measures, scoring outcome measures, reporting outcome measurement results, clinical decision making, and requests for additional resources (literature), and outcome measures.

Table 4.5 Follow-up support program email data

<table>
<thead>
<tr>
<th>Email data</th>
<th>Count (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group emails sent by chief investigator</td>
<td>14</td>
</tr>
<tr>
<td>Emails sent to individual participants by chief investigator</td>
<td>84</td>
</tr>
<tr>
<td>Emails sent to chief investigator by individual participants</td>
<td>68</td>
</tr>
<tr>
<td>Number of participants who sent one or more emails to the chief investigator</td>
<td>27</td>
</tr>
</tbody>
</table>

Email content

- Use/implementation of outcome measure: 24
- Request for additional resources (literature): 19
- Request for additional outcome measures: 14
- Scoring outcome measure: 11
- Setting and writing SMART goals: 6
- Selecting appropriate outcome measures: 6
- Reporting outcome measurement results: 3
- Clinical decision making: 1

Related to telephone support, the author responded to 12 individual calls and one group phone link-up call. Participants most commonly wanted information on how to use
specific outcome measures with their clients, followed by how to score outcome measures. Two participants discussed issues about reporting outcome measurement results. Further, four participants requested additional resources (literature), and three participants requested additional outcome measures (see Table 4.6).

**Table 4.6 Follow-up support program telephone log data**

<table>
<thead>
<tr>
<th>Telephone data</th>
<th>Count (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chief investigator received telephone calls</td>
<td>12</td>
</tr>
<tr>
<td>Telephone messages left by chief investigator</td>
<td>4</td>
</tr>
<tr>
<td>Teleconference telephone phone link up</td>
<td>1</td>
</tr>
</tbody>
</table>

**Telephone conversation content**

| Use/implementation of outcome measures                  | 11        |
| Scoring outcome measures                                | 5         |
| Selecting appropriate outcome measures                  | 4         |
| Request for additional resources (literature)           | 4         |
| Setting and writing SMART goals                         | 2         |
| Request for additional outcome measures                 | 3         |
| Reporting outcome measurement results                   | 2         |

The author attended six individual and group meetings totalling 8.5 hours. Content analyses of the notes taken during the meetings revealed most common topic of discussion related to selection of appropriate outcome measures for use with specific client groups. Other questions were about using or implementation of outcome measures, reporting outcome measurement results, and again, requests were made for additional resources (literature) and additional outcome measures (see Table 4.7).
Table 4.7 Follow-up support program face to face meeting data

<table>
<thead>
<tr>
<th>Meeting data</th>
<th>Count (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meetings requested by participants</td>
<td>6</td>
</tr>
<tr>
<td><strong>Meeting content</strong></td>
<td></td>
</tr>
<tr>
<td>Selecting appropriate outcome measures</td>
<td>4</td>
</tr>
<tr>
<td>Use/implementation of outcome measures</td>
<td>3</td>
</tr>
<tr>
<td>Reporting outcome measurement results</td>
<td>2</td>
</tr>
<tr>
<td>Request for additional outcome measures</td>
<td>2</td>
</tr>
<tr>
<td>Request for additional resources (literature)</td>
<td>1</td>
</tr>
</tbody>
</table>

4.8 Discussion

4.8.1 Key findings

A one-day interactive educational workshop with three months of email and telephone follow-up support did not increase use of outcome measures in this group of allied health clinicians. The current study used an objective file audit to reflect actual outcome measurement practices of clinicians and two subjective, self-report measures to reflect clinicians’ perceptions of their outcome measurement practices. The proportion of clinicians measuring outcomes based on file audits was much lower than participants indicated in their self-report surveys. Differences between groups were not statistically significant for audit data, but were statistically significant for survey data at three months. Frequency of outcome measure use by clinicians was found to be very low according to audit data. The only statistically significant between groups difference was clinicians in the intervention group documented changes in outcome measure scores over time more than the control group. These findings provide empirical evidence that one of the most commonly recommended strategies to facilitate clinician behaviour change is ineffective. The findings from this study will be discussed in detail within the context of current literature.
4.8.2 Sample characteristics
Whilst this study sample included six major allied health professional groups, 85% of the study sample was represented by occupational therapists, physiotherapists and speech pathologists. These three professional groups comprised only 47% of the Australian allied health workforce in 2001 (Australian Health Workforce Advisory Committee, 2006) suggesting that these three groups may be overrepresented in the current study. Other large groupings of allied health professionals in 2001 included clinical psychologists 19%, optometrists 7%, health professionals not classified 6%, dieticians 5% and podiatrists 4%. Further, 96% of participants in this study were female and 4% male compared to the Australian allied health workforce which consists of 78% females and 32% males (Australian Health Workforce Advisory Committee, 2006). With the exception of profession and gender, the sample was representative of the allied health workforce population in Australia, in areas such as age, post-graduate qualifications and working location (city/regional/rural). Therefore, findings from this study are likely to be applicable to the majority of allied health clinicians in the Australian context bearing in mind the over representation of occupational therapists, physiotherapists and speech pathologists, and female clinicians.

4.8.3 Drop-outs and missing data
No participants dropped out of the study. At 3 months, audit data were unavailable for four participants (4/120), or 3% of the total sample. As such, there was a loss of primary outcome data at the first post intervention follow-up point. Reasons for missing data included three participants resigning from their positions at The Spastic Centre, and one participant taking maternity leave. At six months, data were unavailable for ten participants (10/120) or 8% of the total sample. Missing data were again due to the resignations of three participants, and three participants going on maternity leave. Therefore, there was also a loss of primary outcome data at the second post intervention follow-up point.
4.8.4 Primary outcomes

Audits are often used in health care settings to provide clinicians with data about their performance in an attempt to help improve their practice (Jamtvedt et al., 2006). Audit is used an objective measure to reflect clinicians actual performance as opposed to perceived or ideal performance. Based on current literature, audit has not previously been used to measure change in clinicians’ outcome measurement behaviours. The findings of the file audit used in the current study are discussed below.

4.8.4.1 Proportion of clinicians measuring outcomes

The primary outcome data from file audits showed no difference between the intervention group and the control group in the proportion of clinicians who measure outcomes. Differences between groups were neither statistically significant, nor large enough to be clinically important. At 3 months 37% (22 out of 60) participants in the intervention group had used an outcome measure on at least one occasion compared to 25 % (14 out of 60) participants in the control group. At six months, 39% (22 out of 56) participants in the intervention group measured outcomes compared to 17% (9 out of 54) participants in the control group. Audit data revealed the proportion of clinicians measuring outcomes at three and six months post intervention in the current study were often no higher than baseline data reported in other outcome measure use studies that used self-report survey outcome measures\(^6\). As such, the findings of the current study add credence to the body of research that suggests use of self-report data, particularly when assessing performance or behaviour change is subject to bias (Adams, Soumerai, Lomas & Ross-Degnan, 1999; Bailey, 2008; Finkelstein, Lozano, Shulruff, Inui, Soumerai & Weiss, 2000; Maue, Segal, Kimberlin & Lipowski, 2004). The difference in findings between audit and self-report data clearly reflect an over-estimation of clinicians’ actual performance. Inaccurate data such as these make it difficult for academics, researchers, educators and managers alike to assist clinicians to develop knowledge and skills required to competently engage in

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\(^6\) Abrams et al. (2006) - 30% use at baseline and 66% use at follow-up; Akinpelu & Eluchie (2006) - 40% used and were familiar with some standardised measures; Chesson et al (1996) 39.1% of therapy departments in Scotland used outcome measures; Cook et al (2007) - 65.7% use at baseline and 91.4% use at follow-up; Garland et al. (2003) - 8% use; Hanna et al (2007) - 59% use standardised outcome measures daily; Kay et al. (2001) - 97% use by staff therapists and 100% use by professional practice leaders; Mayo et al. (1993) - 50% use, however only 20% could actually name an outcome measure; Stokes & O’Neill (2008) – 30-50% use in 1998 and 100% use in 2003.
clinical behaviours such as outcome measurement. Further, from a scholarly perspective it should be recognised that sole reliance on self-report data when assessing performance or behaviour change is both scientifically indefensible and misleading to consumers of research (Adams et al., 1999).

4.8.4.2 Frequency of outcome measure use

*Frequency of outcome measure use was indicated by the number of times a clinician used an outcome measure; the presence of an outcome measure score sheet in the client file; evidence of written numerical outcome measure score in the file; and/or discussion of change in outcome measure score over time; and a written description in the file of the functional implications of outcome measure results. No difference was found between groups in relation to the frequency of outcome measure use, although clinicians in the interventions group documented change over time significantly more than the control group. The frequency of outcome measure use overall was extremely low for both groups. Audit data revealed that on average individual clinicians documented something about outcome measurement on less than one occasion once per client file. In most instances the frequency for these behaviours was closer to zero. The reality was that very few clinicians’ record outcome measure use, leading to the assumption clinicians are not measuring outcomes, although self-report data from the current study suggests otherwise.

4.8.4.3 Variety of outcome measures used

Results of the current study also showed no difference between groups in the *variety* of outcome measures used. On average participants used less than one outcome measure per client file. Most clinicians were not using any outcome measures even after receiving focussed education, follow-up support and a tailored packaged of ready to use measures. The over-estimation of *variety* of outcome measures used evident in the self-report data of this study is consistent with findings presented in other studies where self-report measures were used as the sole means of measuring change in behaviour or performance. The before and after study conducted by Cook et al. (2007) provides an example of potential over reporting in the variety of outcome measures used by clinicians. Participants in this study (n=35) reported using between 1 and 10 outcome measures with
their clients with a mean of 4 outcome measures post a one-day educational workshop intervention. Further, participants reported that all nine ready to use outcome measures presented at the workshop were being used by some of the participants in addition to non-standard measures (Cook et al., 2007).

No other published studies have used a clinical file audit to establish the proportion of allied health clinicians who measure outcomes, their frequency of outcome measure use or the variety of outcome measures used. Other studies have used self-report surveys, individual interviews or focus groups as a means of assessing outcome measurement performance or behaviour change. It would appear that self-report data often reflects an idealised version of practice as opposed to what actually takes place (Bailey, 2008; Finkelstein et al., 2000). Self-report data from the current study will now be discussed.

4.8.5 Secondary outcomes

Self-reported CReMOS scores demonstrated that participants in the intervention group felt “more” ready to measure outcomes. At both follow-up points, participants in the intervention group scored a mean of 6 points higher on the CReMOS than control group participants. This difference, whilst statistically significant, represents less than a 10% increase on the 100-point CReMOS scale and is not considered clinically important. Further, the greater readiness to measure outcomes reported by the intervention group did not translate into practice. The proportion of participants measuring outcomes in the intervention group did not increase significantly, nor were they more frequently using outcome measures with their clients. Further, despite being given a package of ready to use outcome measures and being shown how to use them in practice, participants in the intervention group were not using a greater variety of outcome measures compared to the control group. Whilst chapter three demonstrated that the CReMOS has strong psychometric properties, this study suggests that a clinician’s readiness to measure outcomes may not translate to behaviour change. These findings add to the body of literature which debates measurement of readiness to change and whether readiness to change is a reliable predictor of behaviour change. For example, over the past 20 years there has been a proliferation of instruments claiming to measure readiness to change.
These readiness to change instruments vary in their method of assessment, theoretical underpinnings, intended populations and their psychometric rigor. Further, many of these instruments have not been tested empirically and have limited or no research to support their clinical application and utility (Carey, Purmine, Maisto & Cary, 1999).

4.8.5.1 Proportion of clinicians measuring outcomes

The high proportion of clinicians who self reported use of outcome measures in this study is similar to other studies that used self-report measures. An Australian study reported a 25.7% increase from 65.7% at baseline to 91.4% at 4 months post intervention based on self-reporting by occupational therapists (Cook et al., 2007). Another Australian study reported an increase of 36% in use of standardised outcome measures from 30% at baseline to 66% at follow-up by physiotherapists using a self report survey (Abrams et al., 2006). In 1992, 50% Canadian physiotherapists reported using standardised outcome measures, however, 10% of their participants did not name any standardised instruments and 20% identified only one instrument (Mayo et al., 1993). The study conducted by Mayo and colleagues (1993) was followed up by (Kay et al., 2001) in 1998 after Health Canada and the Canadian Physiotherapy Association conducted a series of introductory outcome measure workshops in nine cities from 1995 to 1996, and compiled a battery of outcome measure instruments suitable for rehabilitation which was published in 1994. Results of the follow-up study revealed 97-100% of participants reported using at least one standardised outcome measure on the list provided by the researchers in the questionnaire. These findings are contrasted by a study conducted by (Akinpelu & Eluchie, 2006) in Nigeria, Africa which is considered to be a developing nation. The researchers found that less than 40% of physiotherapists reported use of standardised outcome measures in practice. The findings of a study conducted by Garland et al (2003) in California in the United States of America with counsellors, social workers, psychologists and psychiatrists found less than 10% of clinicians reported using standardised outcome measures or scales.
4.8.5.2 Frequency of outcome measure use
In the current study, clinicians estimated the percentage of their client caseload where outcome measures were used. This percentage was used to establish frequency of outcome measures use. There was not a significant increase in the proportion of client caseload where outcome measures were being used; therefore in the current study, clinicians were not measuring outcomes with any increased frequency with their clients. No other studies have reported this type of data and as such comparisons cannot be made.

4.8.5.3 Variety of outcome measures used
Although self-reported frequency did not alter, findings from the current study did show a significant difference between groups in the variety of outcome measures reported to be used. On average at 3 months, participants in the intervention group reported they used five outcome measures compared to three outcome measures used by participants in the control group. At six months, clinicians in the intervention group on average reported using six outcome measures compared to four in the control group. It should be noted however that there is a considerable discrepancy in the findings related to the variety of outcome measures clinicians’ actually use according to audit results and what clinicians report they use. The clinical file audit revealed that on average clinicians use less than one (in many instances closer to zero) outcome measure per client. In the study by (Cook et al., 2007) Australian occupational therapists working in occupational rehabilitation and pain management reported an increase in variety of outcome measures used from a mean of 15 measures to a mean of 18 measures post intervention. The figures reported by Cook et al are considerably higher than those for the current study, and may be due to the different clinical settings and reporting requirements of different organisations.

4.8.5.4 Reporting outcome measure use
The Outcome Measures Questionnaire also provides an indication of how allied health clinicians report the results of the outcome measures they use. For most reporting practices there was no significant difference between groups at three or six months post intervention. For example, there were no differences related to including a full copy of outcome measure results or the outcome measure score sheet in the client file (34% to
51% across both groups); an outcome measure score being recorded in the client file (23% to 32% across both groups); or discussion of functional implications of outcome measure scores at case conferences or team meetings (15% to 21% across both groups). A significant difference between groups was found at 3 months in favour of the intervention group related to discussing the results of outcome measures with clients (67% of the intervention group compared to 47% of the control group), and at 6 months in favour of the intervention group related to including a summary of outcome measure results in client files (51% of the intervention group compared to 37% of the control group). No other studies have explored how clinicians report the results of outcome measures.

4.8.5.5 Knowledge and skill related to outcome measurement

The results from the Outcome Measures Questionnaire show a significant difference between groups related to the need for assistance to develop knowledge and skills in the outcome measurement process. The key steps explored included: writing measurable goals, identifying the desired outcome of intervention, identifying available outcomes, selecting the most appropriate outcome measure to use with clients, administering outcome measurement tools, and interpreting outcome measure scores and reporting outcome measure results. The amount of assistance perceived to be required by participants (from both the intervention and control group) to attain knowledge and skill in all of these areas ranged from 38% to 100%. Further, over 60% of participants reported required assistance in all steps of the outcome measurement process with the exception of participants in the intervention group who needed less assistance to identify the desired outcome of intervention. From these findings it is clear that outcome measurement should not be an assumed skill of all allied health clinicians and that most clinicians will require training to develop their knowledge and skill in this area. One study found that 92% of participants considered themselves to be knowledgeable in the use of outcomes to monitor performance (Cleary et al., 2002). However, other authors identified lack of knowledge and skill to be a major barrier to outcome measure use in practice. According to Kay et al. (2001), this barrier has not changed since the early 1990’s. Participants in two studies were even confused about the meaning of the term ‘outcome measure’ and some reported not knowing what the researchers were referring to (Chesson et al., 1996;
Other authors have also highlighted this to be a problem (Austin & Clark, 1993; Bowman & Llewellyn, 2002). A number of studies which have used self-report methods such as surveys, interview or focus groups have established clinicians do not possess adequate knowledge and skills to measure outcomes in clinical practice (Finch et al., 2002; Garland et al., 2003; Kay et al., 2001; Mayo et al., 1993). Interestingly, no other study has explored the specific areas of knowledge and skill that are lacking as this study has done, and no studies have tested knowledge and skill in relation to the outcome measurement process. One study has tested clinician’s knowledge of specific standardised measures (Akinpelu & Eluchie, 2006).

4.8.5.6 Support for clinicians measuring outcomes

Follow-up support was under-utilised by participants. These findings are interesting considering the amount of assistance clinicians reported needing to develop their knowledge and skills in the outcome measurement process. With regard to writing measurable goals, the proportion of participants in the intervention group who said they required assistance post intervention ranged from 67% to 70%, yet only six requests via email and two request via telephone were received about setting measurable goals. Fewer participants in the intervention group (38% to 40%) reported requiring assistance to identify the desired outcome of intervention. This concept was not identified in the content analysis of the email, telephone or meeting data. A high proportion of participants (72% to 79%) in the intervention group reported requiring assistance to select appropriate outcome measures for their clients. However, only 6 requests for assistance in this area were received via email, four via telephone and four requests were made in the context of face to face meetings. Again, a reasonably high proportion (64% to 68%) of participants in the intervention group reported requiring assistance to develop skills in administering outcome measurement instrument tools. This step in the outcome measurement process attracted the most requests for assistance in the follow-up support program. Twenty four request via email were received, 11 via telephone and three in face to face meetings. After the one day workshop, 68% to 70% of participants in the intervention group reported needing assistance to interpret the scores of outcome measures and report findings of outcome measures. This translated to 11 email requests for assistance related
to scoring measures, 3 email requests related to reporting results, five telephone requests related to scoring and 2 telephone requests related to reporting. In face to face meetings no discussion was had related scoring outcome measures and on two occasions issues related to reporting outcome measures were raised. Thus, based on these results, it is clear that the majority of clinicians did not use the email and telephone follow-up support program as a means of addressing their knowledge and skill development needs.

This current study did not explore why clinicians did, or did not make use of this program. This issue will be investigated as part of a follow-up study planned by the author and her colleagues. As previously described in Chapter Two of this thesis, follow up support programs implemented to ensure desired behaviour change after educational interventions are monitored, maintained and reinforced (NHS Centre for Reviews and Dissemination, 1999). Furthermore, research indicates that individuals are more likely to initiate change in the presence of others who are helpful, supportive and provide understanding (Hanna, 2002). However, since more than half of the participants did not make use of the follow up support program, changes in clinicians’ outcome measurement behaviours were not able to be adequately monitored or reinforced. This finding is not isolated to this study. A study comparing the instructional efficacy of internet based continuing medical education (CME) with live interactive CME workshops found that out of the 97 physicians who participated in the study only 2 (4%) made use of email and telephone follow up support (Fordis et al., 2005). No explanation was given by authors of this study for the poor utilisation of email and telephone support. However, fifty-one percent (51%) of participants in the study conducted by Cook et al., (2007) perceived the four months of email and telephone support helped to effect change in their outcome measurement practices. No data were reported on actual usage of email and telephone follow-up support. Organisational and industry sector influences are likely to have contributed to differences reported between studies.
4.9 Strengths and limitations of this study

There are a number of strengths in this study. The gold-standard methodology, a randomised controlled trial was used to evaluate the effectiveness of an interactive educational workshop and three month email and telephone follow-up support program in increasing allied health clinician’s outcome measurement behaviours. Randomised controlled trials are the highest form of evidence when comparing interventions (Roberts & Dicenso, 1999; Sackett & Wennberg, 1997). This trial employed appropriate randomisation strategies, allocation concealment, and blinded assessment of outcomes to minimise bias. Participant retention rates were good at all points of measurement: baseline (n=120), three months (n=116) and 6 months (n=110). The research protocol employed an objective and reliable primary outcome measure, a clinical file audit and a secondary outcome measurement tool, the CReMOS, with established excellent psychometric properties. Further, participants were unaware that the clinical file audit had been conducted until its completion; this helped to reduce potential bias related to the Hawthorne effect. Finally, the interactive educational program and follow-up support program were carefully designed to be similar to the type of workshops participants would have access to in the clinical setting. The results of this study therefore have good generalisability.

There are also limitations of this study that need to be considered. Firstly, although this trial was randomised, it was not a double blind trial, that is, the participants were not blind to the intervention they received, nor were the investigators blind to participant allocation. It is generally acknowledged that to reduce bias it is best to blind participant and investigators to the intervention being received (Jadad & Enkin, 2007; Pocock, 1983). However, when evaluating the effectiveness of a specific multifaceted educational intervention, it is difficult to blind participants because they are aware of the educational content being evaluated. In an attempt to reduce contamination between groups, the investigators made a specific request of participants in the intervention group not to share information or resources with participants in the control group.
Cluster randomisation would have been an optimal solution to reduce potential contamination of data and bias within the study. However, cluster randomised trials are more complex to design, analyse and execute. Further, the sample size requirements to conduct an adequately powered trial randomised trial prohibited this option being implemented with participants from The Spastic Centre of New South Wales (Campbell, Elbourne & Altman, 2004; Donner & Klar, 2004; Elderige, Asby, Feder, Rudnicka & Ukoumunne, 2004; Grimshaw, Eccles, Campbell & Elbourne, 2005; Torgerson, 2001). Data was collected on the self-report surveys in an attempt to establish the level of contamination within the study. Participants were asked to state whether they had discussed workshop content or shared resources with participants from the “other” group. A small number of participants at three months, 5% (five out of 107) indicated they had potentially contaminated the study, and 11% (11/100) participants at 6 months. Further, it was not possible to blind the investigators as they were delivering the workshop content and the author was also providing the three months email and telephone follow-up support. Further, the transformation of ordinal and ratio survey data into dichotomous outcomes is a limitation of this study as information about size of effect may have been lost (The Cochrane Collaboration, 2002). Another limitation of this study is the use of a non-parametric test when analysing dichotomous outcomes. Non-parametric tests are less powerful and sensitive to detect the effect of the independent variable (Hicks, 2004). Therefore, caution should be taken when interpreting the effect size and statistical significance of the results of the dichotomous outcomes. Finally, this study was conducted within one organisation, The Spastic Centre of New South Wales, in one state in Australia. Consequently, care is needed when applying the results to allied health clinicians working in other organisations, states of Australia and countries, as organisation policy, procedure and work culture may differ.

4.10 Conclusion
This study has shown that interactive educational workshops, printed educational materials and follow-up support are not effective in increasing allied health clinicians’
measurement of clinical outcomes. Five research questions were posed at the start of the chapter. The answers to these questions are summarised below:

1) There was no statistically significant difference between groups post intervention related to the proportion of participants who measure outcomes.

2) There was no statistically significant difference between groups post intervention related to the frequency with which outcome measures are used by participants, with the exception of the intervention group discussing client change over time more frequently post intervention.

3) There was no statistically significant difference between the groups post intervention regarding the variety of outcome measures used by participants.

4) Participants in the intervention group reported greater knowledge and skills of outcome measurement at three months in relation to writing measurable goals, identifying the desired outcome of intervention, selecting the most appropriate outcome measure, administering outcome measures and interpreting and reporting outcome measure results. At six months the intervention group reported greater knowledge and skill in identifying the desired outcome of intervention and selecting the most appropriate outcome measure.

5) Participants in the intervention group were more ready to measure outcomes post intervention.

Key findings of this clinical trial have been discussed in the context of current literature. Chapter five will present hypotheses related to the findings of this study, a discussion about the discrepancy between audit and self-report survey data on the primary outcomes and implications for practice, education, policy development and future research.
Chapter Five

Discussion

5.1 Introduction
Routinely measuring clinical outcomes is a challenge for allied health clinicians. If allied health clinicians are to begin measuring outcomes routinely, a change in attitudes and behaviour is necessary. However, individuals need to be ready to change and often move through several stages of change before practice change is observed. Further, clinicians require adequate knowledge and skill to apply to appropriate outcome measurement in their daily practice. Whilst it is problematic that few allied health clinicians routinely measure clinical outcomes with their clients, there is limited evidence regarding the most effective strategies to increase outcome measure use. In the absence of sound research evidence health care organisations continue to invest time and money on strategies such as in-service education, continuing professional development workshops and purchase of educational resources that may not be effective in achieving their desired goals of increasing clinician use of outcome measures.

The aim of this thesis therefore was to evaluate the effect of a multifaceted education program on the outcome measurement behaviours of allied health clinicians. Two studies were undertaken and are reported in this thesis. Study One outlined the development and psychometric testing of the CReMOS. The CReMOS is the first instrument of its kind to assess clinician’s readiness to measure outcomes. Study Two contributes new knowledge to the body of literature on allied health clinicians’ outcome measurement behaviours. Findings of Study Two revealed that a multi-faceted educational program did not increase allied health clinicians’ use of outcome measures. The information from both studies therefore can be utilised to refine the strategies to promote clinician use of outcome measures in practice.

This discussion chapter reviews key findings of this research program and explores these further in the context of published literature. The contribution of these two studies to the existing body
of knowledge is discussed. Limitations of these studies are outlined and implications for practice, education and research are discussed.

5.2 Key findings
The results of a randomised controlled trial using audit data revealed that a one day interactive educational workshop coupled with printed educational materials and three months of email and telephone support was not effective in increasing the proportion of allied health clinicians’ using outcome measures. Further, clinicians’ level of readiness to change as established by CReMOS scores was not predictive of their actual outcome measurement behaviours in clinical practice. This study was the first to establish clinicians’ level of readiness to measure outcomes. The audit of participants’ clinical files, revealed a discrepancy between objective data and the results obtained from the subjective, self report measure, the Outcome Measures Questionnaire. Clinicians’ reported outcome measure use was much higher than the file audit (objective data) revealed. These findings support the body of literature that suggests self-reporting is prone to inflation and bias and thus should be viewed with caution. These findings also suggest clinicians’ perceptions about their outcome measure use is different to their behaviour. Whilst the self-report results from this study are similar to previous studies that used self-report, the objective audit data from this study as may provide a more accurate and realistic picture of what clinicians are doing in practice.

5.3 Major findings
This program of research produced five major findings. First, the 25-item CReMOS was found to be a psychometrically sound survey instrument capable of discriminating between clinicians with little or no interest in measuring outcomes, and those who are already measuring outcomes to varying degrees. Second, however, clinician’s level of readiness to measure outcomes (or the CReMOS scores) was not predictive of outcome measurement behaviour. Third, results of the RCT audit data showed no significant between-group differences post intervention related to: 1) the proportion of participants measuring outcomes, 2) the frequency of outcome measures used, and 3) the variety of measures used. Fourth, participants in the intervention group self reported
greater knowledge and skills related to steps in the outcome measurement process compared to the control group. Fifth, participants in the intervention group were more ready to measure outcomes post intervention.

5.4 Findings in detail
The five major findings of this research program will be discussed below in the context of existing literature.

5.4.1 The CReMOS is a psychometrically sound survey instrument
The instrumentation study described in Chapter Three established the content validity, construct validity, internal consistency, temporal (stability) reliability and predictive validity of the CReMOS. Content validity testing revealed both the items and instrument as a whole had a high CVI. Construct validity was established using both Classical Test Theory and Item Response Theory. Classical Test Theory methods of EFA and CFA were used. The initial EFA generated a five factor solution, which was consistent with the five stages of change (Prochaska & DiClemente, 1982). CFA was then employed and a two factor model was proposed combining the maintenance factor with the preparation/action factor. Four items with low loadings were dropped. Rasch analysis was conducted and findings supported dropping the original four items as well as an additional misfitting/redundant item. Thus, the CReMOS scale was reduced from 30 to 25 items. Further, Rasch testing highlighted the need to modify the Likert scale of the CReMOS from a 6 point scale to a 5 point scale. Internal consistency for the 25-item CReMOS was high. The temporal (stability) reliability of CReMOS total scores was high but predictive validity was poor for this sample population.

To date, no other instruments measure clinician readiness to measure outcomes. However two short, self report surveys have been developed that measure readiness to adopt evidenced based practice interventions. These surveys are the Clinical Practices in Substance Abuse Treatment (McGovern, Fox, Xie & Drake, 2004) and the San Francisco Treatment Research Center Course Evaluation (Haug, Shopshire, Tajima, Gruber & Guydish, 2008). As yet neither survey instrument has undergone rigorous psychometric testing. Despite this, inferences and
assumptions about clinicians’ level of readiness to change have been made based on subtest or total scores.

As with the CReMOS, a number of survey instruments have been developed which were underpinned by the central constructs of the Transtheoretical Model of Change. These instruments measure readiness to change in a wide variety of areas: for example, abuse of alcohol (Miller & Tonigan, 1996), pain management behaviours (Neilson, Jensen & Kerns, 2003), concurrent alcohol and drug problems (Pantalon, Nich, Frankforter & Carroll, 2002) and violent behaviours in men (Levesque et al., 2000). Psychometric testing of these instruments has revealed poor discrimination between the five stages of change proposed by the Transtheoretical Model. Whilst theoretically each stage is presented as being discrete or mutually exclusive, data from these studies have been unable to clearly show distinctions between individual stages.

Several instruments including the CReMOS identified a two factor solution. CReMOS data highlighted that the stages of pre-contemplation, contemplation and preparation were discrete. These stages merge together as a single factor that represents those clinicians who are not measuring outcomes. Further, no distinctions were found between the action and maintenance stages. These two stages also merge to represent a single factor and those clinicians who do measure outcomes with their clients. This two factor solution is consistent with other instruments such as the Multidimensional Pain Readiness to Change Questionnaire (MPRCQ), which assesses patient readiness to adopt pain management skills (Neilson, Jensen & Kerns, 2003). Data in the current study revealed a two factor solution; one factor involving a willingness and tendency to use a number of specific active strategies to cope with pain, and the second factor involving a decision to use “adaptive” and avoid using “maladaptive” strategies to maintain functioning despite pain.

A number of instruments have presented three factor solutions. Four instruments identified clear factors related to the pre-contemplation, contemplation and action stages of change: The Readiness to Change Questionnaire (Forsberg, Haldin & Wennberg, 2003); the Readiness to Change Measure, a survey designed to measure readiness to adopt a self-management approach to pain management in people with fibromyalgia (Dijkstra, Vlaeyen, Rijnen & Nielson, 2001); a
Readiness to Change instrument developed for use with excessive drinkers (Rollnick, Heather, Gold & Hall, 1992); and the Readiness to Change Questionnaire for Persons with Traumatic Brain Injury (Bombardier & Heinemann, 2000). The Stages of Change Readiness and Treatment Eagerness Scale (SOCRATES) (Miller & Tonigan, 1996) assesses motivation for change in problem drinkers. This scale too identified three relatively unrelated factors; recognition, ambivalence and taking steps. These authors of this instrument explain they have chosen not to label the three factors according to the stages of change as the instrument does not appear to measure stage constructs as conceived by Prochaska and DiClemente (1982, 1986).

The original 32-item University of Rhode Island Change Assessment (URICA) (DiClemente & Hughes, 1990) yielded four discrete subscales, Precontemplation, Contemplation, Action and Maintenance. However, support for the four factor solution has been mixed as the most common analytical strategy used to evaluate the factor structure of the URICA was principal components analysis, a form of exploratory analysis (Carney & Kivlahan, 1995; DiClemente & Hughes, 1990; McConaughy, DiClemente, Prochaska & Velicer, 1989; McConnaughy, Prochaska & Velicer, 1983; Pantalon et al., 2002). The likelihood of four discrete factors being evident after evaluation with a more rigorous method of data reduction, such as CFA is questionable.

The University of Rhode Island Change Assessment – Domestic Violence (URICA-DV), an instrument used to assess men’s readiness to end their violence (Levesque et al., 2000) revealed seven stage clusters after EFA: reluctant, immotive, nonreflective action, unprepared action, pre-participation, decision making, and participation. However the authors of this instrument acknowledge that further confirmatory evidence of factor structure is required.

As several studies have shown, the five stages of change are not evident empirically. In light of available research evidence, the authors of the Transtheoretical Model should consider revising the constructs of the theory, whereby stages of the model are qualitatively distinct and factors that influence each stage transition are clearly specified (Dijkstra et al., 2001; Sutton, 2001). It is well known however, that the popularity of a theory may not depend entirely on empirical support (Michie & Abraham, 2004; Sutton, 2001). A theory such as the Transtheoretical Model’s Stages of Change that is consistent with commonsense ideas about behavioural change may be
more easily accepted than other theories based on evidence (Michie & Abraham, 2004). A particularly attractive feature of the Transtheoretical Model is that it has the potential to identify intervention success in promoting readiness, rather than behaviour change itself, and also it appears to explain why some people respond to particular interventions and others do not (Michie & Abraham, 2004).

Whilst CReMOS scores in this study clearly demonstrated participants in the intervention group were more ready to measure outcomes after the educational intervention, this readiness did not translate to increases in actual outcome measurement behaviours. A number of authors have suggested that some real and serious problems exist when attempting to apply stages of change constructs to complex behaviours (Brug et al., 2005), such as measuring outcomes in clinical practice. Outcome measurement is not a single behaviour, but a complex category of different and specific actions such as planning an outcome measurement strategy, searching for and screening of potential outcome measures, appraising the psychometric properties of individual measures, administering measures, documenting change and re-evaluating progress. It is possible therefore, that people may be in different stages of change for the various specific behaviours that are included as a part of “outcome measurement” (Adams & White; 2005; Brug, Conner, Harre, Kremers, McKellar & Whitelaw, 2005). Further, some studies have shown that many people think of themselves as complying with, or engaging in complex behaviours such as outcome measurement, while their actual behaviour patterns are not in line with their thinking. This was highlighted by the discrepancy between audit and self-report data related to proportion, frequency and variety of outcome measures used by participants in the randomised controlled trial conducted as part of this PhD program. So, it is clear that observable behaviour change is the best criterion of effectiveness for behavioural intervention, again lending support to the use of a file audit as the primary outcome measure when evaluating clinician’s measurement behaviours as for this study.

5.4.2 CReMOS scores did not predict outcome measure use
Readiness to change is expected to predict successful behaviour change. That is, people with high readiness to change are expected to change their behaviour successfully compared to people with low readiness to change (Dijkstra et al., 2001). Whilst clinicians in the intervention group
were found to be more ready to measure outcomes, this readiness did not translate to behaviour change. CReMOS scores were not predictive of outcome measure use in practice. Other readiness to change surveys have also been found to be poor predictors of behaviour change as presented in detail in Chapter 3, for example the URICA (Carey et al., 1999; Pantalon, Nich, Frankforter & Carroll, 2002). Some readiness to change surveys have shown promising results, such as Pain Stages of Change Questionnaire (Biller, Arnstein, Caudill, Federman & Guberman, 2000), and the Stage of Change Questionnaire (Derisley & Reynolds, 2000). Other instruments however have been found to be good predictors of behaviour change. The Anorexia Nervosa Stage of Change Questionnaire (ANSOCQ) (Reiger et al., 2000) and the Readiness to Change Questionnaire (Heather et al., 1993). The predictive potential of the CReMOS requires reinvestigation as the instrument is further developed.

5.4.3 The multifaceted educational intervention did not increase outcome measure use

Objective file audit data, revealed the proportion of participants who measured outcomes, showed no statistically significant between group differences at either 3 or 6 months post intervention. Statistically significant between group differences was found for only one secondary study outcome. That is, the frequency of outcome measure use, in terms of discussion of change in outcome measure score over time was statistically significant at both 3 and 6 months post intervention. There were no clinically important or statistically significant differences between groups on the variety of outcome measures used. This study was the first to use a clinical file audit to objectively quantify outcome measure use and as such it is difficult to make direct comparisons to other studies using subjective measures to determine outcome measure use. One other study, a pilot RCT (N=30) with physiotherapists, conducted by Van Peppen et al (2009) in the Netherlands used an audit of client records to establish use of outcome measures. However, the focus of this study was whether expert tutors versus non-expert tutors influenced the uptake of outcome measures by clinicians. The use of outcome measures increased from a median of 3 to 6 in the expert tutor group and 3 to 4 in the non-expert tutor group ($p = 0.07$).

The self-report, secondary measure, The Outcome Measures Questionnaire revealed a clinically important and statistically significant between group difference in relation to the proportion of
participants who reported measuring outcomes at 3 months, although not at 6 months. There was no significant between group differences in the percentage of the participant’s client caseload where outcome measures were used. There was however a significant between group differences in the variety of outcome measures reported at 3 and 6 months. The findings of this study are not in agreement with any other interventional studies that have explored outcome measure use by clinicians. For example, Kay, Myers and Huijbregts (2001) compared physiotherapists’ use of outcome measures from 1992 to 1998. These researchers found of the participants surveyed in 1992, 20% could identify at least one published instrument after exposure to educational workshops, in-services and publication of a battery of rehabilitation instruments. In 1998, 97% of staff and 100% of leaders could identify a least one instrument. Whilst a greater proportion of participants in this study were able to identify outcome measures, the ability to identify published measures does not necessarily translate to use of measures in practice as is implied. As such, these results should be viewed with caution. Similarly, Abrams et al. (2003) assessed via self-report survey the use of standardised measures by physiotherapists over a six-month period. The percentage of participants using outcome measures reportedly increased from 30% to 66% between March and September 2003. The intervention study closest in nature to the current PhD study was conducted by Cook, McCluskey and Bowman (2007). The proportion of clinicians who reported using outcome measures following the educational intervention increased from 65.7% at baseline to 91.4% at four months post workshop.

Most recently, a pilot randomised controlled trial conducted by Van Peppen and colleagues (2009) that evaluated the effect of an expert versus non expert tutor run education program to increase physiotherapist’s use of outcome measures with stroke patients found, at baseline, participants self reported they used a median of 4 out of 7 outcome measures, however file audit showed they were only using 3. Post intervention, participants with the expert tutor, self-reported an increase in outcome measure use (6 out of 7) as did the participants with the non-expert tutor (5 out of 7). File audits showed that the median increase for expert tutor participants was from 3 to 6, while non-expert tutor participants improved from 3 to 4, however, this was not a significant between groups difference. A significant between groups difference was found for variety of instruments used in favour of physiotherapists educated by the expert tutor. This study lends partial support to the findings from this PhD research. Interestingly, the study conducted by
Van Peppen and colleagues (2009) is the only published study to date that used file audit as an objective measure of behaviour change and the compared objective audit data to subjective self-report data. Consistent with the present study, Van Peppen et al (2009) also found that participants had a tendency to over-report behaviours of interest.

5.4.4 The multifaceted educational intervention did increase self reported knowledge and skill

Participant knowledge and skill was measured using the Outcome Measures Questionnaire. Data revealed a significant between groups difference related to writing measurable goals (3 months), specifically identifying the desired outcome of intervention (3 and 6 months), selecting the most appropriate outcome measure (3 and 6 months), administering the outcome measure (3 months), interpreting and reporting outcome measure results (3 months). All statistically significant differences between groups were in favour of the intervention group. The only intervention study measuring clinician knowledge and skill in outcome measurement was a before-and-after intervention study conducted by Cleary et al (2002) with mental health nurses. Based on a self-report survey nurses’ knowledge of outcome measurement increased from 43% pre-workshop to 76% post workshop. As self-report data is prone to bias, it is unclear whether educational interventions are effective in increasing participant’s level of knowledge and skill. A previous study conducted by the author and colleagues identified the need for an objective instrument to measure change in outcome measurement knowledge and skill (Cook et al., 2007).

5.4.5 The multifaceted educational intervention did increase readiness to measure outcomes

There was a significant between group difference in clinician readiness to measure outcomes (CReMOS scores) at both 3 and 6 months post intervention. Whilst the multifaceted educational intervention did not increase participants’ use of outcome measures, they were feeling more ready to change their outcome measurement behaviours. Further, pre-intervention CReMOS scores will be useful in the conduct of future research aimed at increasing outcome measure use, as scores will assist in the achievement of balanced randomisation when conducting RCTs. Further, CReMOS scores can be used to improve educators’ understanding of participants’ strengths and weaknesses in relation to outcome measure. This information will also help educators to select the most appropriate teaching strategies to meet participants’ learning needs.
This thesis confirms that whilst clinicians in the intervention group were more ready to measure outcomes, a multifaceted educational intervention did not increase clinicians’ use of outcome measures in this organisation. These findings lead to provocative questions regarding readiness to change and the role that educational interventions play in changing outcome measurement behaviours. Perhaps interventions based on the Transtheoretical Model’s stages of change should encourage a focus on identifying whether people: i) are, or ii) are not ready to change their target behaviour. This is supported by the notion that stage progression is not always associated with observable behaviour change. Further, outcome measurement is a complex behaviour. As such, determining a person’s discrete stage of change, from the five stages presented in the Transtheoretical Model may be difficult due to the complex nature of the task. In addition to this, educational interventions that have been developed may have failed to realise the true complexity of the task such as outcome measurement (Adams & White, 2005). Unless interventions can be shown to be associated with behaviour change, they cannot be seen as effective in terms of activity promotion irrespective of their effect on stage progression (Adams & White, 2005). However, this is the first study of this kind and as such warrants replication.

5.5 Strengths and limitations

5.5.1 Strengths of the study

The two studies of this PhD program were carefully planned and designed. The first study involved the development and psychometric testing of an instrument specifically to be used as an outcome measure in the second study, the randomised controlled trial presented in chapter 4. Whilst the CReMOS is a self-report survey, is the first of its kind and has very good to excellent validity and reliability. The advantage of using a psychometrically sound, tailor made outcome measure in a randomised controlled trial is the instrument captures data that is exactly aligned to the study aims.

The other major strength of this research was the use of a gold standard methodology, a randomised controlled trial. A randomised controlled trial is considered the best study design for measuring the effectiveness of an intervention because of its ability to minimise bias (Barton, 2000; Jadad, 2007). Randomised controlled trials are also the highest form of evidence when
The randomised controlled trial design was chosen as it includes a control group to account for rival hypotheses that could explain changes in the dependent variable (i.e. the proportion of clinicians using outcome measures) other than those related to the intervention (the multifaceted educational workshop). Random assignment of individuals to the different groups in the trial ensured a balance between groups for the known and unknown factors that might have influenced outcomes. This trial employed appropriate randomisation strategies, allocation concealment, and blinded assessment of outcomes to minimise bias. Participant retention rates were good at all points of measurement: baseline (n=120), three months (n=116) and 6 months (n=110). The research protocol employed an objective and reliable primary outcome measure, a clinical file audit and a secondary outcome measurement tool, the CReMOS, with established excellent psychometric properties. Further, participants were unaware that the clinical file audit had been conducted until its completion; this helped to reduce potential bias related to the Hawthorne effect. Finally, the multifaceted educational intervention and follow-up support program were carefully designed to be similar to the type of workshops participants would have access to in the clinical setting. Detailed information was also presented in Chapter 4 of this thesis so the study can be replicated in other clinical settings. Generally, it is unrealistic to expect the results of a single RCT can totally resolve a therapeutic issue. Any progress toward changing clinical practice is more readily achieved if further trials produce similar findings (Day, 2007; Pocock, 1983).

The author does not expect that the results of this RCT will be relevant to all allied health professionals in all settings and acknowledges the effects of interventions can be very dependent on factors such as the characteristics of the participants in the study, the method of application of the intervention and the setting where the intervention takes place (Hotopf, 2002; Rothwell, 2005). Whilst these factors were taken into account in the design and performance of the RCT and in the reporting of results, the author is aware of the impact of these factors on external validity (Hotopf, 2002; Rothwell, 2005). However, the care taken to report specific detail regarding setting of the trial, selection of participants, characteristics of randomised participants, the effort to minimise differences between the trial protocol and routine practice, and careful selection of outcome measure that were clinically relevant presented would mean clinicians
should be able to reasonably judge whether findings are relevant to them and their area of clinical practice (Hotopf, 2002; Rothewell, 2005). Every effort was made to maintain a balance between the internal validity, which is the reliability of results and the external validity, the generalisability of results (Godwin et al., 2003). The use of a randomised controlled trial was a key strength of this study as prior to commencement of this research in 2005 this study design had not been used to test the effectiveness of an educational intervention to increase clinicians’ outcome measurement behaviours. The only other study that that has employed a randomised controlled trial was the pilot study conducted by Van Peppen (2009).

5.5.2 Limitations of the study
This study, like any research, has limitations that require consideration. Participants in both studies self selected, and as such may have had greater interest in, or experience using, outcome measures than those who chose not to participate. The participants (N=396) who took part in the development and psychometric testing of the CReMOS consisted of 90% females and 10% males, with occupational therapists, physiotherapists and speech pathologists representing 85% of the study sample. The participants (N=120) involved in the RCT were employed by a single organisation, the Spastic Centre of New South Wales, which champion’s outcome measurement and evidence based practice and actively supports the continuing professional education of employees. Similarly, these participants were 96% female and 4% male with the same three professional groups occupational therapy, speech pathologists and physiotherapists representing 85% of the sample. These three professional groups comprised only 47% of the Australian allied health workforce in 2001 (Australian Health Workforce Advisory Committee, 2006). Thus, these three groups may be overrepresented in this study. In addition, as this research was conducted solely in Australia, further research is required to establish whether findings are representative of other developed countries, their health care systems and their allied health care professionals.

More specifically, whilst the CReMOS, a self-report survey able to be used as an outcome measure, is psychometrically sound, it is important to note that scores may be prone to some inaccuracy due to poor participant recall, lack of understanding of content, discomfort with self disclosure and inherent biases associated with self-report measures. Therefore, caution should be
applied when interpreting participants’ level of readiness to measure outcomes, as score may be inflated. At present, due to poor predictive validity, CReMOS scores are also unable to be used to predict change in clinicians’ outcome measurement behaviours.

Secondly, although the trial was randomised, it was not double blind. That is, the participants were not blind to the intervention they received, nor were the investigators blind to participant allocation. It is generally acknowledged that to reduce bias it is best to blind participant and investigators to the intervention being received (Jadad, 2007). However, when evaluating the effectiveness of a specific multifaceted educational intervention, it is difficult to blind participants because they are aware of the educational content being evaluated. In an attempt to reduce contamination between groups, the investigators made a specific request of participants in the intervention group not to share information or resources with participants in the control group. This was however difficult due to the team based nature of service provision at the Spastic Centre. Cluster randomisation would have been preferable to reduce potential contamination of data and bias within the study; however sample size requirements for a cluster randomised trial prohibited this option (Campbell, Thomson, Ramsay, MacLennan & Grimshaw, 2004). Further, it is recognised that the audit of clinical files may not have captured actual usage of outcome measures by clinicians. It is possible clinicians may have been using outcome measures, discussing intervention outcomes with clients and their colleagues but not documenting this information in client files. Therefore, the impact of organisational expectations and culture requires further research. Data were collected on the self-report surveys in an attempt to establish the level of contamination within the study. Participants were asked to state whether they had discussed workshop content or shared resources with participants from the “other” group. A small number of participants at three months, 5% (five out of 107) indicated they had potentially contaminated the study and 11% (11/100) participants at 6 months. Further, it was not possible to blind the people delivering the intervention as they were presenting the workshop content and the author was also providing the three months email and telephone follow-up support.

The transformation of ordinal and ratio survey data into dichotomous outcomes is a limitation of this study as information about size of effect may have been lost (The Cochrane Collaboration,
Another limitation of this study is the use of a non-parametric test when analysing dichotomous outcomes. Non-parametric tests are less powerful and sensitive to detect the effect of the independent variable (Hicks, 2004). Therefore, caution should be taken when interpreting the effect size and statistical significance of the results of the dichotomous outcomes. Finally, this study was conducted within one organisation, The Spastic centre of New South Wales, in one state in Australia. Consequently, care is needed when applying the results to allied health clinicians working in other organisations, states of Australia and countries, as organisation policy, procedure and work culture may differ.

5.6 Significance and recommendations
Within the context of evidence-based practice there is an increasing demand for accountability and demonstration of change in client health outcomes. There is ongoing pressure on allied health clinicians to demonstrate the effectiveness and efficiency of the services they provide. However, the fundamental problem identified in the literature is that few allied health clinicians actively engage in outcome measurement. Until this study, clinician readiness to measure outcomes and the empirical evidence to support use of educational strategies to facilitate outcome measurement in practice had not been investigated. The results of this study therefore have significance to allied health clinical research, practice, education, policy development, and professional bodies.

5.6.1 Recommendations for research
5.6.1.1 CReMOS
Based on the findings and limitations of this study, the author recommends a number of possible directions for future research. Considering interest in the CReMOS since its publication in the Journal of Evaluation in Clinical practice early in 2009, it would be prudent to conduct further psychometric testing on this instrument. Interest has been shown in this instrument by psychologists working at the New York Medical Centre (United States of America), psychologists in Belgium, who have sought permission to have the CReMOS translated into Flemish, psychologists in the Netherlands, occupational therapists in New Zealand, physiotherapists in Melbourne and Adelaide, Australia as well as pharmacists working at
University of Texas Medical Branch Correctional Managed Care. Testing the validity and reliability of the CReMOS with other clinical groups such as medical practitioners and nurses would likely increase application and clinical utility of this instrument. Further work is required on the scoring system used. Identification of cut-off scores that highlight the distinction between those individuals who are ready versus those who are not ready to measure outcomes may be useful. Further development of descriptors of the specific characteristics of those who are versus those who are not ready to measure outcomes may be a useful tool for clinicians and managers using the CReMOS. Also testing the predictive validity of the CReMOS with another sample of allied clinicians as well as with medical practitioners and nurses is warranted.

5.6.1.2 Educational intervention
Based on the results of this study, it is apparent that a one-day multifaceted educational workshop and three months of follow-up support were not effective in changing outcome measurement behaviours in allied health clinicians’ employed by The Spastic Centre of New South Wales. Clearly, the next step in this process would be to qualitatively explore why this was the case. Study participants may be able to provide useful insights into the reasons why clinicians’ behaviour did not change, even though CReMOS scores indicated they were more ready to measure outcome after the intervention. Interviews could also be used to explore underlying reasons for the discrepancy between objective and subjective outcome measure results related to outcome measurement behaviours. Moreover, information gained from interviews regarding perceived strengths and weaknesses of the educational program would assist the investigators to make appropriate adjustments to the program design. The author and her colleagues have already commenced research in this area and findings will be presented independently of this thesis.

Whilst the educational intervention was not found to increase the outcome measurement behaviours of allied health clinicians from The Spastic Centre, this may not necessarily be the case with other groups of allied health clinicians in different health care settings. As such, it is necessary and appropriate to test the effectiveness of this strategy with a different sample of allied health clinicians, as well as other health professionals such as medical practitioners and nurses. Further to this, modification of the current intervention may also be required.
Modification may involve: increasing the length of the one day workshop to two or three days, having smaller numbers of participants in the workshops, have a follow-up workshop after 3 months to revise, clarify and problem solve issues with participants related to use of outcome measures in their practice settings. Follow-up support may involve setting up “working groups” or “working parties” within an organisation that support the implementation and use of outcome measures. This would allow for peer buddy opportunities, and mechanisms put in place that encourages the sharing of new knowledge and skills. The availability of web based applications such as on-line discussion boards and intranet websites dedicated to the use and dissemination of outcome measurement resources may be a useful tool in addressing practice issues. Inclusion of such strategies may assist in the establishment of a work culture that that encourages and promotes outcome measurement and evidence-based practice. Future evaluations should also consider inclusion of participant interviews pre and post intervention.

5.6.1.3 Study design
Future randomised controlled trials to evaluate educational interventions should use a combination of strategically chosen measures to determine the effectiveness of the intervention. Objective file audit has been shown in this study to be an accurate measure of the proportion, frequency and variety of outcome measure use. Audit therefore is useful to provide a clear and realistic picture of clinicians’ outcome measurement behaviours. However, it is important to acknowledge and consider the logistics, time and cost associated with undertaking a file audit. Use of an objective knowledge and skills test would be preferable to the self-report measure that was used in this study due to the known bias related to self-report measures. However, to date, no such measure has been published. An objective test would provide a more accurate picture of the effectiveness of the educational interventions in increasing participants’ outcome measurement knowledge and skill. The author is currently involved in the design and initial psychometric testing of the Outcome Measures Knowledge Test (OMKT) (Lieschke & Bowman, 2009). Findings from this study too will be disseminated and published independently of this thesis. The CReMOS should continue to be used in such evaluations to: i) provide educators with information about how ready clinicians are to change outcome measurement behaviours, ii) identify clinicians’ specific strengths and weakness related to outcome measurement, and iii)
establish whether readiness to measure outcomes scores are in fact predictive of behaviour change in other populations.

Moreover, the mid to late 2000s have seen the advent of a relatively new scientific approach to health care, which is implementation science. The Implementation Science Journal commenced publication in February 2006. Implementation science involves the scientific study of methods to promote the systematic uptake of research findings into routine clinical practice, and thus reduce inappropriate client care. Implementation science includes the study of influences on healthcare professionals’ behaviour and strategies which enable them to use research findings effectively (ICEBeRG, 2006). Implementation is considered to be a complex but active process that involves individuals, teams, systems and organisations (McCluskey, 2010). Furthermore, changing health professionals practice behaviours requires careful forward planning.

Implementation science literature suggests historically many studies evaluating behaviour change have major limitations in the areas of conceptualisation, planning, design, and reporting (ICEBeRG, 2006; McCluskey, 2010). As such, many researchers are thought to give little consideration to potential problems and barriers. As a consequence, results of studies evaluating the effectiveness of strategies to change behaviour may be disappointing (McCluskey, 2010). Whilst this was not necessarily the case with the educational intervention used in this study, emergence of implementation science in recent years means a review of the educational intervention from an implementation science standpoint may be warranted.

Whilst there is much literature on how to change behaviour and transfer knowledge into practice, understanding how to do it effectively clearly needs improvement. The process the author used to conceptualise, plan, and design the study was consistent with research available at the time. The study was underpinned by the Andragogy in Practice Model, which is a transactional model of adult learning (Knowles et al., 2005) and the Transtheoretical Model Stages of Change (Prochaska & DiClemente, 1982). However, with current research developments within the field of implementation science, further refinement of the current study would be beneficial. The area of the current study design that would most benefit from refinement would be the audit feedback loop. Whilst both audit and feedback did occur in this study, the feedback strategies could have
been improved to create more of a sense of urgency in participants the need for change (Hysong, Best & Pugh, 2006; McCluskey, 2010). Issues the author will consider in greater depth in future studies will be timing of feedback, credibility of the source, format of feedback (written versus verbal), valence (positive versus negative) and the content (task, individual or group focused) (Hysong et al., 2006). Without feedback, health professionals are likely to perceive that their practice is within acceptable levels. It has been shown however that self-reports of behaviour are likely to overestimate performance by up to 27% (Adams, 1999; McCluskey, 2010). A more stringent feedback process may serve to reduce some of the mismatch between self-report and audit data found in the current study.

5.6.2 Recommendations for practice
In order to adequately address today’s major health care problems, clinicians need to change their practice behaviours. Population health can be improved by changing the behaviour of health professionals responsible for delivering effective evidence-based healthcare (Michie, Fixen, Grimshaw & Eccles, 2009). As such, there is a clear need for allied health clinicians to incorporate outcome measurement into their intervention planning and service delivery. However, findings from this program of research show that clinicians currently are not doing so. Clinicians have been encouraged to move away from the use of intuition, subjective opinion, and non-standardised methods of evaluating the effectiveness of clinical practice to the use of objective, standardised measures (Bowman, 2006; Garland et al., 2003; Hatfield & Ogles, 2004; Huijbregts et al., 2002; Kay et al., 2001). This thesis has shown the transition from use of subjective to objective measures in practice is a complex and difficult process. Clinicians can use the results presented in this thesis to reflect on their own outcome measurement behaviours to facilitate improvement.

More specifically, clinicians can use the CReMOS as a self-diagnostic tool to help them to understand the how ready they are to measure outcomes. CReMOS scores will also provide clinicians with insight into the unique characteristics of their personal level of readiness to change and assist them to identify strengths and weaknesses related to the outcome measurement process. The CReMOS is also a useful tool to assist managers of health services to identify how
ready staff are to measure outcomes. This information will assist decision-making about appropriate strategies to facilitate the use of outcome measures.

Strategies may range from dialogue about the importance and benefits of measuring outcomes to the provision of specific educational sessions on various aspects of the outcome measurement process. The findings presented in this thesis indicate clinicians may require a greater number of educational sessions or workshops. The content of workshops and educational sessions may require greater focus on use of conceptual frameworks such as the ICF to guide the outcome measurement process. Clinicians may also need more detailed instruction on the selection, implementation, scoring, interpretation and documentation of outcome measures, as discussed in Chapter 4. Clinicians may also benefit from the presence of a mentor in the workplace to guide and support them in the use of outcome measures. Face to face contact may prove to be a more effective, though more costly strategy than telephone and email follow-up support.

A number of in-house, departmental activities may assist clinicians to embrace the use of outcome measures. It has already been established that organisational factors influence clinicians’ outcome measurement behaviours. Therefore organisations need to implement strategies that demonstrate a commitment to outcome measurement and an evidence-based practice culture. Managers need to involve clinicians in decision-making about potential outcome measures appropriate to their area of practice. The selection and compilation of a specific battery of outcome measures such as was developed for this study may assist to reduce barriers and increase clinician readiness to measure outcomes. Development of standardised reporting pro formas that include a section for outcome measures would serve as a useful reminder of the importance of documenting outcome measure results. Quality improvement activities, such as the development of websites where clinicians can share outcome measure resources and use web based discussion boards may also assist to increase the routine use of outcome measures in practice.

As such, it is this author’s recommendation that allied health clinicians employ and participate in a variety of additional strategies to build on the knowledge and skills previously gained to facilitate use of outcome measures in practice. Strategies adopted should specifically target
clinicians’ level of readiness and gaps in knowledge and skills in relation to the steps in the outcome measurement process.

5.6.3 Recommendations for education
As outcome measurement is an integral component of intervention planning it is important the outcome measurement process is taught at an undergraduate level. Undergraduate education needs to provide future clinicians with the opportunity for acquisition of knowledge and practice of skills necessary to effectively use outcome measures as part of their daily practice (Beattie, 2001). Case based scenarios should provide students with the opportunity to select appropriate measures for specific client groups, provide a sound rationale for their choices, discuss administration issues that may arise, score and interpret results, and document results. Case scenarios ideally would include a variety of diagnostic areas ranging from the simple to complex. Students also need to be taught how to appraise the psychometric properties of outcome measures as part of the evidence-based practice process. Students need to be made aware also that outcome measurement is considered to be essential professional competency standards for entry-level occupational therapists (OT Australia, 1994), physiotherapists (Australian Physiotherapy Council, 2006), and speech pathologists (Speech Pathology Australia, 2001).

Continuing professional education programs need to have an EBP focus incorporating outcome measurement. Professionals who graduated 10 or more years ago may not have been exposed to EBP and outcome measurement content as part of their undergraduate curriculum. Continuing professional education programs on outcome measurement should be affordable and readily accessible to all allied health clinicians. Such workshops should be supported and subsidised by professional associations, particularly those who cite outcome measurement and evidence based practice as core professional competencies (Australian Physiotherapy Council, 2006; Speech Pathology Australia, 2001).

5.6.4 Recommendations for policy
The development of policy concerning outcome measurement and evidence-based practice requirements for allied health professionals is a formal means of articulating expectations of clinicians’ in particular clinical situations. Such policies would typically be developed by, and be
agreed upon by groups of people such as clinical departments or service providers, business organisations such as health care facilities and professional associations, governments or political parties (Cambridge Dictionary Online, 2009). Policy at the department and organisational level will have the most influence on a clinician’s daily practice habits.

Clinical departments and service providers need policies that clearly describe staff responsibilities, behaviours and practices that are expected in relation to outcome measurement and evidence based practice. Departmental and organisational recruitment policies should specify knowledge and skill in outcome measurement and evidence-based practice as an essential criterion for prospective employees. This criterion should also be clearly detailed in job advertisements. Interviews with potential employees should incorporate questions that allow demonstration of the individual’s knowledge and skills in this area. As such, outcome measurement and evidence-based practice responsibilities and requirements must be specifically detailed in clinician job descriptions and should become key performance indicators assessed as part of the staff performance appraisal process. Policies such as those described above should cite current allied health professional competency standards that outline outcome measurement as a professional competency required of entry level practitioners, for example occupational therapy (OT Australia, 1994), physiotherapy (Australian Physiotherapy Council, 2006) and speech pathology (Speech Pathology Australia, 2001). Organisations such as health care facilities should clearly communicate specific policy requirements to their employees and ensure employees are adequately trained to meet policy requirements. Organisations also need to have mechanisms in place so employees are aware of current policy and their responsibility to comply with policy.

5.6.5 Recommendations for professional bodies

As previously established, there is substantial political and societal pressure for clinicians to be evidence-based practitioners. Evidence based decision making is essential to optimise outcomes for clients, improve clinical practice, achieve cost effective care and ensure accountability and transparency in decision making (Canadian Association of Occupational Therapists, 2006). As such, clinicians need to be able to demonstrate the effectiveness and efficiency of their services through the measurement of clinical outcomes. Within the current healthcare climate,
professional associations, regulatory bodies, specialty groups, and accreditation councils must share the responsibility for facilitating evidence based decision making and evidence based practice. These responsibilities extend to identifying the barriers and supporting strategies that facilitate and promote evidence based practice (Canadian Nurses Association, 2002). This includes the ability to recognise that access to, and acquisition of current relevant and evidence-based knowledge, skills and behaviours are the key to the development and use of best practice. This being the case, professional bodies and associations need to take active steps to support their professional members. Professional bodies need to promote workshops and conferences on outcome measurement and evidence based practice and encourage active dialogue on these topics. Further, professional bodies must include outcome measurement and evidence-based practice as key competencies in their competency standards. The Australian Physiotherapy Council (2006) and Speech Pathology Australia (2001) have clearly articulated these requirements for entry level clinicians. Other allied health professional associations need to update their standards to reflect contemporary practice requirements, for example OT Australia.

The Australian Physiotherapy Association (APA) is a good example of a professional body that champions outcome measurement and evidence based practice. The APA has included clear and specific information on their website about the importance of outcome measurement and evidence-based practice to clinical practice. Clinicians are able to directly access position statements such as “Clinical Justification and Outcome Measures” (http://www.physiotherapy.asn.au/index.php/quality-practice/out-measures) from the website. Such statements demonstrate to members that their association promotes the progressive evaluation of physiotherapy treatment outcome as an integral part of accountability and explains how outcome measurement is a requirement of the Australian Physiotherapy Competency Standards 1994-2002 (Australian Physiotherapy Council, 2006). Further, the APA provides members with access to some commonly used outcome measures which can be downloaded from the website. A checklist has also been developed for clinicians to print and follow when using outcome measures with their clients (Australian Physiotherapy Association, 2009). Other allied health professional associations need to follow the lead of the APA and provide their members with useful information that promotes and facilitates the use of outcome measures in practice.
5.7 Conclusion

This thesis offers an original contribution to the allied health literature on clinician outcome measurement behaviours. The findings from this study provide empirical evidence about clinician readiness to measure outcomes and the effectiveness of educational interventions in increasing the proportion of allied health clinicians measuring outcomes, in practice. Investigating the effectiveness of this multi-faceted educational intervention involved the development of a self report survey instrument, the CReMOS and conducting a randomised controlled trial with The Spastic Centre of New South Wales. Overall, the findings indicate that the one day educational workshop and three months of email and telephone follow-up support did not increase the proportion of allied health clinicians using outcome measures. With increasing pressure for health services to be evidence based and for clinicians to measure the effectiveness and efficiency of services provided to clients, these findings represent an important contribution to allied health literature and practice.
References


Benson, J., & Schell, BA. (1997). Measurement theory: Application to occupational and physical therapy. In J. Van Deusen & D. Brunt (Eds.), *Assessment in
occupational therapy and physical therapy (pp. 3-24). Philadelphia: W.B Saunders Company.


Costello, R., & Bowman, J. (2008). The development and content validity testing of the *Outcome Measurement Knowledge and Skills Test (OMKast)*. University of Western Sydney, Sydney.


power and reduces sample size requirements. *Journal of Clinical Epidemiology, 57*, 454-460.


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Appendix A – Use of outcome measures in clinical practice
<table>
<thead>
<tr>
<th>Author/Year/Country</th>
<th>Primary aim of study</th>
<th>Method</th>
<th>Participants (N)</th>
<th>Intervention</th>
<th>Data collection method or outcome measure/s</th>
<th>Findings</th>
<th>Authors/Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mayo, Cole, Dowler, Gowland &amp; Finch (1993) Canada</td>
<td>To determine the extent to which physiotherapists use published outcome measures</td>
<td>Survey design</td>
<td>Physiotherapist managers and physiotherapists (N=207)</td>
<td>N/A</td>
<td>Self-report survey</td>
<td>50% of participants reported using outcome measures, however 10% could not name any measures and 20% could only name one</td>
<td>• Active involvement of therapists in selection of outcome measures for their own clients</td>
</tr>
<tr>
<td>Chesson, Macleod &amp; Massie (1996) Scotland</td>
<td>To establish the extent to which standardised outcome measures were used by occupational therapy and physiotherapy departments</td>
<td>Survey design</td>
<td>Occupational therapists (n=98) and physiotherapists (n=86)</td>
<td>N/A</td>
<td>Two self-report surveys: one sent to all participants and the other sent to participants using outcome measures</td>
<td>39% of departments reported using outcome measures (35% of occupational therapy departments and 44% of physiotherapy departments)</td>
<td>• Education on outcome measure selection, utilisation and interpretation of scores</td>
</tr>
<tr>
<td>Russek, Wooden, Ekedahl &amp; Bush (1997) North America</td>
<td>To determine whether clinicians made efforts to learn standardised measurement methods. To identify groups of statements about standardised data collection that constitutes attitude factors. To explore the relationships between these attitudes, characteristics of therapists and clinics and participation in standardised data collection.</td>
<td>Survey design</td>
<td>Occupational therapists, physical therapists, physical therapist assistants and athletic trainers (N=220) employed in 71 clinics</td>
<td>N/A</td>
<td>Questionnaires were given to participants on a single occasion</td>
<td>Sixty-six percent (66%) of participants made some effort to learn standardised procedures. Five attitudes were identified: inconvenience, acceptance of operational; definitions, automation, paperwork and training</td>
<td>• Outcome measures need to be practical, valid, reliable and responsive • Need more measures of disability • Development of clinical outcome databases useful multi-purpose clinical tool • Computerised client documentation systems may increase clinician efficiency and decrease inconvenience and paperwork</td>
</tr>
</tbody>
</table>
| Brangan & O'Neill (1998) Ireland | To identify the assessment (including re-evaluation) practices of Irish occupational therapists | Survey design | Occupational therapists (N=50) | N/A | Questionnaire was given on a single occasion | Most common method of assessment was observation (60%) least common was standardised outcome measures (14.5%). Five most common | • Standardised tests should not take excessive times to complete • Standardised assessments need to have meaning for the client (face validity) • Need for more client-
<table>
<thead>
<tr>
<th>Reference</th>
<th>Country</th>
<th>Objective</th>
<th>Methodology</th>
<th>Sample Size &amp; Description</th>
<th>Assessment Tools</th>
<th>Challenges</th>
<th>Core Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stokes &amp; O’Neill (1999)</td>
<td>Ireland</td>
<td>To establish the use of outcome measures by physiotherapists working with older adults</td>
<td>Survey design</td>
<td>Physiotherapy departments providing care to older adults (N=22)</td>
<td>N/A</td>
<td>Structured interviews</td>
<td>On average, 29% of participants reported using standardised outcome measures across six areas of assessment</td>
</tr>
<tr>
<td>Bickman, Rosof-Williams, Salzer, Summerfelt, Noser, Wilson &amp; Karver (2000)</td>
<td>North America</td>
<td>To identify data mental health clinicians see as important in treating adolescents</td>
<td>Survey design</td>
<td>Mental health clinicians (N=539) including social workers (46%), psychologists (35%), psychiatrists (9%), counsellors (7%), and others (3%)</td>
<td>N/A</td>
<td>Four page survey administered on a single occasion</td>
<td>Clinicians are interested in using data to improve the effectiveness of their services. Measurement of client outcomes was seen by some as a form of accounting. Clinicians were interested in receiving feedback on client health care outcomes once clients had completed their treatment.</td>
</tr>
<tr>
<td>Haigh, Tennant, Biering-Sorensen, Grimby, Marineck, Phillips, Ring, Tesio &amp; Thonnard (2001)</td>
<td>Europe</td>
<td>To survey the use of outcome measures in rehabilitation within Europe.</td>
<td>Survey design</td>
<td>(N=418)</td>
<td>N/A</td>
<td>Postal questionnaire completed on a single occasion</td>
<td>Heterogeneity of measures is used in each diagnostic group treated in a rehabilitation setting. A large number of measures were being used in only a small number of locations with relatively few patients. What emerges from the data is a relatively small set of dominant outcome measures for each</td>
</tr>
<tr>
<td>Author(s)</td>
<td>Country</td>
<td>Objective</td>
<td>Methodology</td>
<td>Participants</td>
<td>Data Collection</td>
<td>Findings</td>
<td>Implications</td>
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<tr>
<td>Kay, Myers &amp; Huijbregts (2001)</td>
<td>Canada</td>
<td>To examine and compare Physiotherapist’s use of outcome measures from 1992 to 1998</td>
<td>Comparative study, survey design</td>
<td>Physiotherapists; Staff (n=69), Professional practice leaders (PPL) (n=20)</td>
<td>Educational workshops, inservices and publication of a battery of rehabilitation instruments (attended outside of study)</td>
<td>Self-report survey Initial survey conducted by Mayo et al (1993), comparative survey conducted in 1998. Of the participants surveyed in 1992, 20% identified at least one published instrument. In 1998, 97% of staff and 100% of leaders could identify at least one instrument.</td>
<td>• Strategies to develop skills and confidence related to outcome measurement</td>
</tr>
<tr>
<td>Torenbeek, Caulfield, Garrett &amp; Van Harten (2001)</td>
<td>Ireland, Germany, Italy, Austria and the Netherlands</td>
<td>To examine the current use of outcome measures for stroke and low back pain rehabilitation</td>
<td>Comparable, survey design</td>
<td>Rehabilitation providers (N=102)</td>
<td>Self-report survey</td>
<td>On average, 75% rehabilitation providers reported using one or more instruments to measure stroke and low back; most of the reported instruments were locally developed and unpublished</td>
<td>• Translated versions of standardised outcome measurement instruments, • Training and education of clinicians in outcome measure use</td>
</tr>
<tr>
<td>Bowman &amp; Llewellyn (2002)</td>
<td>Australia</td>
<td>To explore occupational therapist’s perspectives of clinical outcomes research</td>
<td>Qualitative study</td>
<td>Occupational therapists (N=15)</td>
<td>Individual in-depth group interviews</td>
<td>Participants identified they had insufficient knowledge to participate in or undertake an outcomes research project. Barriers included: difficulty articulating what to measure, perceived level of skill and a variety of personal, professional, and organisational barriers</td>
<td>• Continuing professional education programs which aim to improve outcome measure research skill acquisition and application of skills in practice</td>
</tr>
<tr>
<td>Cleary, Jordan &amp; Happell (2002)</td>
<td>Australia</td>
<td>To increase mental health nurses’ understanding and awareness of the importance of measuring outcomes</td>
<td>Before-and-after study</td>
<td>Mental health nurses (N=38)</td>
<td>One-day educational workshop aimed at improving nurses’</td>
<td>Self-report surveys (baseline, conclusion of workshop and 3 months post workshop)</td>
<td>Percentage of participants who reported they felt ‘very’ knowledgeable in outcome measurement increased from pre to post workshop (43% to 76%)</td>
</tr>
<tr>
<td>Study</td>
<td>Country</td>
<td>Objective</td>
<td>Methodology</td>
<td>Sample Size</td>
<td>Measure Used</td>
<td>Findings</td>
<td>Strategies</td>
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</table>
| Gilbody, House & Sheldon (2002)            | United Kingdom   | To identify the routine standardised outcome measures used by Psychiatrists | Pilot study, survey design          | Psychiatrists (N=369) | N/A      | Self-report survey                                | On average 9.4% of clinicians reported routinely using standardised outcome measures for the purpose of case identification; 7.8% reported that they routinely used standardised outcome measures to assess clinical change over time | • Provision of adequate resources and training to assist collection of outcomes data  
• Outcome measures developed for use by psychiatrists need to be concise, easy to administer and psychometrically sound |
| Huijbregts, Myers, Kay & Gavin (2002)       | Canada           | To explore physiotherapist’s perspectives regarding the use of outcome measures in clinical practice | Qualitative study                   | Physiotherapists (N=42) | Educational workshops, inservices and publication of a battery of rehabilitation instruments (attended outside of study) | 80% of participants attended workshops, 95% were familiar with the battery of measures, Clinicians report being aware of the importance of outcome measurement but report using measures in an informal manner to support their intuitive judgements. Time constraints and insufficient knowledge were reported as reasons for non-use of standardised measures | • Leadership, training and resources in program evaluation required for clinicians to successfully measure outcomes  
• Development of outcome measures that are appropriate for clinical settings |
<p>| Garland, Kruse &amp; Aarons (2003)             | North America    | To explore mental health clinician’s experiences with and perceptions of the utility, validity and feasibility of standardised outcome | Mixed methods design                 | Mental health practitioners (N=50); counsellors (n=12), social workers (n=16), psychologists | 4-hour training session on the use and interpretation of the state-mandated | Standardised outcome measures were the least frequently reported means of evaluating treatment effectiveness; most clinicians reported using subjective reports from the | • Development of strategies to overcome pragmatic issues and ideological barriers preventing successful outcome measurement |</p>
<table>
<thead>
<tr>
<th>Study</th>
<th>Setting</th>
<th>Objective</th>
<th>Methodology</th>
<th>Participants</th>
<th>Measures Used</th>
<th>Additional Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hatfield &amp; Ogles (2004)</td>
<td>North America</td>
<td>To explore psychologist’s use of outcome measures in clinical practice</td>
<td>Survey design</td>
<td>Psychologists (N=874)</td>
<td>N/A</td>
<td>37% of participants reported using some form of outcome assessment in their clinical practice; 22% stated they used standardised outcome measure</td>
</tr>
<tr>
<td>Maher &amp; Williams (2005)</td>
<td>Australia &amp; New Zealand</td>
<td>To identify the outcome measures used by physiotherapists managing lung transplant patients</td>
<td>Descriptive, qualitative design</td>
<td>Physiotherapists working in major lung transplant centres (N=18)</td>
<td>N/A</td>
<td>Approximately 62% of participants utilised outcome measures to obtain pre-transplant function; most did not consistently measure changes following the transplant. Only 5% reported using outcome measures for the purpose of evaluating intervention effectiveness</td>
</tr>
<tr>
<td>Abrams, Davidson, Harrick, Harcourt, Zylinski &amp; Clancy (2006)</td>
<td>Australia</td>
<td>To assess the use of standardised measures by physiotherapists over a 6 month period, following the implementation of strategies to improve outcome measurement</td>
<td>Longitudinal, postal survey</td>
<td>Physiotherapy providers to a transport accident commission (N=318) (n=154 in March, 2003; n=164 in September, 2003)</td>
<td>N/A</td>
<td>The percentage of participants using outcome measures reportedly increased from 30% to 66% (March to September 2003)</td>
</tr>
<tr>
<td>Akinpelu &amp; Eluchie (2006)</td>
<td></td>
<td>To determine the levels of familiarity,</td>
<td>Descriptive study</td>
<td>Physiotherapists (N=236)</td>
<td>N/A</td>
<td>On average, over 60% of participants reported that</td>
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</table>

- **Hatfield & Ogles (2004)**: To explore psychologist’s use of outcome measures in clinical practice. Survey design with Psychologists (N=874). Participants reported some form of outcome assessment in their clinical practice, but only 22% used standardised measures consistently.
- **Maher & Williams (2005)**: To identify the outcome measures used by physiotherapists managing lung transplant patients. Descriptive, qualitative design with physiotherapists working in major transplant centres. Approximately 62% used measures to obtain pre-transplant function, but 5% used them for evaluating intervention effectiveness.
- **Abrams, Davidson, Harrick, Harcourt, Zylinski & Clancy (2006)**: To assess the use of standardised measures by physiotherapists over 6 months, implementing strategies to improve outcome measurement. Longitudinal, postal survey with physiotherapy providers. There was a significant increase in the use of outcome measures from March to September 2003.
- **Akinpelu & Eluchie (2006)**: To determine levels of familiarity. Descriptive study with physiotherapists (N=236). Participants reported using outcome measures in their clinical practice, with over 60% indicating familiarity.
<table>
<thead>
<tr>
<th>Country</th>
<th>Study Title</th>
<th>Methods</th>
<th>Population</th>
<th>Findings</th>
<th>Recommendations</th>
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<tbody>
<tr>
<td>Nigeria</td>
<td>knowledge and utilisation of 16</td>
<td></td>
<td>Participants had never used and were not</td>
<td>Low outcome measure knowledge was displayed by participants. They were not familiar with standardised outcome measures.</td>
<td>Integration of outcome assessment education into undergraduate physiotherapy curricula</td>
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<tr>
<td></td>
<td>outcome measures with physiotherapists</td>
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<td>not familiar with standardised outcome</td>
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<td>measures. Participants also displayed low</td>
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<td>outcome measure knowledge</td>
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<tr>
<td>Australia</td>
<td>Bowen (2006)</td>
<td>To examine the processes used by occupational therapists to measure</td>
<td>Occupational therapists (N=10) employed to</td>
<td>Participants reported difficulty in identifying specific OT aspects to measure and were found to rarely use objective measurement to assess intervention effectiveness. Lack of outcome measure knowledge and skill was cited as the main reason for non-use of measures.</td>
<td>Further research is required to determine effective means of assisting clinicians to write measurable goals and develop outcome measurement knowledge and skill.</td>
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<td></td>
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<td>occupational therapists to measure intervention effectiveness</td>
<td>treat stoke patients</td>
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<td></td>
<td></td>
<td>Qualitative, focus group study</td>
<td>N/A</td>
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<td>3 focus groups</td>
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<tr>
<td>United Kingdom</td>
<td>Skinner &amp; Turner-Stokes (2006)</td>
<td>To identify the standardised outcome measures used by rehabilitation</td>
<td>Rehabilitation centres (N=83)</td>
<td>86% of rehabilitation centres used at least one standardised outcome measure as part of routine clinical practice; 72% of those using outcome measures reported assessing outcomes through recording the achievement of set goals.</td>
<td>Introduction of goal attainment scaling to rehabilitation centres</td>
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<td></td>
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<td>professionals in clinical practice</td>
<td>N/A</td>
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<tr>
<td></td>
<td></td>
<td>Survey design</td>
<td>Self-report survey</td>
<td></td>
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<tr>
<td>Australia</td>
<td>Cook, McCluskey &amp; Bowman (2007)</td>
<td>To develop and determine the effect of a one-day workshop, resource</td>
<td>Occupational therapists (N=36)</td>
<td>The proportion of clinicians using outcome measures increased from 65.7% at baseline to 91.4% at 4 months post workshop.</td>
<td>Long term follow up after an education workshop to establish whether outcome measure use was maintained over time. Development of an objective instrument to measure changes in outcome measurement knowledge and skill.</td>
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<td></td>
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<td>package and follow up support on the use of outcome measures by</td>
<td>Two one-day workshops on outcome measures,</td>
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<td></td>
<td></td>
<td>occupational therapists</td>
<td>a resource package containing 9 outcome</td>
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<td>measures, 4 months follow up support by</td>
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<td>Self-report survey</td>
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<td></td>
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<td>(baseline and 4 months following workshop)</td>
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<tr>
<td>Study</td>
<td>Country</td>
<td>Objective</td>
<td>Methods</td>
<td>Participants</td>
<td>Instrument</td>
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<tr>
<td>Hanna, Russell, Bartlett, Kertoy, Rosenbaum &amp; Wynn (2007)</td>
<td>Canada</td>
<td>To investigate the outcome measurement practices by allied health clinicians working in paediatric rehabilitation</td>
<td>Descriptive study</td>
<td>Physiotherapists (N=63), occupational therapists (N=72) and speech therapists (N=74) working in a children’s rehabilitation program</td>
<td>N/A</td>
</tr>
<tr>
<td>Copeland, Taylor &amp; Dean (2008)</td>
<td>New Zealand</td>
<td>To examine the methods used to evaluate treatment outcomes and factors influencing the use of outcome measures by physiotherapists treating low back pain</td>
<td>Cross-sectional study used qualitative and quantitative methods</td>
<td>Physiotherapists: Two focus groups, private practice (n=6), public hospital (n=6). Postal questionnaire (n=369)</td>
<td>N/A</td>
</tr>
<tr>
<td>Greenhalgh, Flynn, Long, &amp; Tyson (2008)</td>
<td>United Kingdom</td>
<td>Explores how multi-disciplinary teams (MDT) balance encoded knowledge, in the form of standardised outcome measurement, with tacit knowledge, in the form of intuitive judgement, clinical experience and expertise, in the process of clinical decision-making.</td>
<td>Qualitative study</td>
<td>(n=16) MDT (n=11) practitioners</td>
<td>N/A</td>
</tr>
</tbody>
</table>

- Continuing education for clinicians working in paediatric rehabilitation
- Development of measurement practices and interventions designed to aid adequate measurement practices
- There are limits to the advantages of quantifying and standardising assessments and standardised assessments can support, rather than determine clinical judgement
- Tacit knowledge is essential to produce and interpret this form of encoded knowledge to balance its significance against other information
<table>
<thead>
<tr>
<th>Study</th>
<th>Country</th>
<th>Research Question</th>
<th>Methodology</th>
<th>Participants</th>
<th>Data Collection</th>
<th>Findings</th>
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</table>
| Hefford, Lodge, Elliot & Haxby (2008)     | New Zealand   | To determine whether it was feasible to measure, capture and report on outcomes, across the four University of Otago School of Physiotherapy clinical settings, in a simple and meaningful way. | Observational audit study | N=410 patients treated, n=213 patients had baseline and follow-up data collected | Baseline and discharge Patient-Specific Functional Scale (PSFS) and the Numerical Pain Rating Scale (NPRS) data were collected over a 3 month period | The compliance rate for complete data at baseline and follow-up was 70%  
• Greater attention to detail regarding simplicity of design of forms used  
• Better education of clinicians about the value of collecting outcomes  
• Use of reminders to assist clinicians to collect outcomes data |
| Skeat & Perry (2008)                      | Australia     | To develop a theoretical framework to explain speech therapist’s implementation and use of outcome measures in clinical practice | Qualitative study      | Speech pathology clinicians and managers (N=15) | Individual in-depth interviews | Theoretical model developed by the researchers included two stages: clinicians “try on” outcome measurement to evaluate fit and then utilise alignment strategies to tailor the outcome measure to suit their practice  
• Provision of practical outcome measures suitable for speech pathology practice  
• Continuing education for clinicians regarding the role and need for outcome measurement |
• Development of professional guidelines regarding the use of outcome measures |
| Stapleton & McBrearty (2009)              | Ireland       | To explore the use of outcome measures among a sample of occupational therapists working with adults with physical disabilities | Survey design          | Occupational Therapists (N=109)               | Self-report survey | 30% of participants reported administering a commonly-used instrument in a routine manner; standardised outcome measures were the least reported means used to assess intervention effectiveness  
• Increased postgraduate training opportunities and policies to improve outcome measurement behaviour, such as workshops or development of guidelines for practice |
| **Van Peppen, Schuurmans, Stutterheim, Lindeman & Van Meeteren (2009)** | **The Netherlands** | To evaluate the influence of tutor expertise on the uptake of an education program to increase physiotherapist’s use of outcome measures in the management of patients with stroke | Pilot randomised controlled trial | Physiotherapists (N=30) | Participants were randomised to two groups: Both groups attended five educational workshops. Group one was taught by a tutor experienced in stroke management, group two was taught by an inexperienced tutor | A file audit was conducted at baseline and 14 weeks post intervention (frequency of 7 recommended outcome measures in patients records). Self-report survey data was also collected at baseline and 14 weeks post intervention | At baseline, participants self-reported they used a median of 4 out of 7 outcome measures: file audits showed they were using only 3. Post intervention, participants in the expert tutor group reported an increase in outcome measure use (6 out of 7) compared to participants in the non-expert tutor group (4 out of 7). File audits showed that the median use of the expert tutor group improved from 3 to 6 while participants in the non-expert tutor group improved from 3 to 4. | • Investigation into whether physiotherapists adhere to outcome measurement guideline recommendations • Research into whether successful outcome measurement results in better client-outcomes |
Appendix B – 30-item CReMOS
### CReMOS instrument domains and related items

**Pre-contemplation**
- 5. I know my interventions work, I don’t need to measure them
- 9. I have no idea how to measure client outcomes and I am not interested in learning
- 15. I don’t see the point of measuring client outcomes
- 18. Outcome measures don’t capture the small changes I see with my clients
- 21. Outcome measurement will never be part of my daily routine as it does not fit with my professional philosophy
- 28. My clinical caseload is so heavy I don’t have time to measure outcomes

**Contemplation**
- 3. I think that measuring outcomes helps me to monitor client progress
- 6. I can see that not measuring client outcomes is a problem
- 14. I think about how I could incorporate measuring client outcomes into my daily routine
- 16. I can see the point of measuring outcomes, but I don’t know how to get started
- 29. Outcome measures are good in theory but they take too long to administer
- 30. Measuring outcomes would be good if it didn’t mean spending time doing extra paperwork

**Preparation**
- 2. I have had someone teach me how to search electronic databases to locate relevant outcome measures for my clients
- 10. I have looked at clinical files where outcome measures have been reported to help me develop a format for reporting my own client outcomes
- 12. I talk to and get advice from clinicians who measure outcomes
- 25. I search various resources (e.g. professional literature, Internet, text books etc.) for potential outcome measures for my clients
- 26. Measuring outcomes helps me to make objective decisions about my clients’ interventions/services
- 27. I enrol in workshops/courses to learn how to measure client outcomes

**Action**
- 1. I have critiqued outcome measures and selected the most suitable one/s for my clients and clinical situation
- 4. Although it is difficult, I am using time management strategies to incorporate some outcome measures into my practice
- 7. I have trialed some outcome measures with my clients
- 8. I am measuring outcomes and using strategies to avoid reverting back to my old practice habits
- 13. I am measuring and reporting some client outcomes, but there are still times when I am tempted not to bother
- 17. I have successfully searched literature and other resources to identify potential outcome measures for my clients

**Maintenance**
- 11. I always use the results of outcome measures along with my clinical observation to discuss client progress with other professionals
- 19. I mentor other clinicians who want to learn how to measure client outcomes
- 20. I organise my work to make outcome measurement part of my daily practice
- 22. I have been measuring outcomes with my clients for at least 6 months
- 23. Consistently reporting client outcomes in my notes is a routine part of my daily practice
- 24. I conduct education sessions to teach other clinicians how to measure outcomes
## Pre-contemplation
5. I know my interventions work, I don’t need to measure them
9. I have no idea how to measure client outcomes and I am not interested in learning
15. I *don’t see* the point of measuring client outcomes
18. Outcome measures don’t capture the small changes I see with my clients
21. Outcome measurement will never be part of my daily routine as it does not fit with my professional philosophy
28. My clinical caseload is so heavy I don’t have time to measure outcomes

## Contemplation
3. I think that measuring outcomes helps me to monitor client progress
6. I can see that *not* measuring client outcomes is a problem
14. I think about how I could incorporate measuring client outcomes into my daily routine
16. I *can see* the point of measuring outcomes, but I don’t know how to get started
29. Outcome measures are good in theory but they take too long to administer
30. Measuring outcomes would be good if it didn’t mean spending time doing extra paperwork

## Preparation
2. I have had someone teach me how to search electronic databases to locate relevant outcome measures for my clients
10. I have looked at clinical files where outcome measures have been reported to help me develop a format for reporting my own client outcomes
12. I talk to and get advice from clinicians who measure outcomes
25. I search various resources (e.g. professional literature, Internet, text books etc.) for potential outcome measures for my clients
26. Measuring outcomes helps me to make objective decisions about my clients’ interventions/services
27. I enrol in workshops/courses to learn how to measure client outcomes

## Action
1. I have critiqued outcome measures and selected the most suitable one/s for my clients and clinical situation
4. Although it is difficult, I am using time management strategies to incorporate some outcome measures into my practice
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13. I am measuring and reporting some client outcomes, but there are still times when I am tempted not to bother
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## Maintenance
11. I always use the results of outcome measures along with my clinical observation to discuss client progress with other professionals
19. I mentor other clinicians who want to learn how to measure client outcomes
20. I organise my work to make outcome measurement part of my daily practice
22. I have been measuring outcomes with my clients for at least 6 months
23. Consistently reporting client outcomes in my notes is a routine part of my daily practice
24. I conduct education sessions to teach other clinicians how to measure outcomes
Appendix C- CReMOS content validity testing recruitment email
Dear (insert name),

I extend to you, as an expert in your field an invitation to participate in the psychometric testing a new tool that I have developed as part of my PhD program. The tool I have developed is the Clinician Readiness for Outcome Measurement Scale (CReMOS). I have developed this tool to determine allied health clinicians’ readiness to measure client outcomes as part of their daily practice. This tool will add significant value to allied health professions wanting to increase the number of clinicians routinely measuring outcomes in order to meet current health care demands. Knowledge of clinicians’ stage of readiness will assist educators to develop appropriate educational strategies to assist clinicians to develop the knowledge and skills required to meet this practice demand.

The CReMOS will be published as a new instrument in the near future and as such requires content validity assessment as part of the psychometric testing of its properties. If you agree to assist in this project by being a member of the expert panel that will rate the content validity of this tool, participation will take approximately 30 minutes of your time.

In validating the content you will be asked to examine the features of the tool in terms of content appropriately reflecting specified theoretical constructs, the relevance of the items of the CReMOS to clinician readiness for measuring outcomes; and I would value your observations about the completeness of the instrument.

If you are interested in lending your expertise, please complete return this email and include your postal address and I will send you a content validity package in the mail. If you do not wish to be involved please just discard this email. This study has been approved by the University of Western Sydney’s Human Research Ethics Committee (approval number: HREC 06/030).

Thank you for your time,

Julia Bowman, PhD Candidate; Dr Catherine Cook, Principal Supervisor and Dr Annie McCluskey, Associate Supervisor.
Appendix D – CReMOS recruitment and participant information
email
Dear Allied Health Clinician,

Re: Research Project: The Clinician Readiness for Measuring Outcomes Scale (CReMOS) – Psychometric testing of the 30-item instrument

Are you an allied health clinician (occupational therapist, physiotherapist, podiatrist, psychologist, speech pathologist, social worker, welfare worker or counsellor)?
Do you have formal qualifications in this profession?
Do you work with clients?

If you answered yes to each of these questions, you are invited to participate in a research project that is part of my PhD study being undertaken at the University of Western Sydney. Participation in the study involves completing an anonymous survey which will only take 15 minutes of your time.

The aim of this study is to complete validity and reliability testing on a newly developed instrument – the “Clinician Readiness for Measuring Outcomes Scale” or CREMOS. This instrument has been designed to find out about allied health clinician’s use and comfort with outcome measures. The CReMOS has been used to inform an educational workshop and follow-up support program aiming to increase allied clinicians use of outcome measures in their daily practice. As with any new rating scale, it is important that data collected using the CReMOS are valid and reliable. This study is a formal pilot testing of the structure and reliability of the CReMOS scale.

The information you provide will be used to:
- evaluate the items on the CReMOS using factor analysis, and
- evaluate the internal consistency reliability of the CReMOS.

There is no obligation to complete the attached survey, it is voluntary. Completing and returning the survey constitutes your consent to participate.

Should you decide to participate in the study, please find attached:
1) An information sheet providing more details of the project (please keep);
2) A copy of the CReMOS survey (6 pages) to complete and return; and
3) A fax coversheet for returning CReMOS survey.

You have two options for returning the completed CReMOS survey:
1) By fax 0246 203792: Attention to Julia Bowman (use fax coversheet attached); or
2) Electronically by either “highlighting” or “marking” your responses on the survey, saving the changes and then sending the completed CREMOS as an attachment to Julia Bowman j.bowman@uws.edu.au

This study is using snowball or network sampling methods. Please forward this email and attachments to other allied health professionals that you know - please do not send contact details of potential participants to the researchers. Your assistance in this research project is greatly appreciated and you will be contributing to the development of a new measurement instrument for allied health clinicians.

Should you have any questions please do not hesitate to contact me.

Yours sincerely,

Julia Bowman
PhD Candidate
University of Western Sydney

Dr Catherine Cook
Principal Supervisor
University of Western Sydney

Dr Annie McCluskey
Associate Supervisor
University of Western Sydney

Natasha Lannin
Associate Supervisor
University of Sydney
Appendix E – CReMOS item characteristics
CReMOS Item Characteristics

**Item number:** 1  
**Stage of Change Represented:** Action

**Stem**
Item 1: I have critiqued outcome measures and selected the most suitable one/s for my clients and clinical situation

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**Rasch Statistics**
Location: 56.45
Point biserial correlation: 0.79
Infit mean square (Standardised Z-score): 0.76 (-4.2)
Outfit mean square: 0.76
Preliminary recommendation:  
*Retain with collapsed response category 3/4*

Final recommendation:  
*Retain with refined category*

**Traditional Statistics**
Percentage omitted: 0%
Item factor loading: 0.84
Item-total correlation: 0.81
CReMOS Item Characteristics

**Item number:** 2  
**Stage of Change Represented:** Preparation

**Stem**
Item 2: I have had someone teach me how to search electronic databases to locate relevant outcome measures for my clients

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**Rasch Statistics**

Location: 55.43

Point biserial correlation: 0.57

Infit mean square (Standardised Z-score): 1.51 (7.8)

Outfit mean square: 1.52

Preliminary recommendation:  
*Misfitting item, consider dropping from scale*

Final recommendation:  
*Retain item based on CFA results*

**Traditional Statistics**

Percentage omitted: 0%

Item factor loading: .56

Item-total correlation: 0.61
**CReMOS Item Characteristics**

**Item number:** 3  
**Stage of Change Represented:** Contemplation

---

**Stem**

Item 3: I think that measuring outcomes helps me to monitor client progress

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**Rasch Statistics**

Location: 33.65

Point biserial correlation: 0.58

Infit mean square (Standardised Z-score): 0.89 (-1.7)

Outfit mean square: 1.00

Preliminary recommendation:  
*Retain with collapsed response category 3/4*

Final recommendation:  
*Retain with refined category*

---

**Traditional Statistics**

Percentage omitted: 0%

Item factor loading: 0.59

Item-total correlation: 0.58
CReMOS Item Characteristics

**Item number: 4**  
**Stage of Change Represented:** Action

**Stem**
Item 4: Although it is difficult, I am using time management strategies to incorporate some outcome measures into my practice

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**Rasch Statistics**

Location: 54.69

Point biserial correlation: 0.71

Infit means square (Standardised Z-scores): 0.69 (-5.4)

Outfit mean square: 0.76

Preliminary recommendation

*Retain with collapsed response category 3/4*

Final recommendation

*Retain with refined category*

**Traditional Statistics**

Percentage omitted: 0%

Item factor loading: 0.77

Item-total correlation: 0.75
CReMOS Item Characteristics

Item number: 5  
Stage of Change Represented: Precontemplation

Stem
Item 5: I know my interventions work, I don’t need to measure them

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Rasch Statistics
Location: 38.98
Point biserial correlation: 0.44
Infit mean square (Standardised Z-score): 1.09 (1.3)
Outfit mean square: 1.19
Preliminary recommendation
Retain with collapsed response category 3/4
Final recommendation
Retain with refined category

Traditional Statistics
Percentage omitted: 0%
Item factor loading: 0.65
Item-total correlation: 0.45
CReMOS Item Characteristics

**Item number:** 6  
**Stage of Change Represented:** Contemplation

**Stem**
Item 6: I can see that not measuring client outcomes is a problem

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**Rasch Statistics**

Location: 35.59

Point biserial correlation: 1.52

Infit mean square (Standardised Z-score): .94 (-0.9)

Outfit mean square: 0.94

Preliminary recommendation  
*Retain with collapsed response category 3/4*

Final recommendation  
*Retain with refined category*

**Traditional Statistics**

Percentage omitted: 0%

Item factor loading: 0.59

Item-total correlation: 0.51
CReMOS Item Characteristics

**Item number:** 7  
**Stage of Change Represented:** Action

**Stem**
Item 7: I have trialled some outcome measures with my clients

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**Rasch Statistics**

Location: 46.07

Point biserial correlation: 0.73

Infit mean square (Standardised Z-score): 0.85 (-2.4)

Outfit mean square: 0.82

Preliminary recommendation  
*Retain with collapsed response category 3/4*

Final recommendation  
*Retain with refined category*

**Traditional Statistics**

Percentage omitted: 0%

Item factor loading: 0.78

Item-total correlation: 0.73
CReMOS Item Characteristics

Item number: 8  Stage of Change Represented: Action

Stem
Item 8: I am measuring outcomes and using strategies to avoid reverting back to my old practice habits

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Refined Categories

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Rasch Statistics

Location: 57.98

Point biserial correlation: 0.71

Infit mean square (Standardised Z-score): 0.72 (-4.9)

Outfit mean square: 0.76

Preliminary recommendation
Retain with collapsed response category 3/4

Final recommendation
Retain with refined category

Traditional Statistics

Percentage omitted: 0%

Item factor loading: 0.77

Item-total correlation: 0.73
**CReMOS Item Characteristics**

**Item number:** 9  
**Stage of Change Represented:** Precontemplation

**Stem**
Item 9: I have no idea how to measure client outcomes and I am not interested in learning

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**Rasch Statistics**

Location: 25.70

Point biserial correlation: 0.49

Infit mean square (Standardised Z-score): 1.17 (2.3)

Outfit mean square: 1.02

Preliminary recommendation  
*Retain with collapsed response category 3/4*

Final recommendation  
*Retain with refined category*

**Traditional Statistics**

Percentage omitted: 0%

Item factor loading: 0.70

Item-total correlation: 0.52
CReMOS Item Characteristics

**Item number:** 10  
**Stage of Change Represented:** Preparation

**Stem**
Item 10: I have looked at clinical files where outcome measures have been reported to help me develop a format for reporting my own client outcomes

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<tr>
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<td>Mildly Disagree</td>
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**Rasch Statistics**

Location: 61.86

Point biserial correlation: 0.63

Infit mean square (Standardised Z-score): 1.03 (0.4)

Outfit mean square: 1.05

Preliminary recommendation
*Retain with collapsed response category 3/4*

Final recommendation
*Retain with refined category*

**Traditional Statistics**

Percentage omitted: 0%

Item factor loading: 0.64

Item-total correlation: 0.64
CReMOS Item Characteristics

**Item number:** 11  
**Stage of Change Represented:** Maintenance

**Stem**
Item 11: I always use the results of outcome measures along with my clinical observation to discuss client progress with other professionals

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<tr>
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**Refined Categories**

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**Rasch Statistics**

Location: 54.91

Point biserial correlation: 0.73

Infit mean square (Standardised Z-score): 0.80 (-3.4)

Outfit mean square: 0.82

Preliminary recommendation:  
*Retain with collapsed response category 3/4*

Final recommendation:  
*Retain with refined category*

**Traditional Statistics**

Percentage omitted: 0%

Item factor loading: 0.77

Item-total correlation: 0.75
CReMOS Item Characteristics

Item number: 12  Stage of Change Represented: Preparation

Stem
Item 12: I talk to and get advice from clinicians who measure outcomes

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Rasch Statistics

Location: 50.64
Point biserial correlation: 0.71
Infit mean square (Standardised Z-score): 0.77 (-3.8)
Outfit mean square: 0.78
Preliminary recommendation
Retain with collapsed response category 3/4
Final recommendation
Retain with refined category

Traditional Statistics

Percentage omitted: 0%
Item factor loading: 0.70
Item total correlation: 0.70
CReMOS Item Characteristics

Item number: 13  Stage of Change Represented: Action

**Stem**
Item 13: I am measuring and reporting some client outcomes, but there are still times when I am tempted not to bother

<table>
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**Rasch Statistics**
Location: 54.68
Point serial correlation: -0.07
Infit mean square (Standardised Z-score): 1.93 (9.9)
Outfit mean square: 2.35
Preliminary recommendation: *Misfitting item, consider dropping from scale*

Final recommendation: *Drop item*

**Traditional Statistics**
Percentage omitted: 1.7%
Item factor loading: -0.33
Item-total correlation: -0.32
CReMOS Item Characteristics

Item number: 14  Stage of Change Represented: Contemplation

Stem
Item 14: I think about how I could incorporate measuring client outcomes into my daily routine

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Refined Categories | Score | %  |
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Rasch Statistics
Location: 48.37
Point biserial correlation: 0.57
Infit mean square (Standardised Z-score): 0.89 (-1.8)
Outfit mean square: 0.92
Preliminary recommendation
Retain with collapsed response category 3/4
Final recommendation
Retain with refined category

Traditional Statistics
Percentage omitted: 0%
Item factor loading: 0.58
Item-total correlation: 0.58
CReMOS Item Characteristicst

**Item number:** 15  
**Stage of Change Represented:** Precontemplation

**Stem**

Item 15: *I don’t see the point of measuring client outcomes*

<table>
<thead>
<tr>
<th>Categories</th>
<th>Score</th>
<th>%</th>
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**Rasch Statistics**

Location: 25.90

Point biserial correlation: 0.46

Infit mean square (Standardised Z-score): 1.19 (2.6)

Outfit mean square: 1.34

Preliminary recommendation:  
*Retain with collapsed response category 3/4*

Final recommendation:  
*Retain with refined category*

**Traditional Statistics**

Percentage omitted: 0%

Item factor loading: 0.69

Item-total correlation: 0.47
CReMOS Item Characteristics

Item number: 16  
Stage of Change Represented: Contemplation

**Stem**
Item 16: I *can see* the point of measuring outcomes, but I don’t know how to get started

<table>
<thead>
<tr>
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<th>Score</th>
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**Rasch Statistics**
Location: 53.53
Point biserial correlation: -0.54
Infit mean square (Standardised Z-score): 3.06 (9.9)
Outfit mean square: 4.18
Preliminary recommendation: *Misfitting item, consider dropping from scale*

Final recommendation: *Drop item*

**Traditional Statistics**
Percentage omitted: 1.6%
Item factor loading: -0.54
Item-total correlation: -0.54
CReMOS Item Characteristics

**Item number:** 17  
**Stage of Change Represented:** Action

**Stem**
Item 17: I have successfully searched literature and other resources to identify potential outcome measures for my clients

<table>
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<th>Score</th>
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**Rasch Statistics**

Location: 56.04

Point biserial correlation: 0.74

Infit mean square (Standardised Z-score): 0.86 (-2.4)

Outfit mean square: 0.86

Preliminary recommendation:  
*Retain with collapsed response category 3/4*

Final recommendation:  
*Retain with refined category*

**Traditional Statistics**

Percentage omitted: 0%

Factor item loading: 0.70

Item-total correlation: 0.73
CReMOS Item Characteristics

Item number: 18  Stage of Change Represented: Precontemplation

**Stem**
Item 18: Outcome measures don’t capture the small changes I see with my clients

<table>
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<th>Score</th>
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</thead>
<tbody>
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**Rasch Statistics**
Location: 53.80
Point biserial correlation: 0.21
Infit mean square (Standardised Z-scores): 1.39 (6.0)
Outfit mean square: 1.58
Preliminary recommendation: *Misfitting item, consider dropping from scale*
Final recommendation: *Drop item*

**Traditional Statistics**
Percentage omitted: 1.6%
Item factor loading: 0.23
Item-total correlation: 0.22
CReMOS Item Characteristics

Item number: 19  Stage of Change Represented: Maintenance

**Stem**
Item 19: I mentor other clinicians who want to learn how to measure client outcomes

<table>
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<tr>
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<td>18</td>
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**Rasch Statistics**
Location: 64.71
Point biserial correlation: 0.65
Infit mean square (Standardised Z-score): 1.23 (3.5)
Outfit mean square: 1.24
Preliminary recommendation: Retain with collapsed response category 3/4
Final recommendation: Retain with refined category

**Traditional Statistics**
Percentage omitted: 0%
Item factor loading: 0.56
Item total correlation: 0.61
CReMOS Item Characteristics

**Item number:** 20  
**Stage of Change Represented:** Maintenance

### Stem
Item 20: I organise my work to make outcome measurement part of my daily practice

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### Rasch Statistics
Location: 58.24
Point biserial correlation: 0.83
Infit mean square (Standardised Z-score): 0.51 (-9.6)
Outfit mean square: 0.51
Preliminary recommendation:  
*Retain with collapsed response category 3/4*
Final recommendation:  
*Retain with refined category*

### Traditional Statistics
Percentage omitted: 0%
Item factor loading: 0.89
Item-total correlation: 0.85
CReMOS Item Characteristics

Item number: 21

Stage of Change Represented:

**Stem**
Item 21: Outcome measurement will never be part of my daily routine as it does not fit with my professional philosophy

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**Rasch Statistics**
Location: 28.26
Point biserial correlation: 0.50
Infit mean square (Standardised Z-score): 1.13 (1.8)
Outfit mean square: 1.04
Preliminary recommendation: Retain with collapsed response category 3/4

Final recommendation: Retain with refined category

**Traditional Statistics**
Percentage omitted: 0%
Item factor loading: 0.79
Item-total correlation: 0.52
CReMOS Item Characteristics

**Item number:** 22  
**Stage of Change Represented:** Maintenance

**Stem**
Item 22: I have been measuring outcomes with my clients for at least 6 months

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**Rasch Statistics**

Location: 55.22

Point biserial correlation: 0.75

Infit mean square (Standardised Z-score): 1.23 (3.4)

Outfit mean square: 1.24

Preliminary recommendation: Retain with collapsed response category 3/4

Final recommendation: Retain with refined category

**Traditional Statistics**

Percentage omitted: 0%

Item factor loading: 0.80

Item-total correlation: 0.75
CReMOS Item Characteristics

**Item number:** 23  
**Stage of Change Represented:** Maintenance

**Stem**
Item 23: Consistently reporting client outcomes in my notes is a routine part of my daily practice

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**Rasch Statistics**
- Location: 53.20
- Point biserial correlation: 0.61
- Infit mean square (Standardised Z-score): 1.21 (3.1)
- Outfit mean square: 1.20
- Preliminary recommendation: 
  *Retain with collapsed response category 3/4*
- Final recommendation: 
  *Retain with refined category*

**Traditional Statistics**
- Percentage omitted: 0%
- Item factor loading: 0.65
- Item-total correlation: 0.61
CReMOS Item Characteristics

**Item number:** 24  
**Stage of Change Represented:** Maintenance

**Stem**

Item 24: I conduct education sessions to teach other clinicians how to measure outcomes

<table>
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**Rasch Statistics**

Location: 72.11

Point biserial correlation: 0.69

Infit mean square (Standardised Z-score): 1.03 (0.4)

Outfit mean square: 1.01

Preliminary recommendation:
*Retain with collapsed response category 3/4*

Final recommendation:
*Retain with refined category*

**Traditional Statistics**

Percentage omitted: 0%

Item factor loading: 0.66

Item-total correlation: 0.66
CReMOS Item Characteristics

**Item number:** 25  
**Stage of Change Represented:** Preparation

**Stem**
Item 25: I search various resources (e.g. professional literature, Internet, text books etc.) for potential outcome measures for my clients

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**Rasch Statistics**

Location: 57.50

Point biserial correlation: 0.74

Infit mean square (Standardised Z-score): 0.92 (-1.3)

Outfit mean square: 0.92

Preliminary recommendation:  
*Retain with collapsed response category 3/4*

Final recommendation:  
*Retain with refined category*

**Traditional Statistics**

Percentage omitted: 0%

Item factor loading: 0.71

Item-total correlation: 0.74
CReMOS Item Characteristics

**Item number:** 26  
**Stage of Change Represented:** Preparation

**Stem**  
Item 26: Measuring outcomes helps me to make objective decisions about my clients’ interventions/services

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**Rasch Statistics**

Location: 43.86

Point biserial correlation: 0.70

Infit mean square: 0.77 (-3.8)

Outfit mean square: 0.75

Preliminary recommendation:  
*Retain with collapsed response category 3/4*

Final recommendation:  
*Retain with refined category*

**Traditional Statistics**

Percentage omitted: 0%

Item factor loading: 0.70

Item-total correlation: 0.70
CReMOS Item Characteristics

Item number: 27  Stage of Change Represented: Preparation

**Stem**
Item 27: I enrol in workshops/courses to learn how to measure client outcomes

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**Rasch Statistics**

Location: 58.39

Point biserial correlation: 0.62

Infit mean square (Standardised Z-score): 1.01 (0.2)

Outfit mean square: 1.02

Preliminary recommendation:
*Retain with collapsed response category 3/4*

Final recommendation:
*Retain with refined category*

**Traditional Statistics**

Percentage omitted: 0%

Item factor loading: 0.59

Item-total correlation: 0.61
CReMOS Item Characteristics

Item number: 28  Stage of Change Represented: Precontemplation

Stem
Item 28: My clinical caseload is so heavy I don’t have time to measure outcomes

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Rasch Statistics

Location: 50.02

Point biserial correlation: 0.40

Infit mean square (Standardised Z-score): 1.11 (1.7)

Outfit mean square: 1.13

Preliminary recommendation:
Retain with collapsed response category 3/4, redundancy noted

Final recommendation:
Drop item based on redundancy and item factor loading

Traditional Statistics

Percentage omitted: 0.9%

Item factor loading: 0.23

Item-total correlation: 0.23
CReMOS Item Characteristics

**Item number:** 29

**Stage of Change Represented:** Contemplation

**Stem**

Item 29: Outcome measures are good in theory but they take too long to administer

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**Rasch Statistics**

Location: 52.33

Point biserial correlation: 0.44

Infit mean square (Standardised Z-score): 0.87 (-2.2)

Outfit mean square: 0.90

Preliminary recommendation:
*Retain with collapsed response category 3/4*

Final recommendation:
*Retain with refined category*

**Traditional Statistics**

Percentage omitted: 0%

Item factor loading: 0.31

Item-total correlation: 0.37
CReMOS Item Characteristics

**Item number:** 30  
**Stage of Change Represented:** Contemplation

**Stem**
Item 30: Measuring outcomes would be good if it didn’t mean spending time doing extra paperwork

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**Rasch Statistics**
- Location: 55.78
- Point biserial correlation: .39
- Infit mean square (Standardised Z-score): 1.19 (3.2)
- Outfit mean square: 1.27

Preliminary recommendation:  
*Retain with collapsed response category 3/4, redundancy noted*

Final recommendation:  
*Drop item based on redundancy and item factor loading*

**Traditional Statistics**
- Percentage omitted: 1.5%
- Item factor loading: 0.29
- Item-total correlation: 0.36
Appendix F – 25-item CReMOS
Clinician Readiness for Measuring Outcomes Scale (CReMOS)

The purpose of this questionnaire is to help establish clinicians’ level of readiness to measure clinical outcomes. This information will be used to assist educators to develop education, training and support programs to best suit clinicians’ needs. This 25-item questionnaire will take approximately 10 minutes to complete. Please answer all 25 items. Select the option that best describes you or your current situation (*please select ONE option only and do not tick half way between options*).

*Completion and return of this survey will be taken as an indication of voluntary consent to participate in this study.*

1. I have critiqued outcome measures and selected the most suitable one/s for my clients and clinical situation

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<th>Neutral</th>
<th>Disagree</th>
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</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

2. I have had someone teach me how to search electronic databases to locate relevant outcome measures for my clients

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neutral</th>
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3. I think that measuring outcomes helps me to monitor client progress

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4. Although it is difficult, I am using time management strategies to incorporate some outcome measures into my practice

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5. I know my interventions work, I don’t need to measure them

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6. I can see that *not* measuring client outcomes is a problem

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7. I have trialled some outcome measures with my clients

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8. I am measuring outcomes and using strategies to avoid reverting back to my old practice habits

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9. I have no idea how to measure client outcomes and I am not interested in learning

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10. I have looked at clinical files where outcome measures have been reported to help me develop a format for reporting my own client outcomes

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11. I always use the results of outcome measures along with my clinical observation to discuss client progress with other professionals

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12. I talk to and get advice from clinicians who measure outcomes

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13. I think about how I could incorporate measuring client outcomes into my daily routine

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14. I *don’t see* the point of measuring client outcomes

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15. I have successfully searched literature and other resources to identify potential outcome measures for my clients

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16. I mentor other clinicians who want to learn how to measure client outcomes

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17. I organise my work to make outcome measurement part of my daily practice

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18. Outcome measurement will never be part of my daily routine as it does not fit with my professional philosophy

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19. I have been measuring outcomes with my clients for at least 6 months

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20. Consistently reporting client outcomes in my notes is a routine part of my daily practice

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21. I conduct education sessions to teach other clinicians how to measure outcomes

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22. I search various resources (e.g. professional literature, Internet, text books etc.) for potential outcome measures for my clients

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23. Measuring outcomes helps me to make objective decisions about my clients’ interventions/services

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24. I enrol in workshops/courses to learn how to measure client outcomes

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25. Outcome measures are good in theory but they take too long to administer

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Are you an allied health professional working at The Spastic Centre of New South Wales who treats or provides a service to clients with cerebral palsy?

Would you like to learn about the types and use of outcome measures relevant to cerebral palsy?

A PhD research project, is seeking 120 volunteer allied health professionals to participate in an educational program on outcome measures relevant to clients with cerebral palsy. Julia Bowman, PhD candidate, Dr Catherine Cook and Dr Annie McCluskey, lecturers at the University of Western Sydney, are conducting the project. If you volunteer, you will be randomly allocated to receive training in the types and use of outcome measures at a one-day workshop in either November 2005 or June 2006. You will also receive outreach support for three months after the workshop at no cost. A resource package on published outcome measures for use by allied health professionals will be developed and distributed to participants at the one-day workshop at no cost.

To be eligible, you need to be:
1. A qualified allied health professional;
2. Employed by The Spastic Centre of New South Wales;
3. Currently providing a direct intervention or service to clients who have cerebral palsy;
4. Available to attend a one-day workshop in the Sydney CBD on 29 November 2005 or June 2006;
5. Willing to begin using at least one outcome measure within 4 weeks after attending the workshop.

Shortly you will receive a detailed information sheet about the project.
Appendix H – Participant information letter
Dear (Participant name)

Re: Research Project: Increasing the use of outcome measures by allied health professionals

Thank you for your interest in participating in this project which has been approved by the ethics committees of the University of Western Sydney (approval number: HREC 05/181) and The Spastic Centre. Please find enclosed:

1) An **information sheet** providing more details of the project. (please keep);
2) A **consent form** (2 copies). Please complete one and return to me in the reply paid envelope by the 30 October 2005; and
3) A **survey**. Please complete and return with the signed consent form by the 30 October 2005.

Should you have any questions please do not hesitate to contact me. I look forward to working with you during this project.

Yours sincerely,

*Julia Bowman*

---

**Julia Bowman**

*PhD Candidate*

University of Western Sydney  
Telephone: 02 4620 3592  
Mobile: 0409 544 494  
Email: j.bowman@uws.edu.au

**Dr Catherine Cook**

*Principal Supervisor*

University of Western Sydney  
Telephone: 02 4620 3755  
Email: c.cook@uws.edu.au

**Dr Annie McCluskey**

*Associate Supervisor*

University of Western Sydney  
Telephone: 02 4620 3774  
Email: a.mccluskey@uws.edu.au

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*The Spastic Centre*
Appendix I – Participant information sheet
PARTICIPANT INFORMATION SHEET

Research Study: Increasing the use of outcome measures by allied health professionals.

Dear Allied Health Professional,

You are invited to participate in a research project titled ‘Increasing the use of outcome measures by allied health professionals’.

What is this project?
The best available evidence should guide health interventions and treatments. In practice, the effectiveness of an intervention or treatment should be determined locally by the use of outcome measures. Allied health professionals are expected to demonstrate the effectiveness of their intervention in both meeting the needs of the clients and reducing health care costs. A number of relevant outcome measures are available (such as health related quality of life scales and activity and participation measures). However, these are not regularly being used by allied health professionals to demonstrate change as a result of intervention. This project aims to develop, implement and evaluate an educational program for allied health professionals working at The Spastic Centre of New South Wales who work with clients who have cerebral palsy.

What does the project involve?
This project will educate allied health professionals from The Spastic Centre of New South Wales who see clients with cerebral palsy, on the types and use of outcome measures relevant to their practice. The aim of the educational program will be to provide background information regarding outcome measures and to familiarise participants with a number of outcome measures, which they can use in their practice. The educational program will consist of a one-day workshop (in either November 2005 or June 2006) and a period of outreach support for 3 months after the workshop. Participants will be randomly allocated to one of the two scheduled workshops. Participants will be asked to begin using at least one outcome measure in their practice within 4 weeks after the workshop. A resource package on outcome measures for use by allied health professionals will be developed and distributed to participants at the one-day workshop.

What will be asked of allied health professionals who volunteer to participate?
They will be asked to voluntarily:
- Sign the Consent Form;
- Attend a one-day workshop on the use of outcome measures in November 2005 in the Sydney CBD or June 2006. Participants will be randomly allocated to one of the specified dates.
- Complete Survey 1 prior to attending the one-day workshop (30 minutes);
- Complete Survey 2 three months after the November workshop (30 minutes);
- Complete Survey 3 six months after the November workshop (30 minutes);
- Begin using at least one outcome measure in their practice within 4 weeks after the workshop; and
- Begin recording use of outcome measures in client progress notes within 4 weeks after the workshop.

Outreach support will be provided for activities related to the use of outcome measures following the workshop. There will be no cost for this service, which will include phone and email support from the PhD candidate. Furthermore, participants will be invited to indicate if they wish to be interviewed at the end of the project in June 2006.
Are there any costs to participants?
The Spastic Centre of New South Wales will pay for travel costs for participants travelling over 120kms to attend the workshop. Morning tea, lunch and afternoon tea will be provided. Accommodation for rural participants will be provided. The University of Western Sydney will provide the participant resource packages. The workshop is being subsidised by both the University of Western Sydney and The Spastic Centre of New South Wales.

What are the benefits of participating?
By participating in this project you will:
- Develop knowledge of the types and use of outcome measures relevant to clients with cerebral palsy;
- Practice using a variety of appropriate, readily available outcome measures;
- Further develop skills in defining client goals, identifying interventions and demonstrating client progress through the use of outcome measures;
- To demonstrate client progress to managers, clients and their families;
- Contribute to your own professional development; and
- Receive a free folder on outcome measures that are suitable for use with your clients.
- Save yourself money. Registration to a workshop such as this would ordinarily cost you approximately $450.

Are there any risks?
There are no known risks associated with this research. Should there be any anxiety or concern to a participant by participating in this project then assistance can be provided by the chief investigators. Should this be insufficient the participant will be referred to the ACCESS Employee Assistance Program, which is a 24 hour counselling service. The Contact number for ACCESS is 1300 66 77 00.

Confidentiality
Privacy of participants will be protected. All data collected during this study will be held in confidence and will be stored securely at the University of Western Sydney, and in accordance with University policy. Only the investigators involved in the study will have access to the data collected. All surveys will be numbered for the purpose of tracking returned and outstanding surveys only. The results of this project will be published in peer-reviewed journals and presented at conferences. When the information is analysed and written up for publication, no identifying information will used.

Your rights
Participation in this research project is voluntary. You can withdraw or drop out at any time without adverse consequences, and you do not need to give a reason. Withdrawal from the project will not effect your employment at The Spastic Centre in any way.

Who is conducting the study?
This project is being conducted by Julia Bowman, PhD Candidate at the University of Western Sydney and will be supervised by Dr Catherine Cook and Dr Annie McCluskey of the University of Western Sydney. Questions about the project can be directed at any time to the following people:

Julia Bowman  
**PhD Candidate and Principal Investigator**  
Telephone: 02 4620 3592 (w)  
Mobile: 0409 544 494  
Email: j.bowman@uws.edu.au

Dr Catherine Cook  
**Principal Supervisor**  
Telephone: 02 4620 3755  
Email: c.cook@uws.edu.au

Dr Annie McCluskey  
**Chief Investigator**  
Telephone: 02 4620 3774  
Email: a.mccluskey@uws.edu.au

**Note:** This study has been approved by the University of Western Sydney Human Research Ethics Committee. The approval number is ............If you have any complaints or reservations about the ethical conduct of this research, you may contact the Ethics Committee through the Research Ethics Officers (02 4736 0883 or 4736 0884). Any issues you raise will be treated in confidence and investigated fully, and you will be informed of the outcome.
Appendix J – Participant consent form
CONSENT FORM

Research Study: Increasing the use of outcome measures by allied health professionals

I ______________________ (please write your name here) have been asked to participate in the above study. I agree to participate and understand that:

- The research will be carried out as described in the Participant Information Sheet.
- I have read, and received a copy of the Participant Information Sheet to keep, and have had the opportunity to ask questions.
- The research methods and purpose of the study have been clearly explained to me.
- My consent to participate is voluntary.
- I understand that I am being asked to:
  - Attend a one-day workshop on the use of outcome measures in November 2005 or June 2006;
  - Complete Survey 1 prior to attending the one-day workshop (30 minutes);
  - Complete Survey 2 three months after the November workshop (30 minutes);
  - Complete Survey 3 six months after the November workshop (30 minutes);
  - Begin using at least one outcome measure in my practice within 4 weeks after the workshop; and
  - Begin recording use of outcome measures in client progress notes within 4 weeks after the workshop.

- I will receive outreach support by telephone or email as required for three months after the workshop. There will be no cost for the outreach support.

- I may be invited to participate in an interview on my experiences of using outcome measures approximately six months after the workshop.

- Individual responses from surveys and interviews will be confidential.

- If I decide not to volunteer, my decision will not be questioned. I may withdraw or drop out at any time without adverse consequences. I do not have to give a reason.

- If I have any further questions about the project, I can ask Julia Bowman (PhD Candidate), Dr Catherine Cook (Principal Supervisor), or Dr Annie McCluskey (Associate Supervisor) at the University of Western Sydney.
I can indicate my willingness to complete all stages of the research project by completing the questions below:

1. I am willing to complete Survey 1 prior to attending the one-day workshop and return it with the signed Consent Form in the reply paid envelope provided;
   Yes ☐ No ☐

2. I am willing to complete Survey 2 three months after the November workshop and return it in the reply paid envelope provided;
   Yes ☐ No ☐

3. I am willing to complete Survey 3 six months after the November workshop and return it in the reply paid envelope provided;
   Yes ☐ No ☐

4. I am willing to be interviewed approximately six months after the workshop about my use of outcome measures;
   Yes ☐ No ☐

Signature of Participant: ____________________________________________

Please print your name: ____________________________________________

Date: ________________________________

Signature of Witness: ____________________________________________

Please print your name: ____________________________________________

Date: ________________________________

Please return the signed consent form with the competed survey in the reply paid envelope provided.

Note: This study has been approved by the University of Western Sydney Human Research Ethics Committee. The approval number is ………… If you have any complaints or reservations about the ethical conduct of this research, you may contact the Ethics Committee through the Research Ethics Officers (02 4736 0883 or 4736 0884). Any issues you raise will be treated in confidence and investigated fully, and you will be informed of the outcome.
Appendix K – Outcome Measures Questionnaire
Outcome Measures Questionnaire

Please complete this survey, which will take approximately 20 minutes of your time. The survey is designed to collect information on your experience and use of outcomes measures. Completion and return of this survey is critical to the success of the workshop you will attend in either November 2005 or June 2006. Please return your completed survey in the postage paid return envelope provided.

Thank you for your time – Julia Bowman, PhD Candidate

SECTION 1

1a. Please identify your profession.
   - Physiotherapy
   - Occupational therapy
   - Speech pathology
   - Social worker
   - Welfare worker
   - Psychologist
   - Counsellor
   - Other
   If you have ticked other please give details:

1b. What is the level of your initial qualification in your discipline?
   - Diploma
   - Degree
   - Other
   If you have ticked ‘other’, please give details:

2. How long is it since you graduated in your current discipline?
   - <1 year
   - ≥ 1 but <3 years
   - ≥ 3 but <5 years
   - ≥ 5 but <10 years
   - ≥ 10 but <20 years
   - ≥ 20 years

3. Do you hold any postgraduate qualifications?
   - Yes
   - No
   If you have ticked ‘Yes’, please give details:

4. Are you currently enrolled in any postgraduate study?
   - Yes
   - No
   If you have ticked ‘Yes’, please give details:

5. What is your (paid) employment status?
   - Full-time
   - Part-time (25 hrs or less)
   - Other
   If you have ticked ‘Other’, please give details:

6. In what geographical area/s do you work?
   Tick more than one if necessary.
   - Sydney metropolitan area
   - Regional city/town
   - Rural
   - Other
   If you have ticked ‘Other’, please give details:
7. What is your primary work role at The Spastic Centre? (If you have more than one role, please place ‘1’ beside your primary work role, and ‘2’ beside your secondary role, etc)

- Clinician/practitioner
- Manager
- Case manager
- Consultant
- Researcher
- Other

If you have ticked ‘Other’, please give details:

8. For your clients at The Spastic Centre, list the primary problems you provide intervention/services for.

_______________________________________

_______________________________________

_______________________________________

_______________________________________

_______________________________

SECTION 2

9. What is your understanding of the term 'outcome measure'?

_______________________________________

_______________________________________

_______________________________________

_______________________________________

_______________________________________

10. List any outcome measures that you are aware of.

_______________________________________

_______________________________________

_______________________________________

_______________________________________

_______________________________________

_______________________________________

11. Where did you learn about the outcome measurement process?

- I have never previously learnt about the outcome measurement process
- Undergraduate university course
- Postgraduate university course
- Workshop
- Conference
- Self-taught
- Other

Please specify: ________________________________

Use of outcome measures

12a. Do you currently use outcome measures in your clinical practice at The Spastic Centre?

- Yes
- No (Please go to Q 16)

12b. How many “active” clients do you have on your current caseload at The Spastic Centre?

_______________________________________

12c. With how many of your current “active” clients have you used outcome measures? (eg. 2 out of 10).

_______________________________________
Reasons for using outcome measures

13. I use outcome measures in my practice at The Spastic Centre for the following reasons: (please prioritise your responses from 1-5 with ‘1’ representing the primary reason for using outcome measures)

☐ Employer requirement/policy
☐ To measure change in client progress
☐ To demonstrate value of my intervention
☐ Because I received training as part of entry level professional course
☐ Because I received training as part of formal postgraduate course/studies
☐ Because I received training as part of continuing professional development workshops
☐ Because there is published research evidence to support the use of outcome measures
☐ Outcome measures are currently in use in my workplace
☐ Other reasons

If you have ticked ‘Other’, please give details:
_______________________________________________________________________________
_______________________________________________________________________________
_______________________________________________________________________________

14. How do you use outcome measures in your daily practice? (tick as many boxes as you wish)

☐ For assessment information only (including one off assessments)
☐ For assessment information, although I plan to re-administer at some stage to the same client
☐ To measure change/progress over time in my clients
☐ To guide treatment
☐ To demonstrate effectiveness of intervention/service to myself
☐ To demonstrate effectiveness of intervention/service to client
☐ To demonstrate effectiveness of intervention/service to others
☐ To justify continuation or modification of treatment/program/intervention/equipment
☐ To market my/our services
☐ Other

Please give details:
_______________________________________________________________________________
_______________________________________________________________________________
_______________________________________________________________________________

15. How do you report the results gained from outcome measures used in your daily practice? (Please rank relevant ones in order of priority - rank as many as you consider relevant to your practise)

☐ Full copy of results in clients notes
☐ Summary in client notes
☐ Numerical score in report
☐ I include my interpretation of what the results mean in the report
☐ I discuss scores and results at case conference/team meetings
☐ I discuss results with the client
☐ Other: ____________________________________________

Reasons for not using outcome measures

16. In relation to all your work roles, please identify any reasons below that limit use of outcome measures in your practice. (tick as many boxes as you wish)

☐ Lack of time
☐ Large workload/caseload
☐ Lack of interest/support from my supervisor
☐ Outcome measures take the human aspect out of my work
☐ Lack of interest/support from management
☐ My own lack of interest and enthusiasm
☐ Professional isolation
☐ Entrenched behaviours/habits where I work
☐ Limited knowledge of what outcome measures are available
☐ Limited skill in the administration of outcome measures
☐ Use of outcome measures is not a priority where I work
☐ Lack of evidence to support the use of outcome measures
☐ Lack of appropriate outcome measures
☐ Lack of available training or education on outcome measures
☐ My interventions are too complex to measure
☐ Limited resources and funding to purchase outcome measures
☐ Benefits and advantages of using outcome measures are not clear
☐ Outcome measures do not capture what is happening for my clients
☐ Other: ____________________________________________
### SECTI ON 3

17. Consider a client you have recently seen. Please write in the table below one treatment/service goal that you developed with this client.

<table>
<thead>
<tr>
<th>Treatment/Service Goal</th>
<th></th>
</tr>
</thead>
</table>
18. Please read each statement, then place a tick or cross in ONE box only (per statement).

<table>
<thead>
<tr>
<th>Statement</th>
<th>All of the time</th>
<th>Most of the time</th>
<th>Some of the time</th>
<th>Rarely</th>
<th>Not at all</th>
</tr>
</thead>
<tbody>
<tr>
<td>I write specific measurable goals for/with my clients</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I regularly review goals for/with my clients</td>
<td></td>
<td></td>
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<tr>
<td>I use outcome measures that I have developed myself</td>
<td></td>
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<tr>
<td>I use outcome measures developed by someone at my work</td>
<td></td>
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<tr>
<td>I use published, standardised outcome measures with my clients</td>
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<tr>
<td>When using published, standardised outcome measures, I have access to scoring guidelines</td>
<td></td>
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<tr>
<td>I document client outcomes in reports</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>I interpret the meaning of outcomes and outcome scores in written reports</td>
<td></td>
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</tr>
<tr>
<td>I comment on the magnitude of change that a client achieves (as a result of intervention) in my written reports</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>When discussing client progress with other professionals I talk about results on specific outcome measures</td>
<td></td>
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</tr>
<tr>
<td>I use the results of outcome measures to help me make clinical/service decisions</td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Not Sure</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>If explained properly, clients will not mind using outcome measures</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Staff will actively oppose the use of outcome measures</td>
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</tr>
<tr>
<td>I believe that it is my responsibility to use outcome measures</td>
<td></td>
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<tr>
<td>I feel that outcome measures are just another way for managers to monitor staff performance</td>
<td></td>
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</tr>
<tr>
<td>Outcome measures can highlight important clinical issues</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Using outcome measures will help me to make better treatment/service decisions with my clients</td>
<td></td>
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<tr>
<td>I would find it difficult to change what I already do in clinical practice</td>
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<tr>
<td>I use objective measures with clients (observed/monitored by therapist/other person)</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>I use subjective (self-report) measures with clients</td>
<td></td>
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</tr>
<tr>
<td>It is preferable to select an outcome measure before setting client goals</td>
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</tr>
<tr>
<td>I am familiar with the term 'minimal clinically important difference'</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>I am familiar with the ICF classification system</td>
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<td></td>
</tr>
</tbody>
</table>
19. If you were to measure clinical outcomes, please indicate how much help you would require with each of the following steps *(please tick the category for each task that accurately describes you)*:

<table>
<thead>
<tr>
<th>Task</th>
<th>A lot of help</th>
<th>A moderate amount</th>
<th>Some help</th>
<th>A little help</th>
<th>No help</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Writing measurable clinical goals</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Identifying the desired outcome of therapy</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>3. Identifying outcome measurement options</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Selecting the most appropriate measure for your client</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Implementing and scoring the outcome measure</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>6. Interpreting and reporting outcome measures results</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

20. Do you feel that measuring outcomes can improve the treatment/services that clients receive?

☐ Yes
☐ No

21. Do you have any other comments to add about issues raised in this survey?

* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *

Thank you for taking time to complete this survey.

Julia Bowman, PhD Candidate

* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
Appendix L – Workshop program
<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
<th>Learning objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>08:30am</td>
<td>Registration</td>
<td>Sign the attendance record</td>
</tr>
<tr>
<td></td>
<td><strong>Lise Mogensen</strong></td>
<td>Collect a name badge</td>
</tr>
<tr>
<td></td>
<td><strong>Collect a resource folder</strong></td>
<td></td>
</tr>
<tr>
<td>08:45am</td>
<td>Welcome</td>
<td><strong>Liz Foy - General Manager Research &amp; Service Development</strong></td>
</tr>
<tr>
<td>08:55am</td>
<td>Housekeeping</td>
<td><strong>Sarah McIntyre – Sargents Research Fellow</strong></td>
</tr>
<tr>
<td>09:00am</td>
<td>Welcome and Introduction</td>
<td><strong>Julia Bowman</strong></td>
</tr>
<tr>
<td></td>
<td>- Overview of study and links to TSC strategic plan</td>
<td>- Expectations of participants</td>
</tr>
<tr>
<td></td>
<td>- Introduction to case studies</td>
<td></td>
</tr>
<tr>
<td>09:15am</td>
<td>Setting and writing SMART goals</td>
<td><strong>Julia Bowman &amp; Lise Mogensen, Cathy Cook &amp; Annie McCluskey</strong></td>
</tr>
<tr>
<td></td>
<td>By the end of this session participants will be able to:</td>
<td>- explain the importance of using a systematic method to guide writing of treatment/service goals</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- name the features of SMART goals</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- write SMART goals</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- write SMART goals relevant to the clients in case studies 1 &amp; 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- critique and provide feedback to colleagues on written goals</td>
</tr>
<tr>
<td>10:15am</td>
<td>The outcome measurement process</td>
<td><strong>Julia Bowman</strong></td>
</tr>
<tr>
<td></td>
<td>By the end of this session participants will be able to:</td>
<td>- list the key steps in the outcome measurement process</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- list the skills required to complete each step of the process</td>
</tr>
<tr>
<td>10:45am</td>
<td>Morning tea</td>
<td></td>
</tr>
<tr>
<td>11:00am</td>
<td>Changing outcome measurement behaviour</td>
<td><strong>Julia Bowman</strong></td>
</tr>
<tr>
<td></td>
<td>By the end of this session participants will be able to:</td>
<td>- describe the five stages of change</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- describe strategies to assist successful implementation of outcome measures and overcome barriers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- complete a learning contract that will specify how they plan to use outcome measures in their daily practice</td>
</tr>
<tr>
<td>11:45pm</td>
<td>Outcome measures: GAS, PSS10 &amp; WHOQoL BREF</td>
<td><strong>Julia Bowman</strong></td>
</tr>
<tr>
<td></td>
<td>By the end of this session participants will be able to:</td>
<td>- describe the characteristics, strengths and limitations of the GAS, PSS10 &amp; WHOQoL BREF</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- administer and score the GAS, PSS10 &amp; WHOQoL BREF on another participant</td>
</tr>
<tr>
<td>12:45pm</td>
<td>Lunch</td>
<td></td>
</tr>
<tr>
<td>1:30pm</td>
<td>Outcome measures: IPPA, DASS &amp; ASK</td>
<td><strong>Julia Bowman</strong></td>
</tr>
<tr>
<td></td>
<td>By the end of this session participants will be able to:</td>
<td>- describe the characteristics, strengths and limitations of the IPPA, DASS &amp; ASK</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- administer and score the IPPA, DASS &amp; ASK on another participant</td>
</tr>
<tr>
<td>2:30pm</td>
<td>Outcome measures: FFSS, GMFM &amp; SDQ</td>
<td><strong>Julia Bowman</strong></td>
</tr>
<tr>
<td></td>
<td>By the end of this session participants will be able to:</td>
<td>- describe the characteristics, strengths and limitations of the FFSS, GMFM &amp; SDQ</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- administer and score the FFSS, GMFM &amp; SDQ on another participant</td>
</tr>
<tr>
<td>3:30pm</td>
<td>Afternoon tea</td>
<td></td>
</tr>
<tr>
<td>3:45pm</td>
<td>Participant practice matching outcome measures to clinical problems/issues in case study 1&amp;2</td>
<td><strong>Julia Bowman, Cathy Cook, Annie McCluskey &amp; Lise Mogensen</strong></td>
</tr>
<tr>
<td></td>
<td>By the end of this session participants will be able to:</td>
<td>- match outcomes measures to client problems/issues identified in case studies 1&amp;2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- make recommendations about when and how these outcome measures could be used with the client and/or family in the case study</td>
</tr>
<tr>
<td>4:00pm</td>
<td>Reporting outcome measure results and clinical decision making</td>
<td><strong>Julia Bowman</strong></td>
</tr>
<tr>
<td></td>
<td>By the end of this session participants will be able to:</td>
<td>- describe the importance of reporting outcome measure results verbally to colleagues</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- describe the importance of reporting outcome measure results in client clinical files</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- know how to interpret the results of outcome measures</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- know how to use the results of outcome measures to assist clinical decision making</td>
</tr>
<tr>
<td>4:30pm</td>
<td>Close</td>
<td><strong>Julia Bowman</strong></td>
</tr>
<tr>
<td></td>
<td>- Reminder about project tasks and expectations</td>
<td>- Learning contract &amp; 3 month follow-up support</td>
</tr>
</tbody>
</table>
Appendix M – Audit tool
Baseline Outcome Measures Clinical File Audit

Audit period: Baseline (22 August to 25 November 2005)

Audit start time: _______________  Audit finish time: _______________

1. Where is this information recorded?
   - Individual client record
   - Group record  Specify group: ______________________

2. On how many occasions has the participant written notes in the client’s file during this time period?

3. What outcome measures has the participant used? Complete table below. Write “nil” for those measures not used. Write the date for each occasion the measure was used. For each occasion the outcome measure was used indicate yes or no to the four prompts relating to how the measure was scored and interpreted by the participant.

<table>
<thead>
<tr>
<th>Outcome Measure</th>
<th>Date/s used</th>
<th>Outcome measure score sheet in notes</th>
<th>Score recorded in notes</th>
<th>Interpretation of score: Discusses change over time</th>
<th>Interpretation of score: Discusses functional implications</th>
</tr>
</thead>
<tbody>
<tr>
<td>GAS (Goal Attainment Scale)</td>
<td></td>
<td>Yes No Yes No</td>
<td></td>
<td>Yes No</td>
<td>Yes No</td>
</tr>
<tr>
<td>Perceived Stress Scale (PSS-10)</td>
<td></td>
<td>Yes No Yes No</td>
<td></td>
<td>Yes No</td>
<td>Yes No</td>
</tr>
<tr>
<td>IPPA (Individualised Prioritised Performance Assessment)</td>
<td></td>
<td>Yes No Yes No</td>
<td></td>
<td>Yes No</td>
<td>Yes No</td>
</tr>
<tr>
<td>World Health Organisation Quality of Life - Bref (WHOQoL-Bref)</td>
<td></td>
<td>Yes No Yes No</td>
<td></td>
<td>Yes No</td>
<td>Yes No</td>
</tr>
<tr>
<td>Outcome Measure</td>
<td>Date/s used</td>
<td>Outcome measure score sheet in notes</td>
<td>Score recorded in notes</td>
<td>Interpretation of score: Discusses change over time</td>
<td>Interpretation of score: Discusses functional implications</td>
</tr>
<tr>
<td>---------------------------------------------</td>
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<td>------------------------------------------------------</td>
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</tr>
<tr>
<td>Gross Motor Function Measure (GMFM)</td>
<td></td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Activity Scale for Kids (ASK)</td>
<td></td>
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<tr>
<td>Depression Anxiety Stress Scales (DASS)</td>
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<tr>
<td>Family Function Styles Scales (FFSS)</td>
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<tr>
<td>Strengths and Difficulties Questionnaire (SDQ)</td>
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</tr>
<tr>
<td>Other (Eg. time, distance, number of repetitions or other published measures Eg AUSTOMs or COPM)</td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

**File audit completed:**  □ yes  □ no