Process of health behaviour change: Is Change Talk associated with diabetes outcome? A pilot study of Motivational Interviewing

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ABSTRACT

Motivational Interviewing (MI) is a person-centred and collaborative form of guiding individuals to elicit and strengthen their motivation for change. It has achieved success in the treatment of substance disorders, and has shown promise in several other areas of interest, such as behaviour management in chronic illness. The process through which MI exerts its influence on outcome however, is still in its infancy.

This research set out to explore the nature of Type 1 and Type 2 diabetes patients' utterances in Motivational Enhancement Therapy (MET) sessions (Change Talk), and the associations between their Change Talk and diabetes outcome (clinically significant change in blood glucose levels). Data for this study was taken from a multiple baseline designed study in a diabetes clinic in Christchurch (Britt, 2008). Nine patients who were referred to the clinic for help with their diabetes self-management were administered MET by Diabetes Nurse Educators (DNEs) which comprised four sessions over a six week period. In the current study participants were divided into those who did (BG Change participants; n = 4) or those who did not (BG No Change participants; n = 5) achieve a clinically significant change in their blood glucose levels (HbA1c) post intervention. All client utterances from the 36 transcripts were coded with the Motivational Interviewing Skills Code, version 2.0 (MISC, 2.0), and data analysed accordingly.

This is a unique study in that it investigated both the mean frequency and strength of Change Talk in the different participant sets, as well as their patterns of Change Talk within and across sessions. Trends and directions in data suggest support for parts of the theory of the inner workings of MI. In particular, the BG Change participants uttered stronger Desire Language, a higher frequency of Commitment language, and weaker Ability language than

the BG No Change participants. In addition, a general increasing pattern of strength across and within sessions, and frequency across sessions was found for the BG Change participants, while a similar pattern was found for the BG No Change participants regarding strength, but not frequency. The role of Sustain Talk strength and its relationship to the findings is highlighted. Implications of findings, as well as limitations of the current research and suggestions for future areas of research are discussed.

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List of Abbreviations

AMI……………………………………..."Adaptations" of Motivational Interviewing

BG Change…………………………….……Blood Glucose Change Participant Set

BG No Change………………..............Blood Glucose Non-Changed Participant Set

CBT...Cognitive–Behavioural Therapy

DNE...Diabetes Nurse Educator

ES...Effect size

HbA1c...Glycated Haemoglobin

ICC…………………………………………………..Intraclass Correlation Coefficient

MET...Motivational Enhancement Therapy

MI..Motivational Interviewing

MISC 1.0......................................Motivational Interviewing Skills Code Version 1.0

MISC 2.0 …………………………Motivational Interviewing Skills Code Version 2.0

PE...Patient Education

RCT...Randomised Controlled Trial

SD…………………………………………………………………..Standard Deviation

TAU...Treatment as Usual

TBC………………………………………….…………....Target Behaviour Change

1. INTRODUCTION

1.1. Motivational Interviewing (MI)

Motivational interviewing (MI) is a client-centred counselling method designed to help clients explore and resolve their ambivalence for change (Miller & Rollnick, 2002). Through non-judgemental interviews, the practitioner's role in MI is to aid clients in becoming aware of the implications for and against change, and elicit the clients own resources and motivation for change. Miller and Rollnick (2002) outline that the essence of MI is to preserve the autonomy of the client, so that it is the right and responsibility of the client to choose and make decisions regarding their behaviour change.

1.1.2. Spirit of MI

Collaboration, evocation, and autonomy are three key components important in encapsulating the spirit of MI. Collaboration is about the practitioner creating a positive interpersonal atmosphere, avoiding an authoritarian stance, and communicating a partner-like relationship. Evocation is the Socratic-type eliciting and drawing out of things such as insight, wisdom and motivation, rather than attempting to install or indoctrinate the client with motivation for change. To increase intrinsic motivation for change, so that the change is in line with the person's own goals, autonomy in MI emphasises that the responsibility for change lies within the individual. In the spirit of MI, it is the client, rather than the practitioner that should present the arguments for change (Miller & Rollnick, 2002).

Miller and Rollnick (2002), describe four guiding principles for MI, developed out of Miller's original principles (1983) and intended to capture its spirit in a practical manner.

These principles are: 1) express empathy, 2) develop discrepancy, 3) roll with resistance, and 4) support self-efficacy. The attitude that embodies the empathetic counselling style of the first principle is characterised by a practitioner who accepts, without judgment or blame. Empathy is expressed by reflective listening, and use of summaries in order to understand the client's story from their unique perspective and gain rapport. In order to increase the likelihood of an increase in motivation, MI seeks to reveal and increase the discrepancy between the status quo and the importance of a desired goal. It is thought that changes occur in line with the individuals Target Behaviour Change (TBC) when this discrepancy becomes large enough. The third principle, "Roll with resistance" defines a form of empathy where attempts are made to understand a client's reluctance to change, and arguing is completely avoided. Miller and colleagues (2008) suggest that when a practitioner argues the "good" internal voice of the ambivalent client, the natural response is for the client to argue against that position. The temptation then is to argue for change with more strength, and for the client to resist more forcefully, which is thought to strengthen their commitment to the status quo or resistance to change. New ideas are encouraged, and arguments, answers and solutions are gained and voiced primarily from the client. The final principle is related to client self-efficacy and acknowledges the need for individuals to feel that they have the ability and belief to carry out a task. Practitioners assume the client has the potential to change, offering choices and empowering the individual to enhance their self-efficacy through their own stated solutions.

1.1.3. Client Change Language

Along with practitioner behaviour, client Change Talk is thought to be an important catalyst of behaviour change in MI (Moyers, Martin, Christopher, Houck, Tonigan, & Amrhein, 2007). Change Talk is the spoken recognition of a need, intent, optimism, desire, or

commitment to make a specific change, while Sustain Talk is the inclination away from change or sticking to the status quo (Miller, Moyers, Amrhein, & Rollnick, 2006).

In an attempt to resolve the client's ambivalence in favour of change within an MI session, the practitioner attempts to evoke and strengthen Change Talk. Miller and Rollnick (2002) propose that when talking about change during MI, individuals are in effect convincing themselves of the behaviour as they are speaking of it. This concept is not new, originating from Bem's self-perception theory (1972) which proposes that people learn about their own beliefs by hearing themselves speak and watching themselves behave. This theory infers that when an individual hears themselves defending a point, they in effect become more committed to that point. Indeed the same theory applies to Sustain Talk where a client defends their position *against* change, the client essentially is convincing themselves *not* to change. Change Talk then, is one of the behaviours that Miller and Rollnick suggest is essential to elicit in MI. Practitioners do this by creating opportunities for, and then encouraging and reinforcing, client speech (Change Talk) that is consistent with their motivation for change (Moyers et al., 2007).

1.1.4. Applications of MI

The core components that capture the essence of MI have evolved into different adaptations and applied to various different populations. Adaptations of MI (AMIs) are the combination of MI and additional treatment components (Burke et al., 2003). One adaptation is Motivational Enhancement Therapy (MET; Miller, Zweben, DiClemente, and Rychtarik, 1992). MET was developed as a four-session intervention for a multi-site clinical trial of treatments for alcohol abuse and dependence (Project MATCH, 1993). Along with MI components of client and practitioner behaviours, MET incorporates personalised feedback,

and has been developed into a stand-alone, brief, manually-guided treatment method, using the MI counselling style (Miller & Rollnick, 2002). Other adaptation of MI include its use as a pre-treatment or 'prelude' to other forms of therapy, whereby a MI session is randomly prescribed to clients at the beginning of a specified treatment in an attempt to increase treatment adherence (Hettema et al., 2005). In addition, MI can be integrated into other forms of therapy where a practitioner is able to use MI for certain sessions or a section of a session when ambivalence or resistance is encountered (Arkowitz, & Westra, 2005), or as a clinical style combined with therapy such as CBT (Miller, 2004).

Apart from its use in the field of substance use, MI has also been studied as a 'stand alone' or integrated form of treatment for numerous psychological disorders with promising results (e.g. Arkowitz, Westra, Miller, & Rollnick, 2008). It is also being applied to the management of various other target behaviours, including health behaviour change (Miller & Rollnick, 2002).

Based on such favourable evidence, the MI counselling style seems well suited to the field of health behaviour change in chronic illness. Direct questioning, persuasion, and advice giving have been found to be inadequate in the management of chronic illness (Anderson & Funnell, 2000). Furthermore, it appears that patients with illnesses such as diabetes, which require complex daily routines, are only weakly motivated by others' suggestions and advice regarding the process and application of these behaviours (Bien, Miller & Tolligan, 1993). While a "clinician cantered" strategy may be more suited to acute care, it typically may elicit ambivalence or resistance in those with chronic conditions, who may face the on-going task of self-management in the face of competing demands (Anderson & Funnell, 2000). MI on the other hand, allows individuals to access and assess their own reasons and processes for change (Miller & Rollnick, 2002). In addition, MI as a counselling style has been found to be

highly acceptable patients (Britt, 2008, Dellasega, Anel-Tiangco, & Gabbay, 2011). Themes such as 'non-judgemental accountability', 'being heard and responded to as a patient', and 'encouragement and empowerment' all emerged when testing Type 2 diabetes patients' perceptions of MI in contrast to the negative perceptions that emerged from standard care (Dellasega, et al., 2011). Finally, a MI approach to health behaviour change is consistent with the Patient Empowerment Model, which has been well recognised in the field of diabetes (Anderson & Funnell, 2000).

1.2. Efficacy of MI

Support for the efficacy of MI for alcohol problems is well established (Lundahl & Burke, 2009). MI has been found to be at least equal to, or up to 20% more effective than other treatments in the area of alcohol-use disorders (Lundahl & Burke, 2009). In addition, MI produces effects in fewer sessions on average than other interventions (Burke et al. 2003, Project MATCH, 1998), and therefore is emphasising cost-effective. Although some meta-analyses have found MI to have weakening effects over six months (Vasilaki et al.,2006, Burke et al., 2004), others have found its effects to be durable for up to two years, (Burke et al., 2003, Lundahl et al., 2009) and Project MATCH (1998) found positive effects up to three years post-treatment.

While studies of MI for problem drinking have yielded the most robust findings Miller & Rose, 2009), MI has been applied more broadly to the field of healthcare, generating positive findings for a number of health behaviours, such as cardiovascular rehabilitation, diabetes management, dietary change, hypertension, infection risk reduction, and smoking cessation (Martins & McNeill, 2009, Hettema et al., 2005, Rubak, Sandboek, Lauritzen, & Christensen, 2005). These studies have made use of MI as both a standalone intervention, or

as an adaptation of the counselling style. Research on other applications of MI, such as integrating it into CBT for anxiety disorders, is also producing promising data (Arkowitz, Westra, Miller, & Rollnick, 2008). In addition, MI appears to increase adherence to a course of therapy after a short single 20-minute session administered as part of a normal intake interview (Carroll, Ball, Nich et al., 2006).

Studies that have been conducted of MI with diabetes patients show similar effects to other studies within the health arena (Lundahl & Burke, 2009). One such study was a randomised controlled trial where 217 overweight women with Type 2 diabetes were randomised to either a group based weight loss session with supplemental MI sessions, or the same weight loss sessions with health education sessions (Smith, West et al, 2004). Not only did they find that at six months, women in the treatment condition lost statistically significantly more weight than those in the control condition, but there was increased treatment adherence in the MI condition on all process variables, such as session attendance and submissions of self-monitored weekly diary entries (Smith, West et al., 2004). Effects in MI diabetes research however do not always yield positive findings in behaviour change. Although Heinrich and colleagues (2010) found advantageous effects of chance locus of control, and diabetes knowledge among the Type 2 diabetes patients in their randomised controlled trial (RCT), they found no effect of MI on several outcome measures (Heinrich, Candel, Schaper, & de Vries, 2010).

Martins and McNeill's (2009) systematic review of studies of MI and health behaviour included five studies which focussed on Type 1 diabetes, and four that focussed on Type 2 diabetes, with promising results overall. MI was found to be effective as a stand-alone treatment and in combination with other treatments in helping patients with maintaining blood glucose levels (the primary outcome measure in many of the studies), reduction of

weight, dietary changes and increasing exercise. In addition, other secondary measures such as improved self-efficacy were also found to be associated with MI. While there is growing support for the positive effects of MI in diabetes, Martins and McNeil (2009) recommend that future research also examines the active ingredients and processes involved in the MI process, as well as the degree to which client language predicts outcome.

Thus, MI has gained a "substantial and increasing body of evidence" (p.1234, Lundahl & Burke, 2009), and despite the strong evidence from MI largely concentrated in the area of addiction, research in various areas and with various adaptations of MI are gaining support from numerous controlled trials and meta-analyses (e.g. Hettema et al., 2005, Miller, Vasilaki, Hoisier, & Cox, 2006, Burke et al., 2004, Lundahl & Burke, 2009). A recent comprehensive meta-analysis (Lundahl, Kunz, Brownell, Tollefson, & Burke, 2010), involving 119 studies covering substance use, health related behaviours, gambling, and engagement in treatment variables, revealed a small but significant effect range (average Hedge's $g = 0.28$), with a large amount of heterogeneity in terms of the features and characteristics of any given study. Of note, when comparing studies that employed MET to those that were described as using MI, MET produced statistically significantly stronger results than MI ($g = 0.32$ versus $g = 0.19$ respectively). They conclude that while results are variable, MI has significant positive effects across a wide range of problem behaviours, and the effects are generally consistent with other change interventions (Lundahl et al., 2010).

While such meta-analyses have found positive effects, it is important to note that researchers have commented on the difficulty in conducting reviews on MI, due to the variable nature of the research (Lundahl et al.; Hettema et al.). These researchers point to the broad range of groups MI has been compared to, as well as the different AMIs, and wide ranging therapist and client variables that make work in this area a challenge.

Notwithstanding these obstacles, research on the comparative efficacy of MI has continued. It has been suggested however, that the process components which underlie the efficacy of MI need to be further researched (Lundahl et al.; Hettema et al.).

1.3. How does it work? The Process of MI

1.3.2. Conceptualisation of MI

Hettema, Steele, and Miller (2005) suggest MI can be reduced to three central hypotheses:

1. Practitioners who practice MI will elicit increased levels of change talk and decreased levels of resistance, relative to more overtly directive or confrontational counselling styles.

2. The extent to which clients verbalize arguments against change (resistance) during MI will be inversely related to the degree of subsequent behaviour change.

3. The extent to which clients verbalize change talk (arguments for change) during MI will be directly related to the degree of subsequent behaviour change.
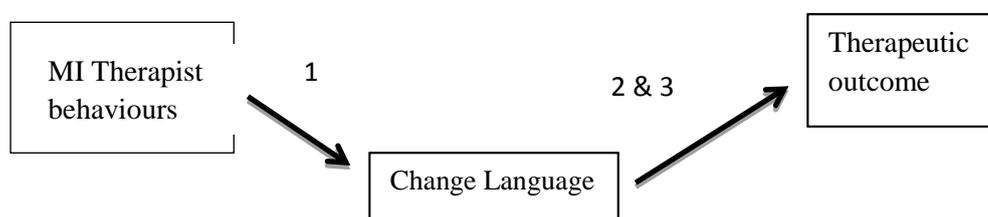
Figure 1: Pictorial adaptation of three central hypotheses of MI

These hypotheses depicted in Figure 1 have been now been supported by research. (Gaume, Gmel, Faouzi & Daeppen, 2008, Moyers, Miller, & Hendrickson, 2005, Moyers & Martin, 2006, Gaume, Bertholet, Faouzi, Gmel, & Daeppen, 2010). Evidence suggests that MI consistent behaviours produce increased Change Talk and decreased Sustain Talk, (referred to as 'resistance' or Counter Change Talk (CCT) in these studies). Furthermore, Sustain Talk has been found to predict negative outcomes (Miller, Benefield and Tonigan, 1993, Moyers et al., 2007, Campbell et al. 2010). Until more recently however, findings had not validated the third hypothesis (Miller & Rose, 2009).

1.3.3. A new understanding of Change Talk

After initial failed attempts to find support that increases in Change Talk predict change (Miller et al., 1993), a seminal study was carried out by Miller and colleagues which involved collaboration with psycholinguist Paul Amrhein (Amrhein, Miller, Yhane, Palmer, & Fulcher, 2003). Rather than the singular construct that had been previously measured, these researchers decided that Change Talk utterances could be looked at in more detail, and on different levels in order to see if particular aspects of Change Talk were associated with behaviour change.

The study utilized components from a coding system Amrhein (1992) had developed to assess the relationship between speech and behavioural outcome (Amrhein et al., 2003). Change Talk was broken down into five different subcategories resembling components of natural language: Desire, Ability, Reasons, Need, and Commitment to change. Rather than simply coding the frequency of language toward change (generic Change Talk) with a '+' sign, as measured in the MISC 1.0 (see below), the coding of the frequency of Desire,

Ability, Reasons, Need, Commitment, and Taking Steps language, as well as the strength of these utterances for and against change was now able to be measured.

A taxonomy to rate the *strength* of utterances that favoured change rather than simply their frequency was also incorporated. To say that you are "definitely going to" represents a much stronger commitment utterance than you "might". Amrhein and colleagues (2003) captured these levels of *strength* in the five differentiated subcategories of Change Talk. Furthermore, the *pattern* of client's language strength within each MI session was analysed to find out whether this parameter had an effect on predicted outcome (Miller & Rose, 2009).

Findings from this seminal study implicated Commitment language as the only Language Category that predicted change in outcome. As was predicted, the strength of utterances, as well as pattern across the session was also indicative of outcome. In order to measure the pattern of within-session strength, Amrhein and colleagues divided sessions into deciles (ten equal epochs) in order to standardise varying duration of videotapes. The pattern of strength across these ten within-session deciles was then analysed in order to discover whether strength differed according to outcome group. In particular, the *pattern* of increasing Commitment language strength across time in a session, and specifically at the end of the session was found to predict less substance use in the follow-up period. Interestingly, the study also found that Desire, Ability, Reasons, and Need Language Categories all contributed to consequent strength of commitment language, but did not directly predict behaviour change. It was concluded that to say that *one wants to, can, has cause to, or needs to* change is not the same as making a *commitment* or stating the *intention* to change (Amrhein et al., 2003). Consequently, as can be seen in Figure 2, Change Talk has been conceptually split up into *Preparatory language* (Desire, Reasons, Ability and Need) and *Commitment language* (Miller & Rose, 2009).
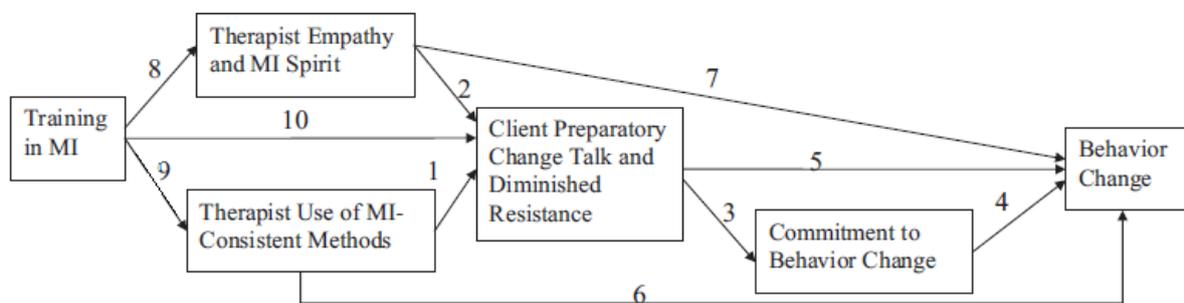
Figure 2. Hypothesised relationship between process and outcome variables in MI. Taken from *Toward a Theory of Motivational Interviewing* (Miller & Rose, 2009).

1.3.1. Measurement

In order to measure interactions of practitioner and client behaviour as well as causal mechanisms, an MI coding system was developed, known as the Motivational Interviewing Skills Code (MISC 1.0, Miller, 2000). The MISC 1.0 requires three "passes", where the rater codes three different parameters after (consecutively) listening to audio taped or videotaped MI sessions. The first is a global rating of client, practitioner, and their interaction behaviour such as levels of practitioners' "warmth" and "MI Spirit", clients' "engagement" and the relationships' level of "collaboration". The second pass consists of specific ratings of practitioner and client utterances termed behaviour counts. The client behaviour counts include categories such as Change Talk, and Resist Change. Change Talk includes all/any statements that move "forward in the direction of change" (MISC 1.0, p. 12) and examples are given such as expressing Concern, and Desire/Intention to change. Resist Change indicates a movement away from change, and includes *behaviours* such as 'Arguing' with, 'Interrupting' or ignoring the practitioner as well as *utterances/statements* that express the client's reluctance to change. Examples of these statements that are given in the manual are

giving reasons or excuses why change cannot happen, disagreeing with the practitioner's suggestions, or lack of desire to change. Finally, the third pass consists of a computation of client and practitioner talk time.

It has been suggested that using the MISC 1.0 may be too labour-intensive as it takes three passes to code a MI session, and these researchers suggested a more practical and complete instrument was needed (de Jonge et al. 2005.). However this instrument has been effectively used in a number of studies, the majority of which have been in treatment integrity and assessing practitioners pre to post MI training (Baer et al., 2004; Miller & Mount, 2001), and assessing the predictive power of Change Talk (e.g. Moyers et al., 2007).

The MISC 1.0 could be described as more descriptive and weighted toward coding *practitioner* as opposed to *client* behaviours, such as the numerous *practitioner* behaviour counts: advice, affirm, confront, direct, emphasize control, facilitate, filler, inform, question, raise concern, reflect, reframe, support, structure and warn, compared to the four available *client* counts: ask, follow, resist change, and change talk. Overall, the MISC has been found to be moderately reliable (de Jonge et al, 2005, Moyers, Martin, Catly, Harris and Asluwalia, 2003).

As a result of Amrhein and colleagues' collaborative study, a new version of the Motivational Interviewing Skills Code (MISC 2.0; Miller, Moyers, Ernst, & Amrhein, 2003) was developed. Many aspects of the original MISC (1.0) were retained, however the MISC version 2.0 contains a more complex system relating to Client Behaviour Counts that incorporated the need to code the frequency of specific language categories, as well as strength ratings of these utterances. Instead of conducting three "passes" as was the procedure with the first version of the MISC, the MISC 2.0 contains two passes through each tape, forgoing the third speech timing pass. The first pass is for completing global rating

scales (for both client and practitioner), and the second is to categorise utterances into their behaviour codes (for both practitioner and client behaviour codes). The first pass includes a Global Counsellor Rating, and a Global Client Rating, which are single global ratings of the entire client practitioner interaction. Global Counsellor Ratings are measured on three dimensions; Acceptance, Empathy, and Spirit, which are clearly defined within the manual. Global Client Ratings are a measure of the Client's level of Self Exploration during the treatment session, and the score is taken from the highest level of the client's self-exploration in the session.

The second pass was designed to code Behaviour Counts, where utterances are categorised into several categories. An utterance or "turn" in conversation is typically defined as a complete thought which ends either when a new thought begins or when it is interrupted. The utterances can range from a couple of words to several sentences. In instances where two statements can be assigned to different Language Categories within the same "turn", both are coded as (separate) utterances (MISC 2.0). Counsellor Behaviour Counts are separated into 15 categories which utterances can be categorised into. One such category is Affirm (AF), coded when the counsellor says something positive or complimentary to the client such as "You're a very resourceful person". Four of the 15 categories are further differentiated into subcategories. For the Client Behaviour Counts, instead of coding behavioural counts as moving simply away or toward the TBC, as in MISC 1.0, behaviour counts of each linguistic sub-category are coded separately with a positive or negative valence. A positive valence utterance is one which has a tendency towards the TBC (Change Talk), whereas a negative valence utterance is a tendency away from the TBC or one which sustains the status quo (Sustain Talk). In order to code the strength of these utterances as weak to strong indicators of Change or Sustain Talk, the MISC 2.0 included a strength score scale of +/-1 to +/-5. It

must be noted that Sustain Talk however, should not be confused with Resistance. 'Resistance' was changed from a generic term for both language and behaviour against change in Miller and colleagues' (1993) study, to 'Resist Change' in MISC 1.0 which similarly specified categories of behaviour and a generic category to measure language against change. In the MISC 2.0 however, only *language* against change is coded in the second pass (not behaviours such as arguing or interrupting), and this language is termed Sustain Talk. Sustain Talk in the MISC version 2.0 is separated into specific Language Categories through which clients state their reasons not to make a change. Resistance has subsequently been defined by Miller, Moyers, Amrhein, & Rollnick (2006) in a consensus statement on the definitions of Change Talk, and more recently in the Motivational Interviewers Network of Trainers (MINT) glossary, (Sciacca, 2009)as *behaviours* associated with/suggesting the client and practitioner are not moving in the same direction toward the same goal. This may be expressed by the client interrupting, arguing, or ignoring the practitioner.

A growing body of literature utilising the MISC 2.0 has subsequently emerged (Miller & Rose, 2009). This research has focussed on frequency counts, as well as the different parameters (such as pattern and strength) and their relationship with outcome (behaviour change). The results of this research will be summarised in the following section.

An updated version of the MISC (MISC 2.1) has subsequently been developed (Miller, Moyers, Ernst, & Amrhein, 2008) which takes into account the findings of the study that emphasised the importance of Commitment language in behaviour change, and separated this Language Category from the other four (Desire, Ability, Reasons, and Need) that predicted subsequent Commitment language (Amrhein et al., 2003). Version 2.1 takes this relationship into account, and specifies a code for Commitment language, and Taking Steps

language, but Desire, Ability and Need Language Categories are consigned to sub codes of Reasons language. In addition, there are two other client utterance codes in version 2.1; 'Other' in order to capture language that does not fit into Reasons language, but that indicates a movement toward the TBC, and 'Follow/Neutral' to allow coding of 'turns' that are not clearly inclined toward or against TBC.

When coding client language, the MISC version 2.0 was utilised in the current thesis. This was due to the use of this manual by other researchers to which we could compare our reliability data and general findings (e.g. Campbell, 2007, Magill, Apodaca, Barnett, & Monti, 2010, Guame, Gmel, & Daeppen, 2007), and the desire to measure the separate effects of the six different Language Categories. Currently, there are four versions of the MISC; The MISC version 1.0, version 2.0, version 2.1, and the Manual for the Client Language EAsy Rating (CLEAR) Coding System (Glynn & Moyers, 2012) which was previously named the MISC 1.1. The CLEAR is a simplified coding system to classify the frequency of client language into either Change Talk, or Counter Change Talk, (without accounting for categories or strength ratings)   In addition, there are other (specialised) coding systems such as The Motivational Interviewing Treatment Integrity (MITI 3.1.1; Moyers, Martin, Manuel, Miller, & Ernst, 2010), to measure treatment fidelity, or the Sequential Code for Process Exchanges (SCOPE, Martin, Moyers, Houck, Christopher, and Miller) behavioural coding system (designed to measure the sequential within-session MI practitioner-client interactions), that have also emerged as part of an evolving MI coding system.

The psychometric properties of the MISC were found to be useful in examining the relationship between the practitioner and client, albeit requiring further research into its construct validity (Madson & Campbell, 2006; Miller & Mount, 2001). The psychometric properties of the subsequent versions of the MISC however have not yet been identified (Madson et al., 2006), and it has been acknowledged that in modifying an instrument, the

validity and reliability of each revision need to be re-established (Miller et al., 2008). This said, many strong features of the MISC 1.0 have been retained in the later versions, and the changes that have been made are believed to have strengthened the original instrument (Miller et al, 2008).

1.3.4. Change Talk and Outcome

Since the encouraging and promising findings by Amrhein and colleagues (2003) regarding the predictive power of Commitment language, there has been a particular focus of study on this linguistic subcategory and its relationship with therapeutic outcome. For example, Aharonovich, Amrhein, Bisaga, Nunes and Hasin's (2008) study on Commitment strength language, in an outpatient cognitive behavioural treatment (CBT) study, found that Commitment strength language averaged over ten deciles was statistically significantly related to outcome (treatment retention i.e., number of weeks in treatment program).

Commitment language strength was also found to predict positive gambling outcomes whereby those that uttered stronger Commitment language had better outcomes than those who uttered weaker or no commitment language in MI sessions at 12 months. This also included a reduction in gambling (both days and dollars spent), an increase in gambling self-efficacy (beliefs around resisting gambling), and meeting participants' gambling goals (Hodgins, Ching, & McEwen, 2009). Similar to the Amrhein et al. (2003) study, expressions of Need, Desire, Reasons, and Ability to change were not directly related to outcome, however Ability language was related to Commitment language. These researchers divided MI sessions into thirds, examining whether the pattern of language strength also affected outcome. However, unlike the Amrhein et al study, commitment strength in the last third of

the MI session was not a strong predictor of gambling outcome – instead, it was in the first two thirds that commitment language predicted treatment outcome.

Commitment language however is not the only Change Talk subcategory that deserves attention. A study that examined substance using adolescents' Change Talk in a brief MI intervention (Baer, Beadnell, Garrett, Hartzler, Wells, & Peterson, 2008) found that statements about Reasons for change were associated with greater reductions in substance use, and language that reflected Desire or Ability Sustain Talk negatively predicted change in substance use. Yet, Commitment language was not related to outcome at all. Expressions about Ability to change have also been found to significantly predict reductions in alcohol use in a brief (15 minute) MI intervention (Gaume, Gmel & Daeppen, 2007).

In a recent study conducted within the context of a RCT , Campbell, Adamson, and Carter (2010) examined the relationship between Change Talk, practitioner behaviours, and drinking related outcomes in participants with mild to moderate alcohol dependence. Client language was analysed after coding 106 audio recorded sessions from 28 participants who completed 3-4 sessions of MET. Client and practitioner language from this study was compared to six month drinking outcomes, which separated participants into either controlled or uncontrolled drinkers (drinking within or without national guidelines). Having divided sessions into early, mid and late intervals to study the within-session pattern of change language, this study found that, compared to controlled drinkers, uncontrolled drinkers uttered statistically significantly lower Ability language strength over all MET sessions, as well as at the end interval. Additionally, researchers discovered that the unremitting drinkers uttered lower Commitment language strength during the second and forth sessions, and had a different pattern across sessions than the Controlled drinkers.

More recently, Desire and Reasons for change, but not Commitment language, have been found to statistically significantly predict marijuana treatment outcome (proportion of days abstinent from marijuana) in a long term (34-month) follow-up study with marijuana dependent participants (Walker, Stephens, Rowland, & Roffman, 2011). Based on an RCT investigating of treatment for marijuana dependent adults (Stephens et al., 2006), this paper (Walker et al., 2011) was a secondary analysis of the data, and examined participants' language in their first treatment sessions. Randomised to either four or nine sessions (over four or twelve weeks) of 'MI/CBT/Case Management', marijuana use, as measured by a structured interview, informant data, and toxicology drug screens, was assessed at baseline, and at 4, 10, 16, 22, 28, and 34 months from intake. In order to allow for pre-existing levels of motivation which were assessed at baseline, the researchers repeated the regression analyses, adding participant's baseline motivation to change, and found Desire and Reasons for change language remained significant predictors of treatment outcome, irrespective of the participants initial level of motivation at baseline.

Taken together, these findings suggest the likely role Change Talk plays in MI; as a mediator in the relationship between practitioner behaviour and behavioural outcome and adds further support for the active ingredients hypotheses emerging in MI theory.

1.4. The Present Study

It appears that Change Talk and its predictive power warrant further study, particularly with regard to strength and the pattern of within-session Change Talk. Furthermore, due to the variability in MI outcome found in meta-analytic studies (e.g. Hettema et al., 2005), identifying specific within session factors and mechanisms that influence effectiveness is a natural direction for future research. If the process of effective

Change Talk, the "active ingredients", can be elucidated, then practitioners will know what to try and elicit within treatment sessions, in order for behaviour to change (Miller & Rose, 2009).

In addition, to our knowledge, no research exists on these processes in health behaviour, despite the growing literature supporting the effectiveness of MI for health behaviour change (Britt, Hudson, & Blampied, 2004, Rubak et al., 2005, Hettema et al., 2005, Lundahl & Burke, 2009, Rollnick, Miller, & Butler, 2007). Given that the majority of research on MI is centred around the drug and alcohol area (Lundahl et al., 2010), findings may be particularly enlightening when conducted within a different domain.

The present study comprises coding and evaluating data from nine patients who have diabetes and underwent four sessions of MET, provided by Diabetes Nurse Educators, in a multiple baseline design study in a diabetes clinic. Both mean frequency and strength of Change and Sustain Talk language strength were examined, as well as pattern of within and across-session intervals regarding all six Change Talk subcategories: Desire, Ability, Reasons, Need, Commitment, and Taking Steps from the MISC 2.0. In addition, this research set out to examine whether, and in what way this change language differs depending on outcome: patients that did or did not achieve clinically significant change in blood glucose level, defined as the BG (Blood Glucose) Change, and the BG No Change participants respectively. It is hypothesised that:

1) **Mean Strength:** BG Change participants will have
   a. a higher mean strength of Change Talk, and Total strength (Change and Sustain Talk), and a lower mean strength of Sustain Talk than the BG No Change participants.

    b.   a higher mean Total strength for each of the six linguistic subcategories (Desire, Ability, Reasons, Need, Commitment, and Taking Steps) than the BG No Change participants' mean strength.

2)   **Mean Frequency:** BG Change participants will have a higher mean frequency of Change Talk, and a lower mean frequency of Sustain Talk than the BG No Change participants. This will be evident:

    a.   for each of the six linguistic subcategories (Desire, Ability, Reasons, Need, Commitment, and Taking Steps).

    b.   overall (average frequency across six language categories).

3)   **Strength across sessions:** The BG Change participants' mean Change Talk and Total strength will show an increasing pattern across the sessions, and particularly at session two and session four. Conversely, the BG No Change participants will *not* fit this pattern. These trends will be evident:

    a.   For each of the six linguistic subcategories (Desire, Ability, Reasons, Need, Commitment, and Taking Steps).

    b.   Overall (average frequency across six language categories).

4)   **Strength within sessions:** The BG Change participants' mean Change Talk and Total strength will show an increasing pattern of strength across the deciles within sessions, and particularly toward the end of sessions. Conversely, the BG No Change participants will not fit this pattern. These trends will be evident:

    a.   For each of the six linguistic subcategories (Desire, Ability, Reasons, Need, Commitment, and Taking Steps).

    b.   Overall (average frequency across six language categories).

5) **Frequency across sessions:** The BG Change participants' mean Change Talk frequency will show an increasing pattern across the sessions. Conversely, the BG No Change participants will not fit this pattern. These trends will be evident:

   a. For each of the six linguistic subcategories (Desire, Ability, Reasons, Need, Commitment, and Taking Steps).

   b. Overall (average frequency across six language categories).

6) **Frequency within sessions:** The BG Change participants' mean Change Talk will show an increasing pattern of frequency across the deciles within sessions, and particularly toward the end of sessions. Conversely, BG No Change participants will not fit this pattern. These trends will be evident:

   a. For each of the six linguistic subcategories (Desire, Ability, Reasons, Need, Commitment, and Taking Steps).

   b. Overall (average frequency across six language categories).

2. **METHODS**

2.1. Participants

The data for this study was collected from a previous study (Britt, 2008) which took place at the Diabetes Centre, Canterbury District Health Board (New Zealand).The study was devised to evaluate whether MET was effective in an in-vivo clinical setting for diabetes patients that were having difficulties with managing their illness, as well as to compare the effectiveness of MET with another active treatment, Patient Education (PE) which was the standard treatment offered at the clinic. In addition, the effects of MI training on both practitioners and patients behaviour were evaluated.

Participants were patients who had been diagnosed with either Type I or Type II diabetes for at least 12 months. Patients had been referred to diabetes nurse educators (DNEs) at the Diabetes Clinic by primary health professionals such as GPs in the major metropolitan area and surrounding rural areas, for further assistance in managing their diabetes. These participants were recruited in two phases to fit with the two intervention phases of the study. Initially, 16 consecutive referrals were approached regarding participation in the first (PE) phase, of which nine remained and participated in this phase. The DNEs that had administered the first phase were then trained in MET and additional participants were subsequently recruited for the second (MET) phase. As in the PE phase, out of 16 consecutive referrals to the DNEs that were approached regarding participation in the MET phase, nine patients went on to receive the intervention. The present study includes only the group of nine patients who received the MET phase.

Characteristics of the patients who declined, withdrew, and completed the MET intervention are outlined in table 1. Participants were mostly Caucasian, with Type 1 (44%)

or Type 2 (56%) diabetes, and were of either gender (56% male, 44% female). All of the

patients that declined participation had Type 2 diabetes, and there was a majority of patients

with Type 1 diabetes that completed the MET intervention. Those that completed MET had a

mean age that was nine years lower than the patients that declined participation, but were

similar in age to those that withdrew from the study (Table 1). The duration of diabetes for

those who received the MET intervention was from ten to fifteen years (95% CI = 10.432-

15.123 years since diagnosis).

Table 1.

Characteristics of Participants.

	Declined	**Withdrew**	**Completed**
Diabetes (number)			
Type 1	0	2	4
Type 2	4	1	5
Gender (number)			
Male	2	1	5
Female	2	2	4
Ethnicity (number)			
Maori		1	2
Caucasian		2	7
Age (years)			
Mean	53.0	42.3	44.0
Range	45–65	21–56	21–69

Note. Adapted from original study (Britt, 2008).

In order to compare a favourable with a less favourable outcome on MET processes,

the current study divided the nine MET participants into two groups according to their fasting

glycated haemoglobin (HbA1c). HbA1c was one of the primary outcome measures in the

Britt (2008) study, and measures the average blood glucose over the previous 8-10 weeks. A 0.5% change in HbA1c, which represents one standard deviation (Butler et al., 1995), was considered clinically significant. In the current study, we differentiated those participants who did, from those who did not achieve a clinically significant change in blood glucose level from baseline to post intervention (measured at two weeks post-intervention). These groups were termed the *BG Change Group*, and the *BG No Change Group* respectively. There were four patients who achieved this change at post-intervention, (the BG Change Group), and five patients who did not (the BG No Change Group). Although there were further clinically significant reductions in patient's blood glucose levels at three and six-month follow-up, two of the four BG Change Group participants either maintained or improved their blood glucose level at the twelve-month follow-up.

2.2. Intervention

The MET intervention phase of the Britt (2008) study comprised of four 30-40 minute individual MI sessions with personalized feedback, conducted over a six week period, and were scheduled as close as possible to weeks 1, 2, 4, and 6. Sessions were delivered by two DNEs who were both registered nurses with considerable experience of diabetes management. The DNEs received two days training in MI, by practitioners experienced in MI training. The interactive training included methods such as modelling, didactic teaching, role-plays with feedback, and videotaped demonstrations. Training utilised principals of adult education (Kolb, 1984; Reece & Walker, 1997). DNEs also were provided with a manual, adapted from Sellman, Sullivan and Dore's manual (1996) which outlined key principals, strategies, techniques and the process of MET. The manual outlines MET phases to work through, details of session content, as well as checklists to be completed for each session. All

sessions were audio taped and transcribed, and 36 sessions in total were therefore available to be examined. A non-concurrent multiple baseline design operated, whereby MET was applied in sequence to individual participants, while at the same time baseline data was being collected for succeeding participants.

Treatment integrity was established by the audio-taping of each session, with feedback given to the DNEs after the review of tapes to ensure intended therapeutic processes were carried out. Treatment integrity was further established by an independent rater who reviewed and judged a randomly selected session from each PE and MET participant as either a PE or MET session. The rater was a Clinical psychologist who had worked in diabetes, was trained in MI, and was blind to condition. Findings supported treatment integrity, with analyses revealing that ninety four percent of the audiotapes reviewed by the independent rater were correctly identified as either a PE or MET session. One PE session was identified incorrectly, however all MET sessions were correctly identified, suggesting distinct interventions. Additionally, the level to which the DNEs reached proficiency in MI cores skills of reflections, open questions, and MI-consistent behaviour was analysed in the Britt (2008) study which found differing levels of proficiency for each of these components, with both nurses reaching proficiency in most areas either at start or with ongoing feedback and coaching provided throughout the study.

2.3. Coding

The current research only makes use of the Client Behaviour Counts of the MISC 2.0 (Miller et al., 2003) as it is the Client Language that is being investigated. Client Behaviour Counts are measured differently in the MISC 2.0 than the first version of the Motivational Interviewing Skills Code (MISC 1.0) where TBC relevant utterances were simply coded as moving away from change (Resist Change) or toward change (Change Talk). In the MISC

2.0, the *types* (Ability, Desire, Need, Commitment, Reasons, and Taking Steps) of TBC relevant speech are coded separately. These types of utterance are termed Language Categories and are each recorded with a positive (+) or negative (-) valence. A positive valence utterance is an inclination towards the TBC (Change Talk), whereas a negative valence utterance is an inclination either away from the TBC or a zero to sustain the status quo (Sustain Talk).

The MISC 2.0 outlines the following definitions for each type of linguistic change language category: Client statements of Ability (A+) or Inability (A-) indicate personal perceptions of capability or possibility of change. Client statements of Commitment imply an agreement, intention, or obligation toward (C+) the or away from the (C-) TBC. Desire statements indicate a wanting, wishing, willing to change (D+) or not to change (D-). Statements of Need indicate a necessity, urgency, or requirement for change or No Change (N+ or N-), and statements of Reasons usually specify a particular rationale, basis, incentive, justification, or motive for making the TBC (R+ or R-). Finally, Taking Steps is coded when clients have recently taken behavioural steps that are intended by the client to lead toward (T+) or against TBC (T-).

Each utterance within a Language Category is given a strength weighting. These weightings can range from +/- 1 to +/-5 to indicate the strength and direction of each utterance for or against the TBC being discussed at the time. If an utterance has an inclination toward the TBC it is termed Change Talk, whereas if the utterance has an inclination away from the TBC or maintains the status quo it is Sustain Talk. For example in the MISC 2.0, utterance examples such as "I could" or "Yes, it's possible (for me)" are placed within the Ability Language Category, and given strength ratings of +3. These statements would then each be coded as A+3. Similarly, a Sustain Talk utterance example is "I don't want to quit", which was placed within the Desire Language Category, and given a strength rating of -3 (D-

3). Full definitions for all of these Language Categories, as well as a more detailed account of the coding process are available in the manual (http://casaa.unm.edu/download/misc2.pdf).

Coding of the transcripts was carried out by the author. Coding training was given by Eileen Britt (a member of the Motivational Interviewing Network of Trainers), and sessions initially involved familiarisation with the processes and methods utilized in MI, including the manualized coding system - (MISC 2.0). Further training involved reviewing, and discussing assignment of codes in practice examples. Initial transcripts were coded by the author and coding trainer and any deviation in coding was discussed. The primary coder then coded the transcripts, and approximately 10% (four out of thirty six) were randomly selected and coded independently by Eileen Britt. This was particularly important due to the version of the MISC that was being utilized. A recent version of the manual has been developed, version 2.1, which is suggested to enhance reliability and efficiency (Miller, Moyers, Ernst, & Amrhein, 2008). Differences in the versions of the manual include measuring utterance Client Language strength ratings as ranging from +/-1 to +/-3, rather than from +/-1 to +/-5, as well as a reduction in the number of Client Language Categories. While the decision to use the MISC 2.0 was in an attempt to gain a finer grained analysis, as well as to fit with previous research analysing Change Talk and outcome that utilised the MISC 2.0 framework (e.g. Amrhein et al., 2003), it was also dependent on the outcome of the reliability statistics. It was agreed that if the reliability did not meet an acceptable level, transcripts would be re-coded with the MISC, version 2.1.

2.4. Reliability

In order to ensure an acceptable level of coding reliability, inter-rater reliability was calculated. Both independent coders were blind to each others' ratings. Reliability statistics

were generated from these two sets of data to determine whether or not reliability was at an acceptable level to proceed. Inter-rater reliability of Language utterance counts were judged as acceptable in line with other published research (e.g., Moyers et al., 2003).

Intraclass Correlations (ICC, Bartko, 1966) were used to assess reliability. This statistic is a more conservative measure than the Pearson correlation, as it corrects for chance agreement, and has been suggested as the reliability measurement of choice (Cicchetti, 1994). In addition, comparable studies have also chosen this method (e.g. Campbell, 2007). ICC assesses reliability by comparing the variability of different ratings of the same subject to the total variation of all ratings and all subjects. The three classes of ICC that Shrout and Fleiss (1979) describe in their notable paper are applied to different rater agreement designs. The first has a pool of raters from which raters (for each subject) are randomly selected. The second describes a study whereby the same set of raters rates each subject. This design corresponds to a 2-way mixed ANOVA, where both subject and rater are separate effects, and, unlike the first case described where raters are viewed as measurement error, in this case raters are considered a random sample of raters from a fictitious pool of potential raters. The third variation is rarely used as it is similar in design to the second method, with a 2-way ANOVA design, however results are limited in their generalizability as ICC estimates only apply to the particular raters in the study. The second 'case' as described by Shrout and Fleiss (1979) was used in the current study as our raters were not selected at random, yet generalizability was desired. After determining the design specificity, it is necessary to decide on whether a measure of absolute agreement or consistency is needed. Absolute agreement was utilised in the current study as it was necessary determine the extent to which a rating was agreed upon rather than determining the extent to which ratings varied in a consistent pattern.

Guidelines for interpretation of clinically significant agreement between raters have been outlined and categorised by Cicchetti (1994) and outlined in Table 2. Proportion of agreement between the coders with regard to assignment of either Change or Sustain Talk was assessed, as was the proportion of agreement regarding Language Category. In addition, the level of agreement between coders regarding both strength and frequency ratings for each separate Language Category, and summary measures were assessed.

Table 2.

Cicchetti's (1994) Categorization for Reliability Coefficient Levels of Clinically Significant Agreement.

ICC Statistic	Level of Agreement
<.40	Poor
.40 - .59	Fair
.60 - .74	Good
.75 – 1.00	Excellent

2.4. Outcome Measures

Patient's transcripts were examined to see if there was any distinction between the two groups with regard to the language they used within MET sessions. Change and Sustain Talk *frequency* and *strength* were the primary measures investigated. In addition, the pattern Change and Sustain Talk within and across sessions was measured. Consistent with Amrhein et al (2003), sessions were divided into ten equal deciles and utterances coded and tallied in sequence to examine the changes in *pattern* of Change and Sustain Talk in a fine grained

analysis over the course of the session. In order for this to occur, the transcripts for each

participant for each of the four sessions were divided up by pages into ten equal intervals.

This was in order to test whether outcome group differed as a function of the slope of

utterances during a session, as has been found for certain Language Categories in previous

research (Amrhein et al, 2003, Campbell et al., 2007).

Finally, as the MET intervention was comprised of four treatment sessions, outcome

group was analysed as a function of *session number.* This was consistent with research

finding differences in outcome groups across sessions (Campbell et al., 2007).

Change or Sustain Talk Strength (across deciles and sessions)

Change or Sustain Talk strength is a measure of the total mean strength, across the six

Language Categories defined in the MISC 2.0, with which utterances are either inclined

toward or against (or keeping the status quo) the TBC. Utterances are measured per decile,

per participant, and averaged to generate points for each outcome group at each decile and at

each session.

Total Strength for each Language Category (across deciles and sessions)

The behaviour counts of both Change and Sustain Talk strength (from +/-1 to +/-5)

were tallied in sequence in order to examine the *pattern* of mean utterance *strength* for each

of the six linguistic categories (by viewing the slope in change talk strength across the

session) both within the ten deciles of a session, and across the four sessions.

Total Strength (across deciles and sessions)

Combination strength is a measure of the mean combined Change and Sustain Talk

strength, and Total strength is a measure of combination strength, totalled across all the six

Language Categories. Total strength is measured per decile per participant and averaged to generate points for each outcome set/participant set at each decile within session and at each session.

Change Talk Frequency (across deciles and sessions)

Change Talk frequency is a measure of mean total (six language categories) Change Talk and is measured by summing the frequency of utterances per decile per participant, regardless of strength. The mean Change Talk frequency was averaged to generate points for each outcome group at each decile within session and at each of the four sessions.

Sustain Talk Frequency (across deciles and sessions)

Sustain Talk frequency is a measure of mean total (six language categories) Sustain Talk. It is measured per decile per participant and averaged to generate points for each outcome group at each decile within session, and at each of the four sessions.

Change Talk frequency for each Language Category (across decile and sessions)

Change Talk frequency for each language category is a measure of mean Change Talk frequency for each of the six Language Categories per decile per participant and averaged to generate points for each outcome group at each decile within session and at each session.

Sustain Talk frequency for each Language Category (across decile and sessions)

Sustain Talk frequency for each Language Category is a measure of mean Sustain Talk frequency for each of the six Language Categories per decile per participant and averaged to generate points for each outcome group at each decile within session and at each session.

2.5. Data Analyses

     Instead of coders listening to the audio taped sessions, the coding for the present study was taken from transcripts of the audio taped sessions, which further facilitates consistency between coders as utterances are readily available for review and re-consideration. The coding data for each participant was entered into a spreadsheet, with each point struck through as it was entered. At the end of each decile, the number of entries were added up and compared against the sum of data points that had been entered under each language category, with any discrepancies being rectified.

     Each participant's utterance counts were entered to generate both frequency and strength ratings per decile within and across the four sessions. Frequency measures included the frequencies of the separate Change and Sustain Talk category utterances, as well as the total Change Talk and Sustain Talk frequencies. Change Talk frequencies were calculated by summing all the utterances that represent an inclination toward the TBC for each decile. Frequencies were generated for each separate Client Language Category as defined by MISC 2.0 (Ability, Reasons, Need, Desire, Commitment, and Taking Steps), irrespective of strength, as well as the total frequency counts, irrespective of strength or Client Language Category per decile, per session. The same process was used for Sustain Talk frequencies. All utterances that represented an inclination away from the TBC were summed for each linguistic category, and for the total frequency count, regardless of strength per decile per session. Strength measures of both total and mean Change Talk for each Language Category and overall strength for each decile were calculated. Similarly, Sustain Talk strength measures were total and mean strength of utterances. Sustain Talk strength measures were calculated for each Language Category, and for overall strength per decile per session. Having created frequency, strength, and summary measures, the first and last few entries

were checked, both in terms of the formulas used, as well as against the original spreadsheet or manual worksheets and discrepancies rectified to attempt accuracy.

An exploratory data analysis process was employed. As data was transformed into figures and visual plots, it became apparent which client utterance variables warranted further investigation. Given the small sample size, large number of language categories and values (including both Change and Sustain Talk), and the inclusion of both session and within-session decile in the study, it was decided that performing multivariate analyses would produce very little useful findings. Thus the focus of the current study was to look qualitatively at the patterns in the data, in terms of strength and frequency of Client Language within and across the four MET sessions for the two outcome groups. In order to achieve this outcome, data was analysed using a series of univariate analyses in SPSS (version 19) which produced separate plots for both the strength and frequency of each Language Category, for both within or between sessions. T-tests were then carried out on the mean participant set differences for each separate language category for both strength and frequency data. Effect sizes were then calculated for these measures as is recommended by the American Psychological Association (APA, 1994). These effects were calculated using Cohen's *d* (1962), which is calculated by the difference between two means, divided by the pooled standard deviation. In addition, the current study took into account Cohen's (1988) estimates of what is thought to be typically a small (0.2), medium (0.5), or large (0.8) effect.

When analysing patterns within the data, effect sizes were also employed. Effects were calculated between points which were thought large enough to warrant analyses after visual analysis of the chart patterns. Effect sizes have been defined as a representation of a standardised measure of change within or across group/s (Kazis, Anderson, & Meenan, 1989), or characterize the degree to which sample results diverge from the null hypothesis

(Cohen, 1988, 1994). As such, effect sizes in this context were thought to be appropriate standardized measures of the magnitude of change from one point to another, in a direction either toward, or against the hypothesised pattern.

Strength analyses

Initially, strength graphs were generated, including average strength of Change Talk, average strength of Sustain Talk (across all six language Categories), and average combined strength of both Change and Sustain Talk, termed *mean overall strength*. Strength graphs were also generated for each Language Category. These graphs included both the Change and Sustain Talk strength (positive and negative valences) to take into account strength of language for and against the TBC. Previous research has also analysed language strength in this form (e.g. Amrhein et al., 2003, Campbell, 2007). All strength analyses were plotted in two forms; between sessions, and within session deciles. Patterns in the data were then noted, and if visual analyses suggested a possible difference between outcome groups, independent t-tests were then carried out. Within session, t-tests were typically carried out on difference of strength of outcome group near the end of sessions (ninth decile). If a difference was noted, t-tests were then typically carried out on the difference of outcome group in the first interval to measure the difference between groups at this point, in comparison to nearer the end of session. Similarly, t-tests were carried after visual analyses on outcome groups at session four (end of intervention). If differences were apparent, analyses were carried out on outcome group at the first session (baseline) in order to tentatively explore the any differences arising from the first to the forth session.

Frequency analyses

Before frequency analyses could begin, the similarity between the session lengths of the two participant sets needed to be established so that findings were not skewed in favour of the participant set with longer session times and the possibility of higher total frequency counts. An independent t-test was carried out on average pages per decile per (participants) transcript. Findings indicated that the BG Change and BG No Change participant sets did not differ significantly on this measure (t (88) = 1.0552, *n.s.*), and frequency analyses could proceed.

Similar to the plots generated in the strength analyses, univariate analyses and subsequent plots were generated separately for average Change Talk and average Sustain Talk frequency (including all six Language Categories), and for *mean overall strength* (average combined strength of Change and Sustain Talk). In addition, in order to view the frequency of Change Talk separately from that of Sustain Talk, analyses and plots were generated for frequency of each Language Category for both Change and Sustain Talk separately. All frequency plots were generated for both session and within session decile so that patterns in the data could be revealed. Consistent with strength analyses, independent t-tests were again carried out between outcome groups within sessions, typically at the ninth and first deciles, and at session one and four when visual analyses warranted as such. Trends in session and decile plots were noted.

3. RESULTS

3.1. Reliability

Inter-rater agreement on whether statements should be categorised as either Change or Sustain Talk was found to be within the fair range, with an ICC of 0.522. When a Language Category was assigned to a statement, the agreement between raters on differentiating between the six distinct categories was in the good range, yielding an ICC of 0.695. Tables 3 and 4 display findings relating to both the strength and frequency ratings of each of the specific Language Categories. Statements of Desire were assigned ratings of the least strength by both coders. Need was assigned ratings with the highest strength. (Table 3). ICC findings relating to the agreement between raters on strength of each separate Language Category ranged from fair to excellent, with the Total strength reliability in the good range.

Table 3.

Levels of Interrater Reliability of Language Category and Summary Strength.

Measure	CODER 1 Mean (SD)	CODER 2 Mean (SD)	Interrater reliability ICC (*p*-value)
Desire	.867 (2.59)	.867 (1.92)	.858 *p* < .000
Ability	1.027 (1.68)	1.75 (1.55)	.406 *p* < .05
Reasons	1.317 (1.76)	1.414 (1.93)	.715 *p* < .00
Need	2.277 (1.60)	2.5 (1.29)	.831 *p* < .00
Commitment	1.66 (1.77)	2.38 (1.16)	.440 *p* < .084
Taking Steps	1.62 (2.059)	1.59 (1.86)	.823 *p* < .000

Total Strength	1.49 (1.93)	1.67 (1.86)	.664 $p < .000$

Note: Level of clinical significance: $<.40$ = poor; .40-.59 = fair; .60-.74 = good; $\geq.75$ = excellent.

Frequency measures also were found to have similar levels of reliability. Change Talk frequency reliability was notably higher than the Sustain Talk reliability, with ICCs yielding a result in the fair range for Sustain Talk, versus the excellent range for Change Talk. Additionally, in general, considerably fewer Sustain Talk statements were endorsed by either coder than Change Talk statements, indicating that the Sustain Talk frequency utterances need to be treated with additional caution. Frequency ratings of each of the separate Language Categories fell within the fair to excellent ranges, with ICC ratings of 0.548 to 0.869 (Table 4).

Table 4.

Levels of Interrater Reliability of Frequency Utterances

Measure	CODER 1 Mean (SD) per transcript	CODER 2 Mean (SD) per transcript	Interrater reliability ICC (*p*-value)
Change Talk	37.5 (14.57)	48 (23.51)	.887 ($p < .000$)
Sustain Talk	6.25 (9.25)	8.5 (13.67)	.402 ($p < .089$)
Total frequency	43.75 (19.56)	56.5 (32.42)	.874 ($p < .000$)
Desire	4.75 (2.5)	2.0 (2.16)	.548 ($p < .067$)
Ability	4.25 (1.5)	8.75 (4.99)	.796 ($p < .008$)
Reasons	16.25 (10.71)	25.25 (18.28)	.869 ($p < .001$)
Need	3.5 (4.04)	6.0 (4.55)	.706 ($p < .045$)

Commitment	3.75 (2.63)	8.25 (6.18)	.645 (*p* < .056)
Taking Steps	10.75 (7.89)	10.25 (7.63)	.983 (*p* < .000)

Note: Mean scores represent frequencies per transcript.

3.2. Mean Language Strength and Outcome

The BG Change and the BG No Change participant sets did not differ statistically significantly with regard to their strength of utterances in the majority of Language Categories (Table 5). Only the Desire and Ability Language Categories differed statistically significantly between participant sets.

The difference in Desire was in the hypothesised direction, with Desire higher for the BG Change participants than the BG No Change participants. This suggests that, when averaged across the intervention, the BG-Change participants expressed a greater desire to change their diabetes self management than did the BG No Change participants.

The difference between participant sets for Ability was in an unexpected direction. The BG No Change participants had a mean Ability strength that was notably above that of the BG Change participants. This suggests that overall the BG No Change participants had greater personal perceptions of their capability, or the possibility of, changing their diabetes self-management, than the BG Change participants.

Although not yielding statistically significant results, the BG Change participants' mean strength was higher than the BG No Change participants for Reasons, Need, Commitment, and Taking Steps, with large effect sizes generated from Need and Taking Steps language strength. This implies that in general, the BG Change participants uttered

slightly stronger Need, and Taking Steps utterances toward change than the BG No Change participants.

Non-statistically significant results were also found between participant sets with regard to Total Change Talk, Total Sustain Talk, and Total (Change Talk plus Sustain Talk) strength, although the relationships were in the hypothesised direction. The BG Change participants had a slightly higher mean strength of Total Change Talk than the BG No Change participants, and although not statistically significant, this difference yielded a large effect size (Cohen, 1988). Total strength was also higher for the BG Change participants, with a modest effect size. Unexpectedly, the BG Change participants uttered Sustain Talk with a fraction more strength overall than the BG No Change participants, although the difference between participant sets was minor, with a small effect size.

Table 5.

Summary Strength t-tests on Mean Differences between Participant sets

Language Category	BG Change participant set	BG No Change participant set	*t*-statistic	Effect size (Cohen's *d*)
	Mean (*SD*) per decile per session	Mean (*SD*) per decile per session		
Desire	2.567 (0.224)	2.078 (0.299)	2.701 *	1.812
Ability	0.099 (0.5)	1.077 (0.525)	2.832*	1.9
Reasons	0.787 (0.498)	0.726 (0.456)	0.191	0.127
Need	2.482 (0.354)	2.161 (0.313)	0.144	0.969
Commitment	1.537 (0.338)	1.368 (0.415)	0.655	0.44

Taking Steps	1.905 (0.46)	1.475 (0.496)	1.332	0.894
Total Change Talk	2.04 (0.164)	1.89 (0.163)	1.376	1.04
Total Sustain Talk	-1.089 (0.188)	-1.058 (0.188)	0.245	-0.164
Total Strength	1.218 (0.248)	1.122 (0.248)	0.577	0.387

Note: Each of the six Language Categories are measures of a combination of both Change

and Sustain Talk strength, Total strength refers to the combination of Change and Sustain

Talk across all six Language Categories.

* $p < 0.05$.

3.3. Mean Language frequency and Outcome

Commitment was the sole Language Category that appeared to differ statistically

significantly in frequency between the BG Change and the BG No Change participant sets,

with the BG Change participants engaging in a greater frequency of Commitment Talk.

(Table 6). This suggests that all participants uttered similar amounts of Change and Sustain

Talk, both in total, and when separated into Language Categories. The BG Change

participants however, voiced their commitment to change with a higher frequency, than the

BG No Change participants, consistent with the hypotheses. Additionally, although found to

be non-statistically significant, the BG Change participants spoke more often about their

desire to change, their commitment to change, and conversely their commitment not to

change (Commitment Sustain Talk) than the BG No Change participants, with medium to

large effect sizes.

Overall, there were very few Sustain Talk statements made across the intervention,

with an average total Sustain Talk frequency for both participant sets of approximately 0.2

statements per decile per session (or only two sustain statements per session). Due to the lack

of Sustain Talk in some of the Language Categories, only the findings regarding Ability and
Reasons Sustain Talk frequency were analysed further. The BG Change participants uttered a
higher frequency of Sustain Talk statements than the BG No Change participants for several
of the Language Categories.

Table 6.

Summary Frequency t-tests on Mean Differences between Participant sets

Language Category	BG Change Mean (*SD*) per decile per session	BG No Change Mean (*SD*) per decile per session	*t*- statistic	Effect size (Cohen's *d*)
Change Talk				
Desire	0.438 (0.134)	0.265 (0.134)	1.92	1.288
Ability	0.6 (0.186)	0.59 (0.186)	0.08	0.053
Reasons	1.35 (0.396)	1.51 (0.396)	0.602	-0.404
Need	0.563 (0.188)	0.695 (0.187)	1.047	0.702
Commitment	1.0 (0.2)	0.625 (0.2)	2.77*	1.875
Taking Steps	0.655 (0.158)	0.62 (0.159)	0.34	0.224
Total	0.768 (0.106)	0.717 (0.105)	0.72	0.483
Sustain Talk				
Desire	0.025 (0.028)	0.01 (0.029)	0.78	0.524
Ability	0.37 (0.13)	0.315 (0.13)	0.61	0.423
Reasons	0.75 (0.25)	0.84 (0.246)	0.55	-0.363
Need	0.03 (0.03)	0.025 (0.031)	0.2438	0.1639
Commitment	0.1 (0.05)	0.05 (0.05)	1.47	1

Taking Steps	0.125 (0.072)	0.130 (0.071)	0.1039	-0.069
Total	0.233 (0.054)	0.228 (0.054)	0.1358	0.092

Note: Mean scores represent average frequency per decile, per session

* $p < 0.05$.

3.4. Pattern of Total Language Strength and Outcome

3.4.1. Pattern of Change Talk Strength

The average Change Talk strength of inclination was close to two for both sets of participants across all four sessions of the MI intervention (Figures 3 & 4). According to MISC 2.0 a strength of inclination of '2' suggests a moderated, somewhat qualified statement such as "mostly, pretty much, probably, or not really". While the BG Change participants had a higher mean strength of Change Talk than the BG No Change participants at sessions one, two and three, both sets of participants were uttering the same strength of Change Talk at the end of the intervention (Figure 3). The BG Change participants' mean Change Talk strength was hypothesised to increase across the intervention, and particularly at session two and four. It increased at session two, but not at session four, and did not generally display an increasing strength across sessions. Additionally, the BG No Change participants had an increased mean Change Talk strength at the second and final session, which is also inconsistent with the hypothesis for these participants.
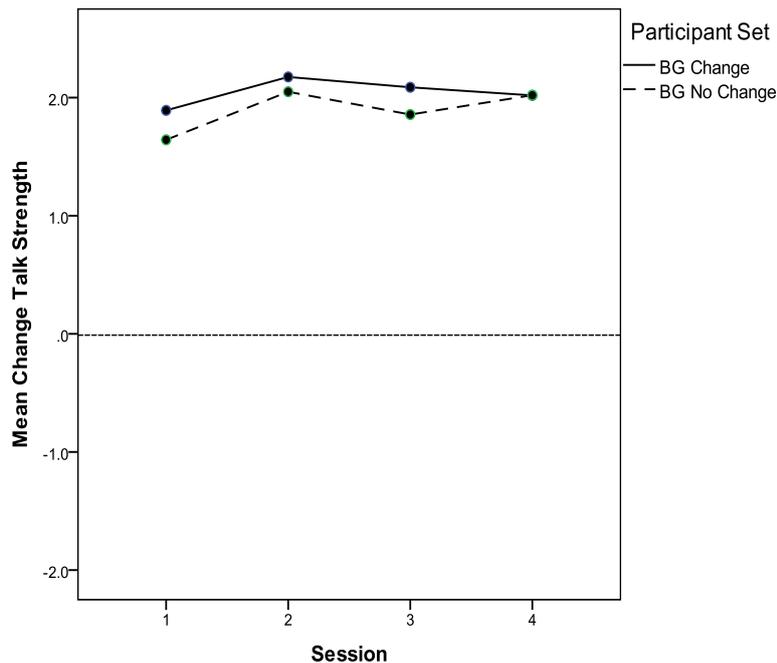
Figure 3. Total mean Change Talk strength across sessions.

Within sessions, the BG Change participants uttered Change Talk with greater strength than the BG No Change participants at the beginning and the end of sessions, suggesting they entered and left the sessions uttering Change Talk with greater intensity than the BG No Change participants (Figure 4). However, the BG Change participants' mean stayed relatively flat during the course of a session, which was not consistent with the hypothesised increasing pattern of strength across deciles. The BG No Change participants' mean strength, however, dropped at the end of the intervention with a large effect size between the mean at the ninth and tenth (final) deciles ($d = 1.07$). This finding fits with the hypothesis that the BG No Change participants' mean strength would not show. An increasing pattern, particularly at the end of the session).
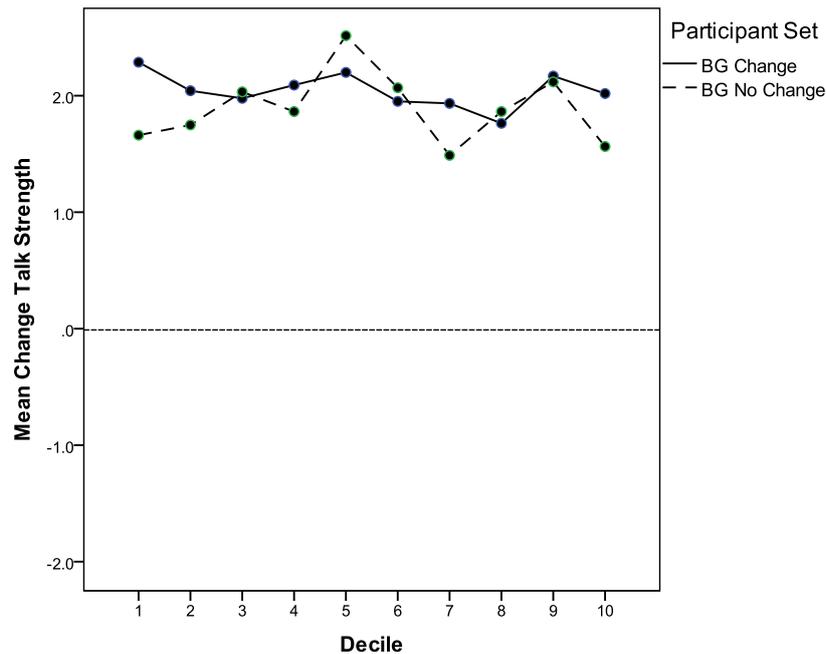
Figure 4. Total mean Change Talk strength across deciles.

3.4.2. Pattern of Sustain Talk Strength

The BG Change participants uttered Sustain statements with more strength in session one and two than the BG No Change participants, suggesting that they had less inclination to change than the BG No Change participants at the beginning of the MI intervention. However, this trend reversed, and at the third and forth sessions the BG Change participants had a mean Sustain Talk strength that was less than the BG No Change participants (Figure 5). This pattern indicates that over the course of MI, the BG Change participants uttered Sustain statements with a decreasing strength, with a large effect size across the intervention ($d = -0.986$), and thus became more inclined to change. While there was a slight decrease in Sustain Talk strength for the BG Change participants across sessions, there was no notable decrease at session two, as had been hypothesised. The BG No Change participants' mean Sustain Talk strength was maintained, but did not follow a pattern of increasing strength across the intervention as hypothesised.
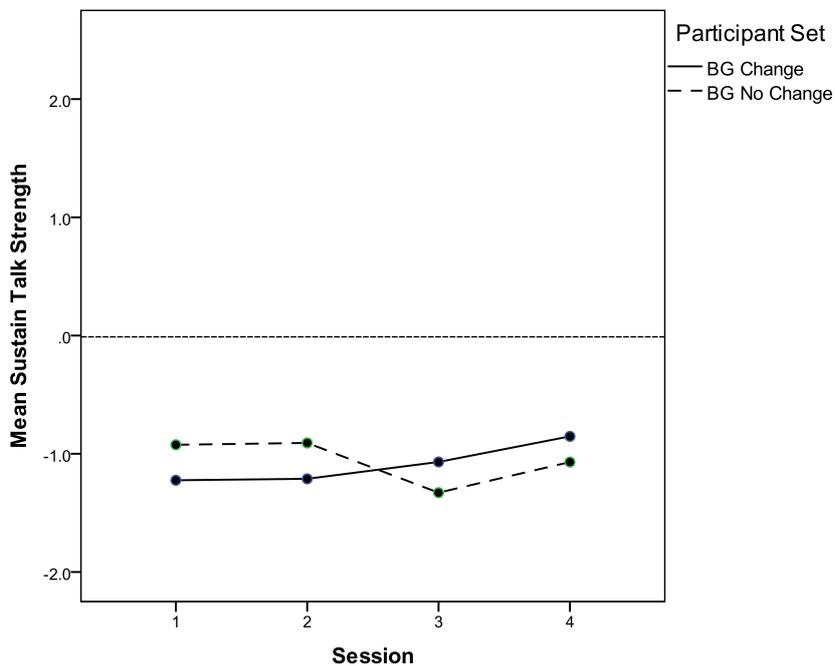
Figure 5. Total mean Sustain Talk strength across sessions.

Sustain Talk strength tended to decrease as the session progressed for both outcome

participant sets, with a greater decrease between decile one and ten for the BG No Change

participants (d = -1.33), than for the BG Change participants (d = -0.698). The weakest

average Sustain Talk point for both sets of participants was at the tenth decile, which supports

the notion that, in general, MI diminishes Sustain Talk (Figure 6). These results were in line

with the hypothesis regarding the BG Change participants, but not consistent with the

hypotheses with regard to the BG No Change participants.
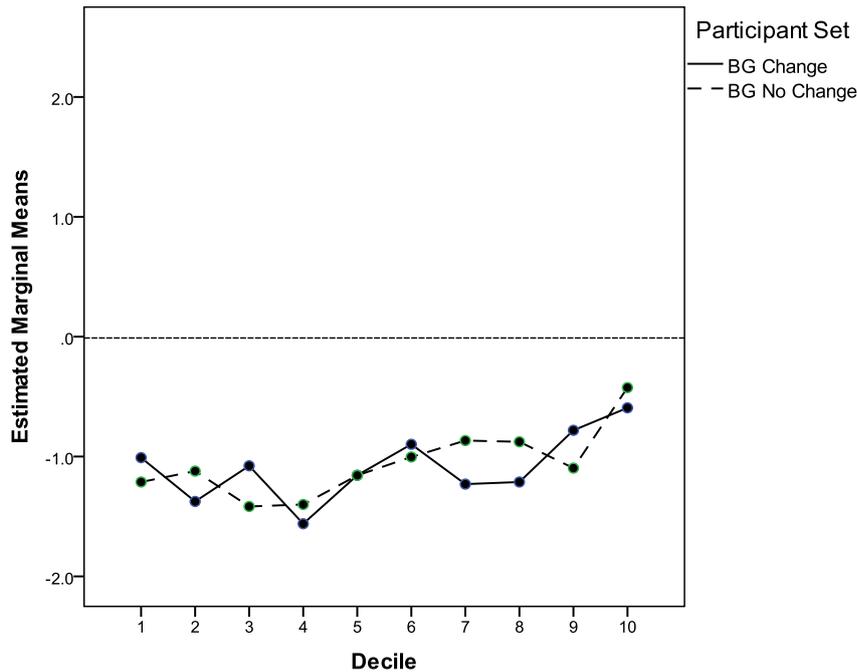
Figure 6. Total mean Sustain Talk strength across deciles.

3.4.3. Pattern of Total Strength

Total strength is a measure of the average combined negative (Sustain Talk) and positive (Change Talk) valenced utterances. As described in the method section, this measure was used in the current analyses for both Total strength (across all six Language Categories), and separately for each of the six Language Categories that follow.

Both sets of participants had higher mean total strength in the second and forth sessions than in the first and third sessions (Figure 7). This data is consistent with the hypothesis for the BG Change participants, however it is inconsistent with the hypothesis for the BG No Change participants. In addition, as predicted, the BG Change participants had a general increasing trend in strength across the intervention. The difference in effect size between session one and four was large ($d = -1.05$), indicating that these participants uttered Change Talk with *increasing* strength, or Sustain Talk with *decreasing* strength as the intervention proceeded.
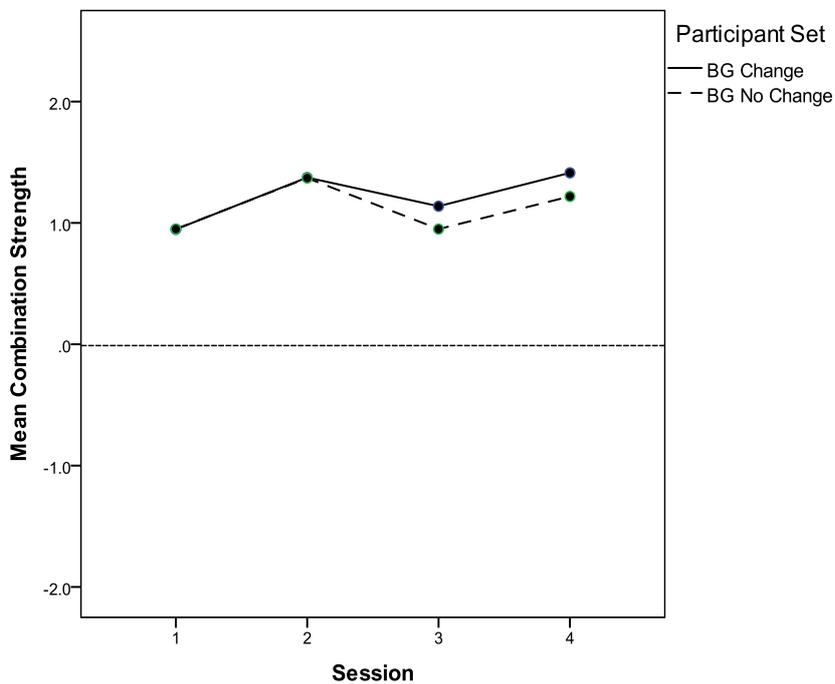
Figure 7. Total strength across sessions.

The BG Change participants had a higher mean Total strength than the BG No Change participants at several deciles within sessions, the most notable being decile one and decile nine (Figure 8). Both sets of participants had a slight increasing trend across deciles, a finding that supports the hypotheses with regard to the BG Change, but not for the BG No Change participants. In addition, as hypothesised, the BG Change participants' mean increased most toward the end of sessions, with a large effect size between decile eight and decile nine (d = -0.89).
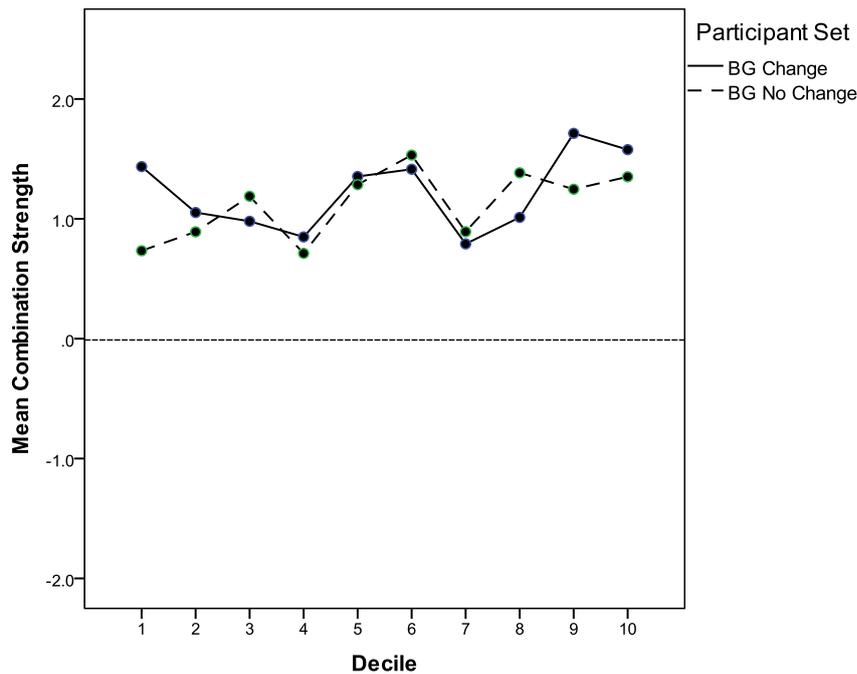
Figure 8. Total mean strength across deciles.

3.4.4. Pattern of Desire Strength

Note, the pattern of strength of each separate Language Category below, are measures of the combination of both Change and Sustain Talk.

There was a slight increasing trend in Desire strength across sessions for the BG Change participants (Figure 9). The BG No Change participants' mean strength also increased from session one to three, however notably decreased from session three to session four with a large effect size ($d = 2.57$). This pattern suggests that at the end of the intervention, the strength with which the BG No Change participants were wanting, wishing or willing to change decreased notably at the end of the intervention. Although the BG Change participants' mean Desire strength did not increase at session two and four as was hypothesised, it was maintained, or slightly increased across the intervention. The BG No Change participants' Desire strength did not follow a pattern of increasing strength across the

intervention, particularly at sessions two and four, and as such was consistent with the hypotheses.
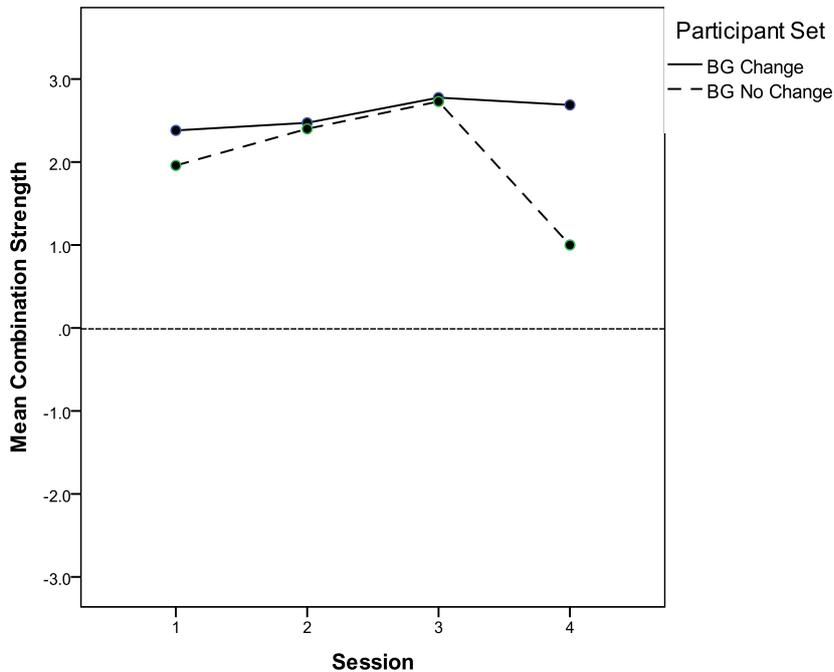

Figure 9. Average Desire strength across sessions.

Within sessions, the BG Change participants' pattern of Desire strength appeared to trend slightly downward across the deciles (Figure 10). This pattern is not consistent with the hypotheses, and suggests that at the end of sessions, the BG Change participants were voicing their desire to change with slightly less strength than at the beginning of each session. The BG No Change participants entered sessions talking about their desire to change with notably less strength than the BG Change participants. In addition, they changed over the course of the session from uttering statements about their lack of desire to change with more strength around the start of the sessions, to uttering statements about their desire to change with more strength toward the end of sessions. This increasing trend of Desire strength across the ten

deciles yielded a large effect size ($d = -1.788$), and suggests a pattern that was inconsistent with the hypotheses.
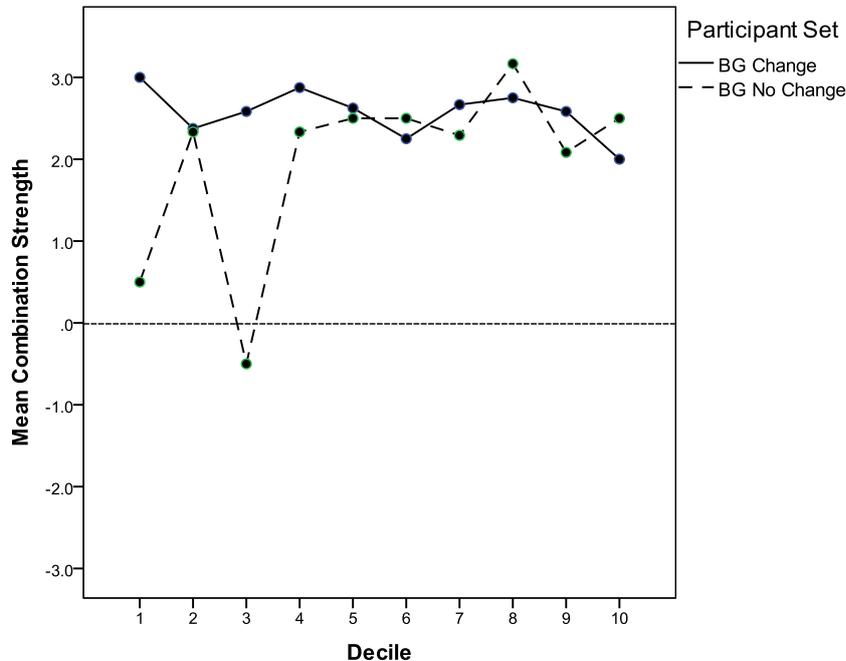

Figure 10. Average Desire strength across deciles.

3.4.5. Pattern of Ability Strength

Across sessions, the BG Change participants had a mean Ability Strength of close to zero for sessions one to three, but this increased in the fourth session to approximately one, a large effect ($d = -1.035$). This pattern suggests a neutral stance by the BG Change participants on their ability to change across the first three sessions of the intervention, followed by an increase in strength in the last session. The hypotheses predicted an increase in strength at sessions two and four for these participants, thus the hypotheses were not fully supported. In contrast, the BG No Change participants mean Ability strength increased across the intervention until the third session, to a level of strength of two, and then decreased to

approximately one at the final session. The difference in mean Ability strength from the third to the final session for these participants yielded a notable effect ($d = 0.747$), although it did not quite reach Cohen's convention for a large effect. This pattern indicates that when the BG No Change participants were discussing their ability to change, they did so with increasing strength until the third session when these statements were at a somewhat qualified level, followed by a reduction to a highly diminished level of strength at the end of the intervention. It was hypothesised that the BG No Change participants would not follow a pattern of increasing strength across the session, notably at sessions two and four. These findings were in line with the predictions regarding the fourth session, but not regarding session two.
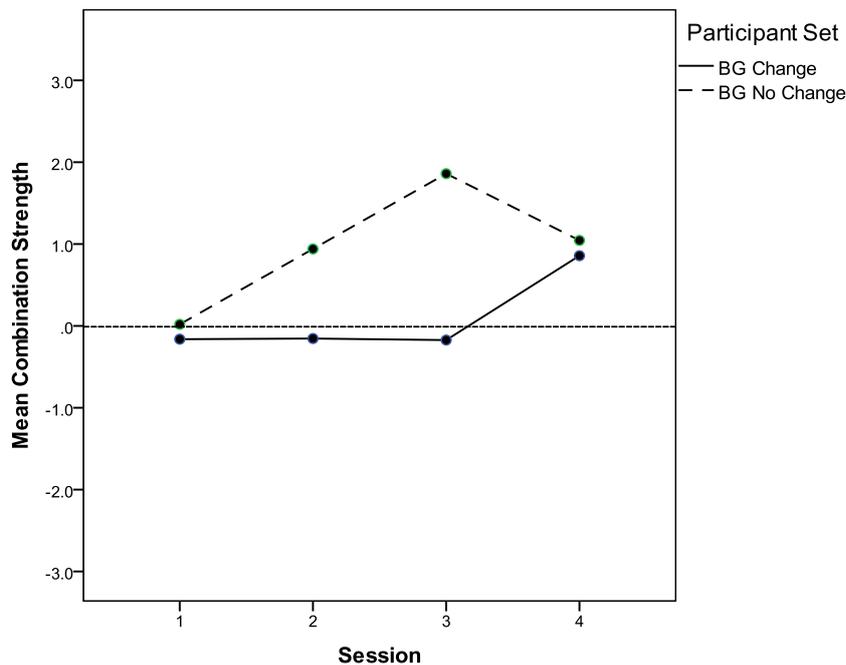

Figure 11. Average Ability strength across sessions.

BG No Change participants appeared to have a higher mean Ability Talk strength at most deciles within session than the BG Change participants, including the first and last

deciles (Figure 12). Inconsistent with hypotheses, at the end of sessions, the BG No Change participants' mean Ability Talk increased between the ninth and final decile, with a moderate effect size ($d = -0.77$), suggesting increased confidence in their ability to change before leaving each session. The BG Change participants' mean Ability Talk however decreased slightly toward the end of sessions, which was inconsistent with hypotheses and suggests their perception of their capability, or possibility, to change became less intense as the session concluded.
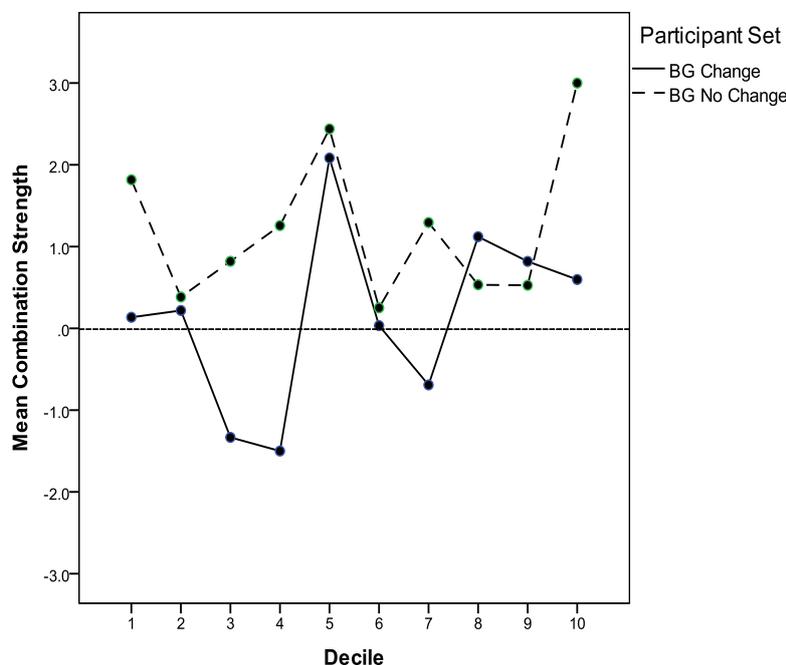
Figure 12. Average Ability strength across deciles.

3.4.6. Pattern of Reasons strength

Across sessions, both BG Change and No Change participants' mean Reasons strength increased from session one to two, but decreased to lower mean ratings at session three (Figure 13). At session four, the BG No Change participants' mean Reason strength continued to decrease as hypothesised, the BG Change participants' mean Reason strength

increased, with a large effect size ($d= 1.097$). This suggests, consistent with hypotheses, that the BG Change participants' reasons for change were uttered with more strength across the intervention, particularly at session two, and session four.
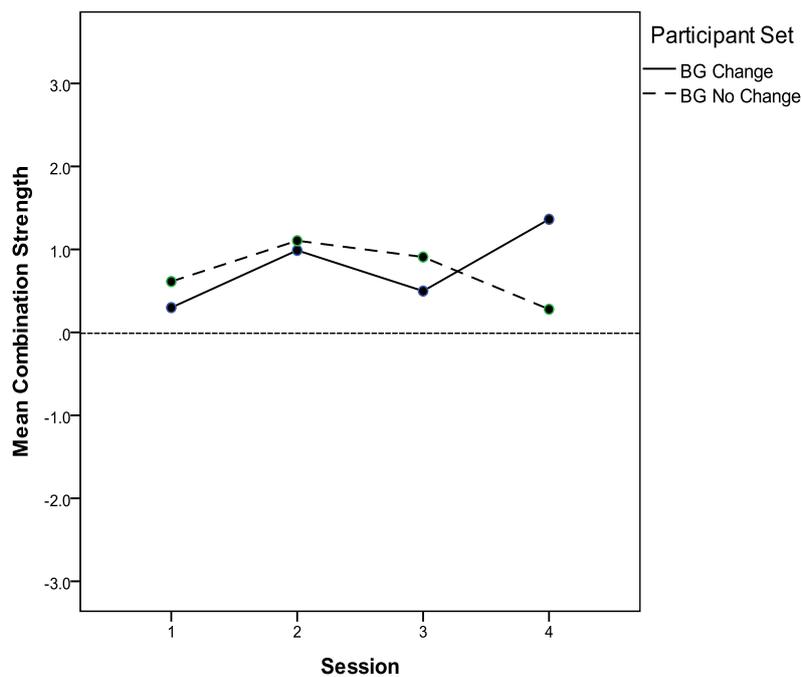

Figure 13. Average Reasons strength across sessions.

The mean Reason strength at decile one for the BG Change participants was 1.308 ($SD = 1.974$), and for the BG No Change participants -0.151 ($SD = 1.437$), suggesting that the BG Change participants tended to start sessions talking more about the reasons for change than the BG Change participants (Figure 14). The BG Change participants appeared to utter a similar level of Reasons strength at the beginning and end of sessions, which was not what had been hypothesised. This suggests that over the course of a session their utterances regarding reasons for change did not increase in strength. Conversely, there appeared to be an increasing within-session trend in the BG No Change participants that continued toward the

end of sessions and yielded a large effect size between deciles one and deciles ten ($d = 1.37$).

This finding was inconsistent with the hypotheses and suggests that the BG No Change

participants entered sessions with a neutral stance regarding reasons to change, but were

talking about reasons to change with a stronger inclination at the end of sessions.
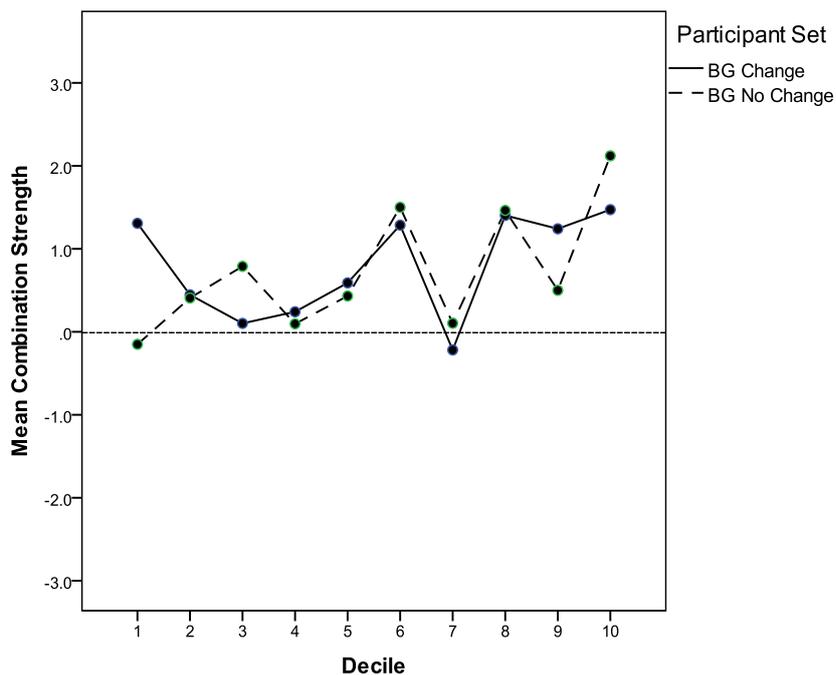
Figure 14. Average Reasons strength across deciles.

3.4.7. Pattern of Need Strength

When discussing the need to change, the BG Change participants' language decreased

in strength across the intervention, in particular at the final session (Figure 15). The

difference in strength of Need between sessions one and four generated a large effect size (d

$= 1.248$). This pattern of strength is inconsistent with the hypotheses, and suggests that these

participants voiced their necessity or urgency to change with less inclination to change at the

end of the intervention than they did at their first session. Conversely, the BG No Change

participants voiced their perceived need to change with an increasing strength across the intervention, particularly at sessions two and four, with the difference across the intervention yielding a large effect size (Cohen's $d= 0.82$). These findings were in direct contrast to what had been predicted for these participants and as such are inconsistent with hypotheses.
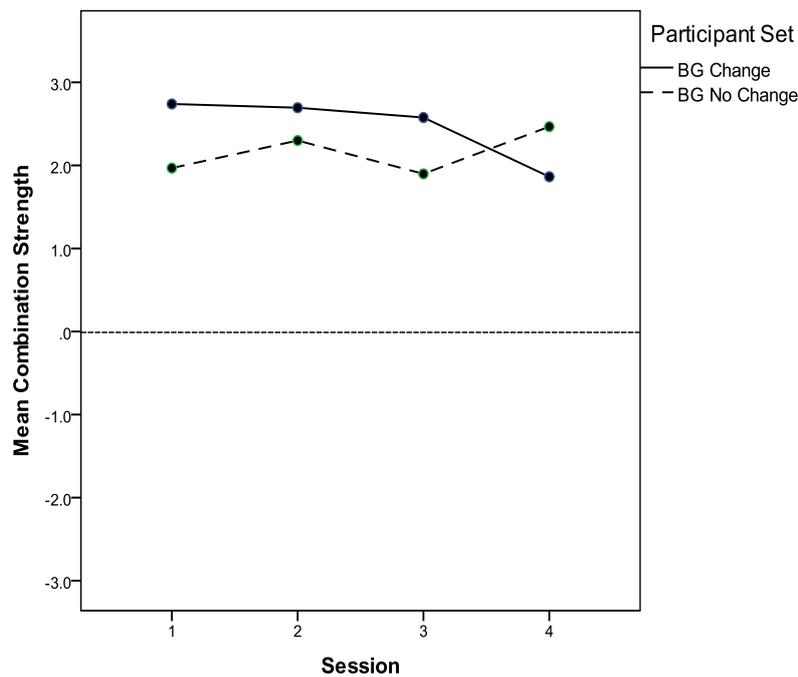
Figure 15. Average Need strength across sessions.

Within deciles, there appeared to be an increasing Need strength across the deciles for the BG Change participants which generated a large effect size ($d = 1.45$). As hypothesised, this indicates that the BG Change participants uttered statements of urgency or requirement for change with an increasing strength within sessions, and with a greater strength at the end of sessions. The BG No Change participants did not show this within session pattern, which was also consistent with hypotheses (Figure 16).
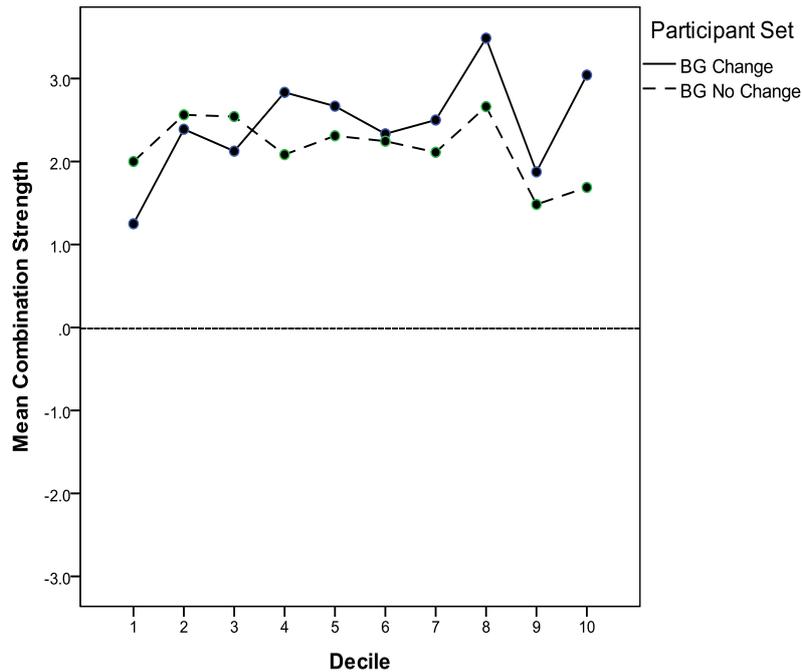
Figure 16. Average Need strength across deciles.

3.4.8. Pattern of Commitment Strength

Both the BG Change and the BG No Change participants had similar mean strength ratings at session one and four, however the gap between them widened at sessions two and three, with the BG Change participants expressing greater commitment to change in these sessions than the BG No Change participants (Figure 17). While the BG Change participants Commitment strength did increase at session two, with a notable effect size ($d = -1.20$), it did not follow a pattern of increasing strength and increase at the final session., and therefore the hypotheses were only partially confirmed. Furthermore, the BG No–Change participants' pattern of Commitment strength increased at sessions two and four which was also inconsistent with what was hypothesised.
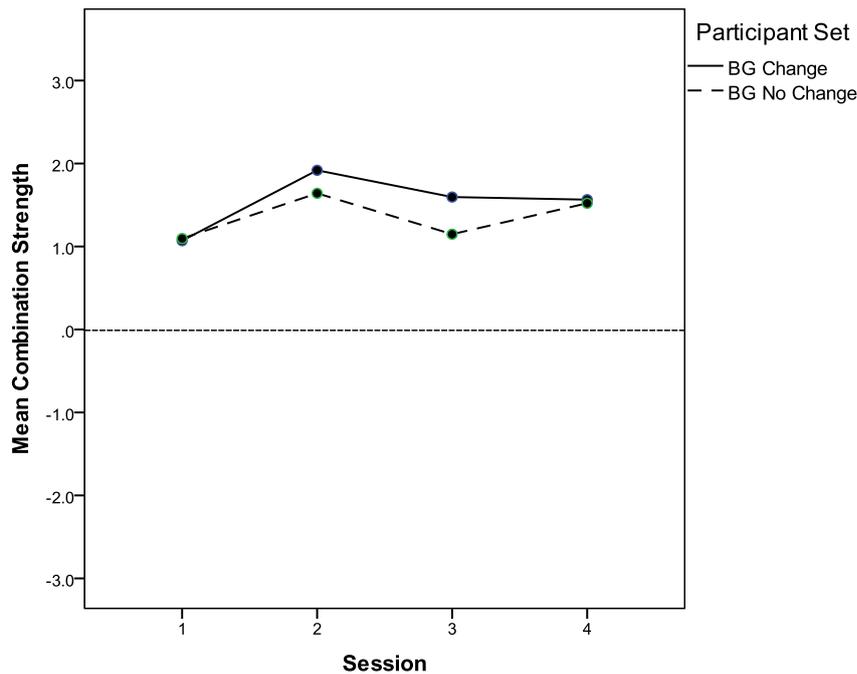
Figure 17. Average Commitment strength across sessions.

Mean Commitment strength ratings within sessions revealed a notable difference at decile one (Figure 18). The BG Change participants' mean (3.083, $SD = 1.338$) was notably higher than the BG No Change participants' mean (-3.00, $SD = 2.99$) with a substantial effect size ($d = 2.51$), suggesting the BG Change participants tended to enter sessions expressing a stronger commitment to change than the BG No Change participants. There was a large variability across the deciles for the BG Change participants, and their strength of Commitment talk at decile one was above their strength of Commitment talk at decile ten, a difference yielding a notable effect size ($d = 1.427$). These findings were not consistent with the predicted pattern of increasing Commitment strength. The BG No Change participants Commitment strength did increase notably across the intervention with a considerable effect size, portraying the large difference between their commitment strength at the beginning and end of sessions ($d = -2.23$). These findings were also contrary to what had been hypothesised.
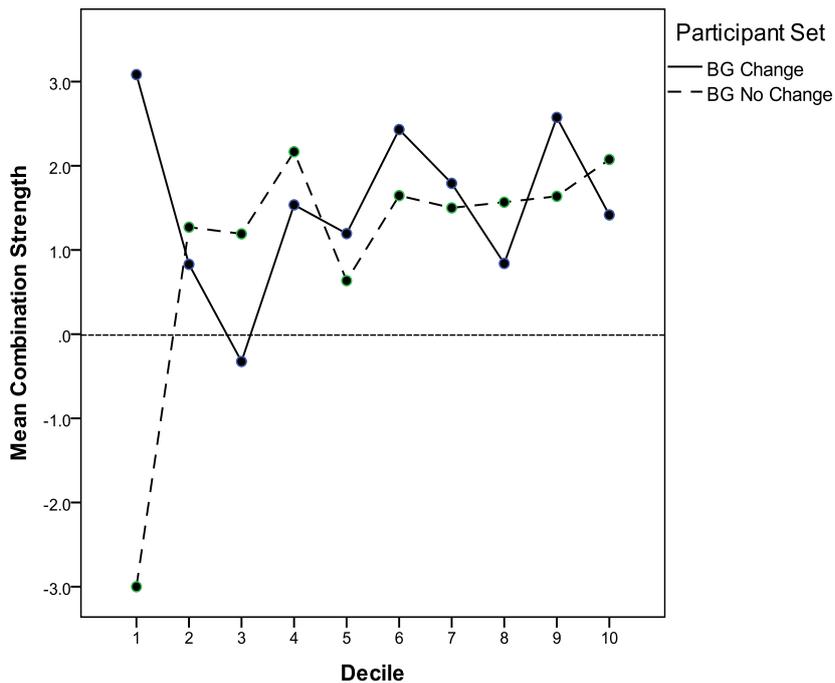
Figure 18. Average Commitment strength across deciles.

3.4.9. Pattern of Taking Steps strength

The pattern across sessions revealed that while both the BG Change and the BG No Change participants' mean ratings were the same at session one, the gap between the two appeared to widen across sessions two to four, with the BG No Change participants' mean strength of Taking Steps decreasing further than the Change participants (Figure 19). This suggests that while the BG Change participants uttered statements regarding specific behavioural steps they had taken toward change with a similar level of strength across the intervention, the BG No Change participants' level of strength decreased across the intervention. This decrease across the intervention was in line with hypotheses, and yielded a moderate effect size ($d = 0.705$). Although the BG Change participants maintained their mean strength across the intervention, they did not show an increasing pattern, particularly at sessions two and four, and thus were not consistent with the hypotheses.
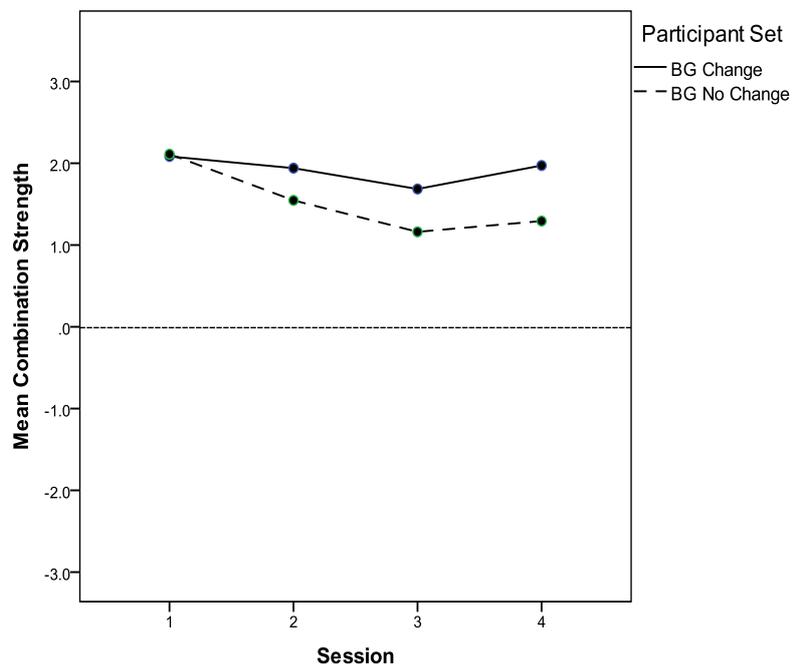
Figure 19. Average Taking Steps strength across sessions.

Across deciles, there was a large amount of variability for both the BG Change and BG No Change participants (Figure 20). Although the BG Change participants' Taking Steps language did not show a clear pattern of increasing strength within sessions, their statements regarding specific behavioural steps toward change appeared to increase toward the end of sessions. The difference between the BG Change participants' mean Taking Steps strength from deciles seven to ten yielded a sizeable effect ($d = $ -1.10). In contrast, the BG No Change participants showed an increasing pattern of strength across the first half of sessions, followed by a decrease toward the end of sessions. The difference between their mean Taking Steps strength from the ninth to the final decile generated a moderate effect size ($d = 0.68$). Although there was a large amount of variability across deciles, the patterns of each participant set were in line with what was hypothesised.
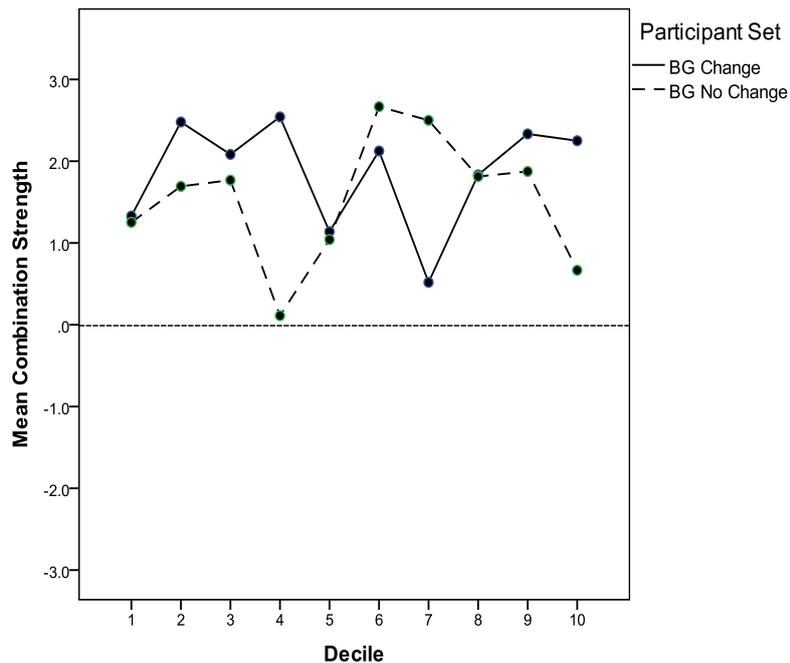
Figure 20. Average Taking Steps strength across deciles.

3.3. Pattern of Frequency and Outcome

In order to standardise the measures and graphs across the current study, data points have been set to indicate mean frequency per decile per session. However, it is at times more relevant to refer to mean rating points per session. This means that while the figures remain in a standardised format, the text may refer to findings in a more intuitive manner such as 'an average of 11 statements per session', rather than 'an average of 1.1 statements per decile in the second session'.

3.3.1. Pattern of Change Talk Frequency

While both sets of participants were similar across the first few sessions on frequency of Change Talk (Figure 21), at the final session the BG Change participants were uttering Change Talk more frequently (mean = 0.854 , *SD* =.21) than the BG No Change participants (mean = 0.563, *SD* =.21). Consistent with hypotheses, the BG Change participants uttered an increased amount of Change Talk at sessions two and four, with a slight increasing trend

across the intervention. A substantial effect size was generated ($d = -1.58$) when the difference between the BG Change participants' Change Talk frequency at session one was compared to their frequency at session four. This suggests that these participants spoke about changing their diabetes self-management with greater frequency at the end of the intervention than they had at the beginning of the intervention. Although the BG No Change participants' pattern of Change Talk frequency increased at session two, it did not increase at the final session or show an increasing pattern of strength across the intervention, and thus was in line with what had been hypothesised.
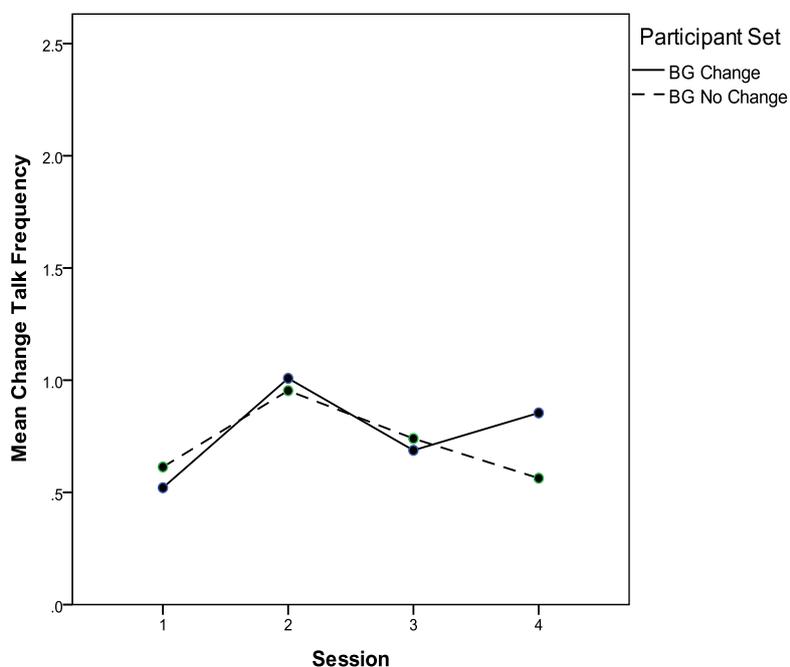
Figure 21. Overall mean Change Talk frequency across sessions.

The trend across session deciles for average Change Talk frequency remained relatively flat for the BG Change participants (Figure 22). Their frequency did however increase toward the end of sessions, with the highest frequency of Change Talk occurring at decile nine, (approximately ten Change Talk statements), before decreasing at the final decile. The decrease in frequency between deciles nine and ten for these participants yielded

a notable effect size ($d = 1.50$), and illustrates a pattern that is inconsistent with hypotheses. Similarly, the BG No Change participants Change Talk frequency also appears to have increased toward the end of the sessions, although decreasing at the final two deciles. This pattern of frequency was not consistent with what had been hypothesised regarding the BG No Change participants.
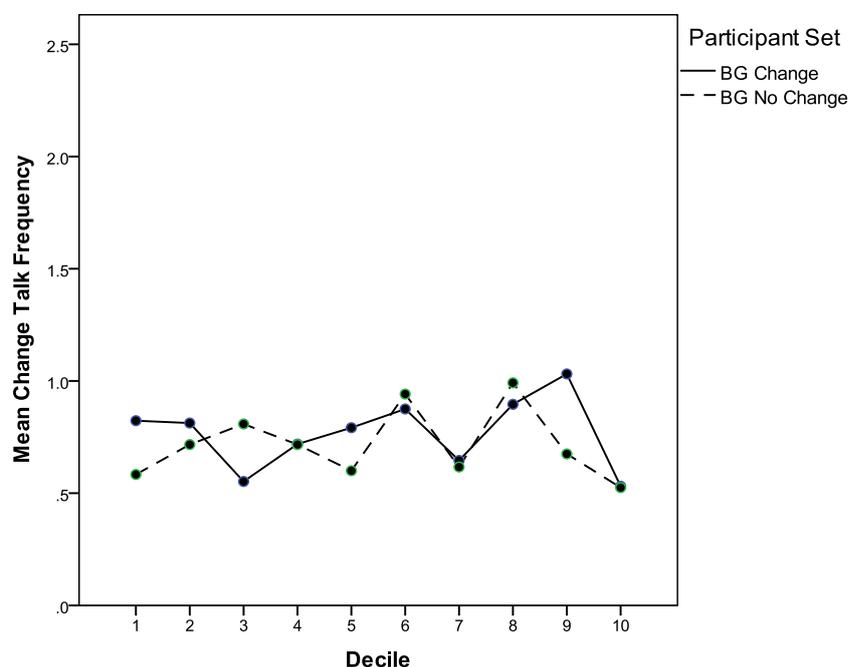
Figure 22. Overall mean Change Talk frequency across deciles.

3.3.2. Pattern of Sustain Talk Frequency

The average Sustain Talk frequency was relatively flat for all participants across the MI intervention. The amount of Sustain Talk statements decreased slightly at the last session for the BG Change participants, and increased slightly for the BG No Change participants (Figure 23). This suggests a small increase in statements against change for the BG No Change participants, and towards change for the BG Change participants at the end of the intervention. The pattern across the intervention was consistent with the hypotheses with

regard to the BG No Change participants, however, due to the increase in Sustain Talk at the

second session, was not in line with predictions regarding the BG Change participants.
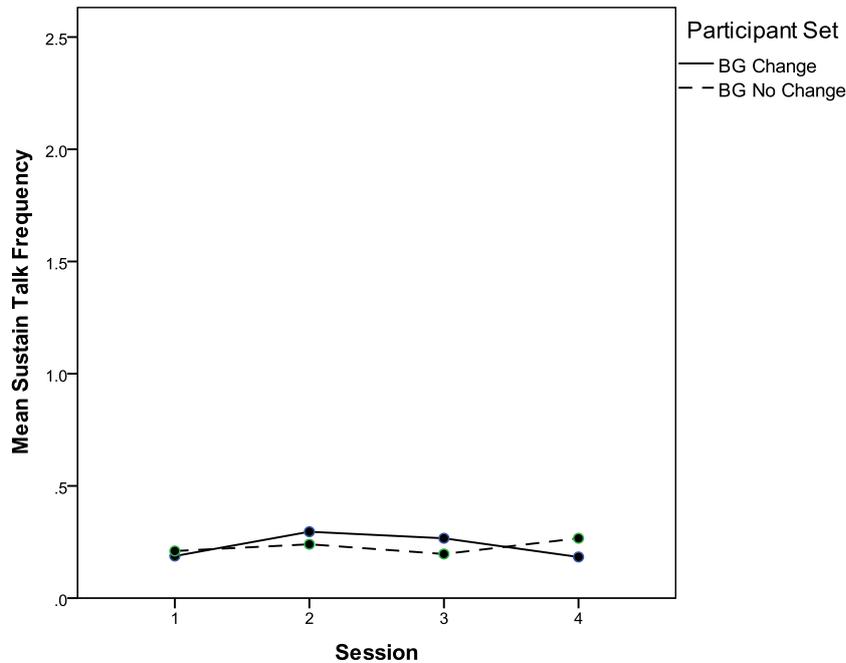
Figure 23. Average total Sustain Talk frequency across sessions.

Both participant sets' mean frequency of Sustain Talk decreased over the session

(Figure 24). It was hypothesised that this would be true for the BG Change participants,

however not regarding the BG No Change participants. It is however consistent with the

notion that MI in general diminishes sustain talk.
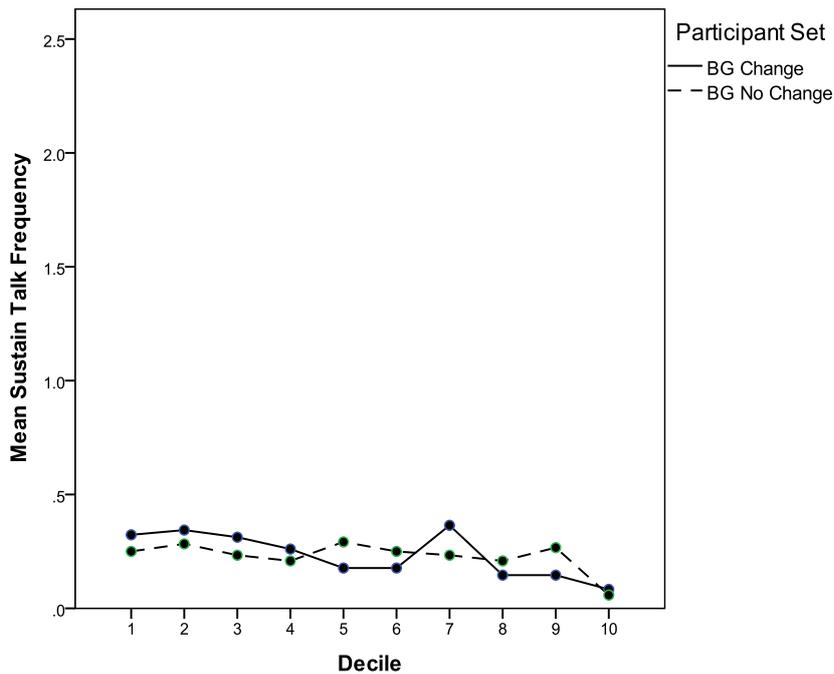
Figure 24. Average total Sustain Talk frequency across deciles.

3.3.3. Pattern of Desire Change Talk Frequency

BG No Change participants uttered slightly more Desire Change Talk in the initial

session than the BG Change participants. This trend however reversed, and at sessions two,

three and four, the BG Change participants were uttering statements indicating a wishing,

wanting or willing to change with a greater frequency (Figure 25). The BG Change

participants' mean frequency increased from the first to the second session with a moderate

effect size ($d = -0.657$), and then decreased over the final two sessions to a point that was

slightly lower than their mean at session one. Although there was an increase in frequency at

the second session, there was not an increase at the final session, or an increasing pattern

across the intervention as had been hypothesised. Conversely, the BG No Change

participants' frequency of Desire Change Talk was consistent with predictions as it decreased

from the first to the second sessions, with a notable effect size ($d = 1.12$), and showed a

decreasing pattern across the intervention, with a sizable effect size between the first and last

sessions ($d = 1.05$).
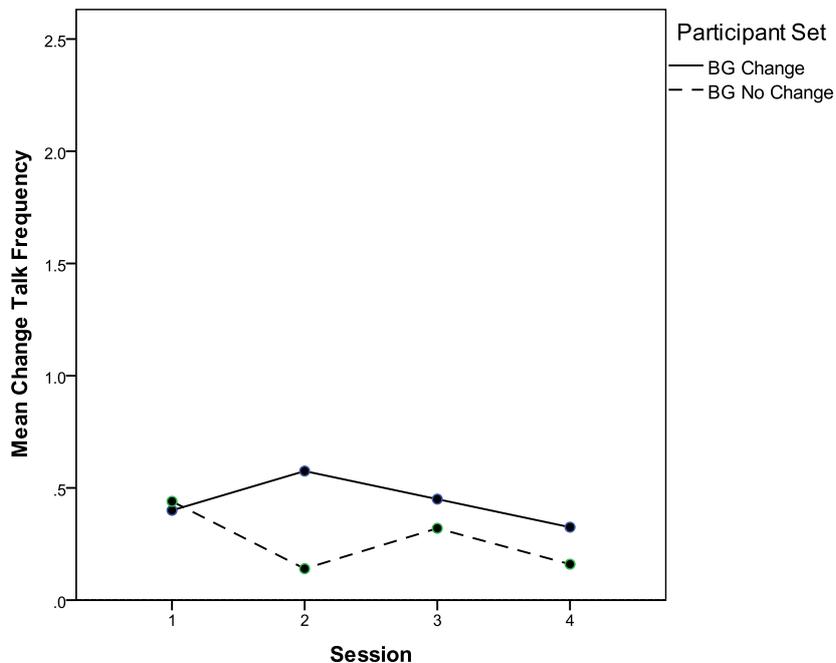
Figure 25. Average Desire Change Talk frequency across sessions.

Across the within session ten deciles, both participant sets entered and finished

sessions voicing either none, or very few statements of desire to change (Figure 26). The BG

Change participants frequency of Desire Talk increased notably at decile two, with a

substantial effect size ($d = -1.63$), and then trended downward from the second decile. This

suggests they were speaking about their wanting, or wishing to change with a greater

prevalence after the first few minutes of a session (decile two), followed by a decreasing

prevalence of these statements across the remaining deciles within sessions, which was not

consistent with hypotheses. The BG No Change participants generally trended upward

through session deciles. This pattern had also not been hypothesised and suggests that while

these participants spoke about their desire to change with little frequency in the first half of

sessions, their Desire statements increased as the session progressed.
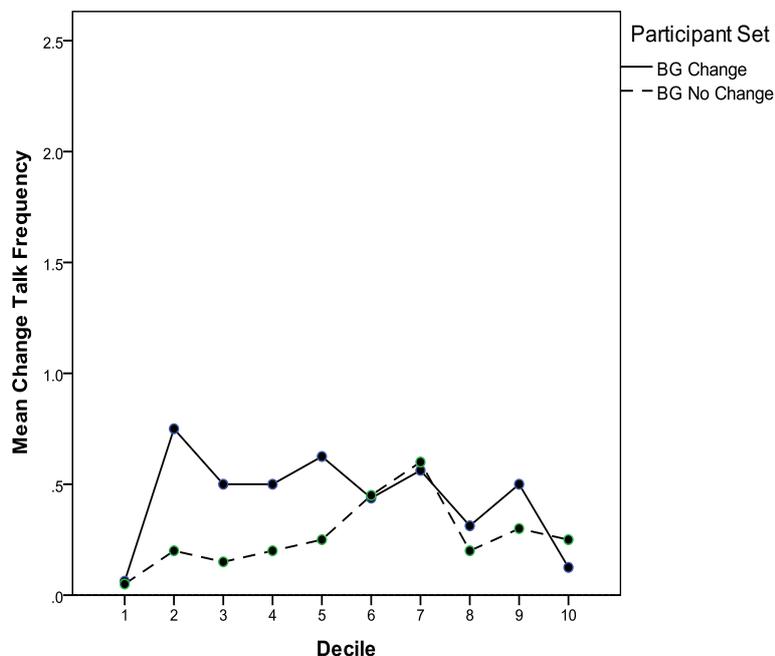
Figure 26. Average Desire Change Talk frequency across deciles.

3.3.4. Pattern of Ability Change Talk Frequency

As can be seen in Figure 27, the BG No Change participants' frequency of Ability

Talk increased across the first three sessions, but decreased at session four, whereas the BG

Change participants had a significant overall increasing trend across sessions, with a notable

effect size from sessions one to four ($d = 2.083$). Thus the BG Change participants ended the

MI intervention talking with numerous more statements of their perceived capability or

possibility to change than they had previously, whereas the BG No Change participants'

Ability statements decreased. In addition, the BG Change participants increased their

prevalence of statements regarding their perceived ability to change at sessions two and four.

The BG Change participants increased their Ability Change Talk utterances from approximately five statements in the third session, to approximately ten statements in the final session, with a substantial effect size illustrating this change (d= -3.09). These patterns of Ability Change Talk frequency were consistent with hypotheses.
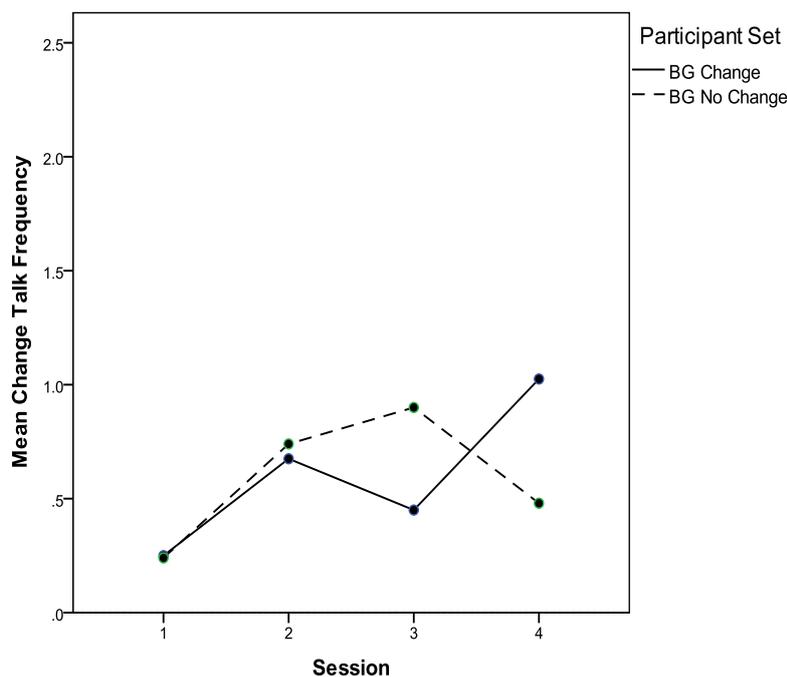
Figure 27. Average Ability Change Talk frequency across sessions.

Across deciles, the BG No Change participants' Ability Talk tended to increase over the first half of sessions, and then decrease toward the end of sessions. The difference between decile one and ten for these participants yielded a medium effect size ($d = 0.51$). Conversely, the BG Change participants generally appeared to have a higher frequency of Ability Change Talk in the second half than in the first half of sessions (Figure 28). This suggests that the BG Change participants ended sessions uttering more statements regarding the perception of capability or possibility to change their diabetes self-management than they

did at the beginning of sessions, whereas the BG No Change participants made a decreasing

number of these statements toward the end of sessions. While these patterns were in

accordance with hypotheses, the increase across deciles for the BG Change participants was

only minor, with a small effect size generated ($d = 0.21$) between deciles one and ten.
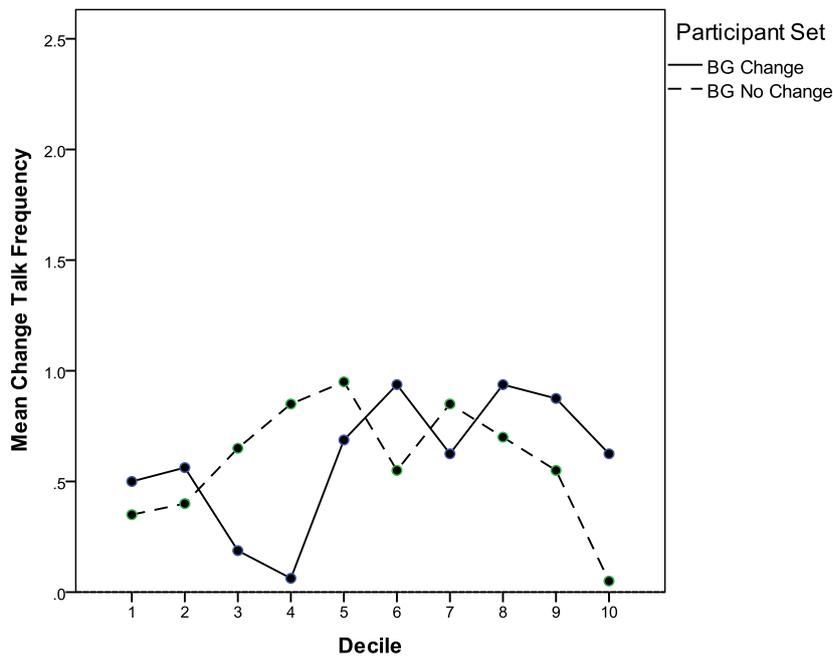
Figure 28. Average Ability Change Talk frequency across deciles.

3.3.5. Pattern of Reasons Change Talk Frequency

Both participant sets were similar in their trends across sessions. The statements that

both sets of participants made regarding a particular rationale, basis, incentive, justification,

or motive for making a change increased at the second session and decreased at the third and

forth sessions (Figure 29). The increase in Reasons frequency was particularly evident for the

BG Change participants who uttered approximately seven Reasons Change Talk statements at

the first session, and then approximately 24 at the second session, which yielded a substantial

effect size ($d = -2.12$). Although an increase in frequency at sessions two was hypothesised,

the BG Change participants' Reasons statements did not increase at the final session, with the difference between session one and session four for the BG Change participants yielding a small effect size of $d = 0.443$. This pattern did not indicate an increasing pattern of frequency across the intervention, and as such was not consistent with the hypotheses.
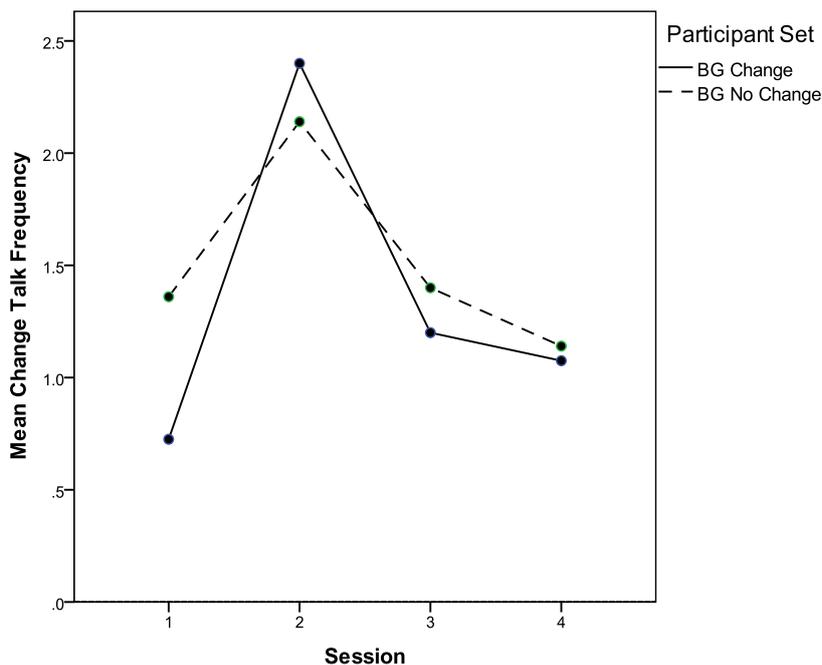
Figure 29. Average Reasons Change Talk frequency across sessions.

The pattern of Reason Change Talk frequency across deciles was highly variable (Figure 30). Contrary to what was predicted by the hypotheses, the BG Change participants entered sessions uttering more reasons for change than they did when they left the sessions, with a moderate effect size ($d = 0.65$), portraying a slightly decreasing frequency within sessions. Furthermore, the BG No Change participants' mean frequency increased across the

ten deciles, with a moderate effect size (d = -0.68). These patterns of frequency regarding Reasons Change Talk are not in line with the hypotheses.
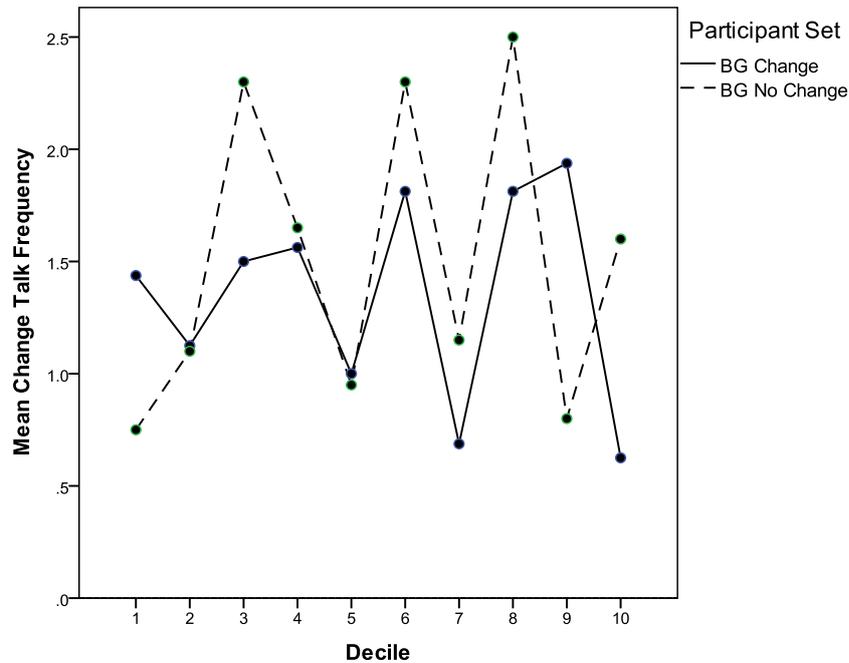
Figure 30. Average Reasons Change Talk frequency across deciles.

3.3.6. Pattern of Need Change Talk Frequency and Outcome

Across the MI intervention, the BG Change and BG No Change participants had a similar pattern of voicing their necessity, urgency, or requirements to change their diabetes self-management (Figure 31). At the first two sessions, participants' frequencies remained at a comparable level, with a similar pattern of decreasing at the third session, and increasing slightly at the final session. This general decreasing pattern across the intervention was in line with hypotheses regarding the BG No Change participants, but do not fit with hypotheses for the BG Change participants.
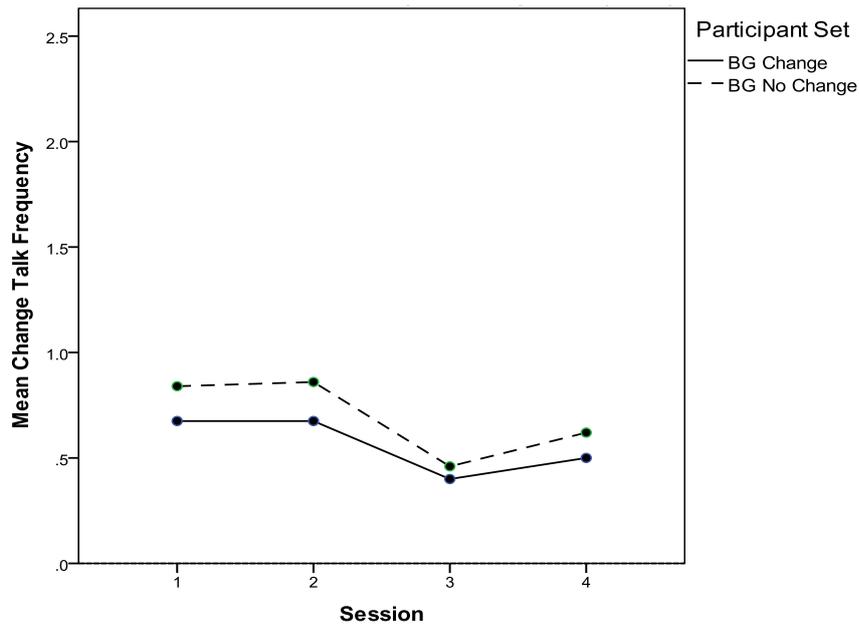
Figure 31. Average Need Change Talk frequency across sessions.

The BG No Change participants' mean Need Change Talk frequency (Figure 32) increased across the first six deciles of sessions, and then decreased toward the end of sessions, so that their mean was similar at decile one (mean = 0.4, *SD* = 0.592) and decile ten (mean = 0.45, *SD* = 0.592). However, the BG Change participants' mean frequency of Need Change Talk increased across the deciles and at session ten (mean = 0.563, *SD* = 0.592) was above its mean at decile one (mean = 0.25, *SD* = 0.592), with a notable effect size (*d* = -1.05). This increasing pattern of frequency was consistent with the hypotheses for the BG Change participants.
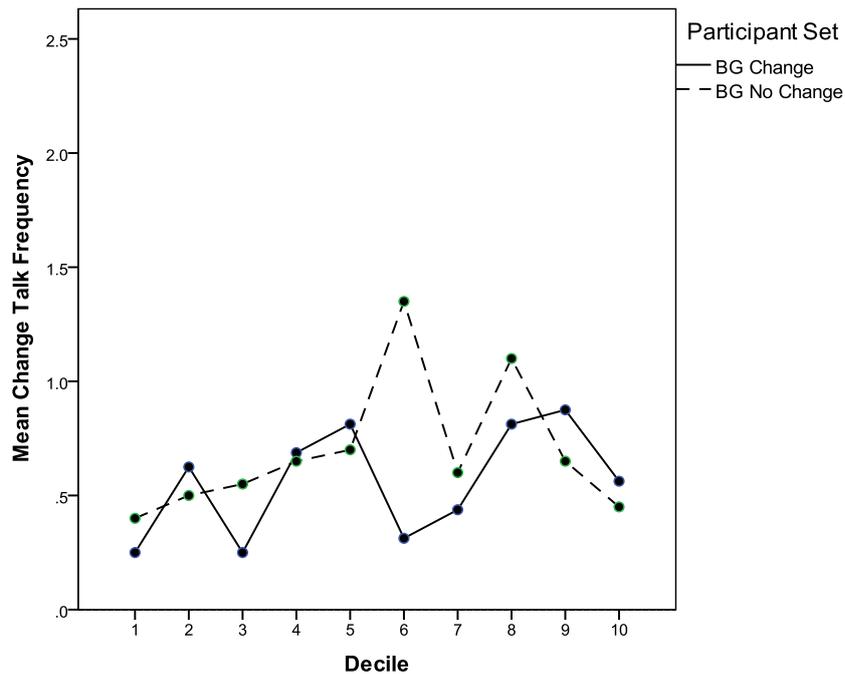
Figure 32. Average Need Change Talk frequency across deciles.

3.3.7. Pattern of Commitment Change Talk Frequency and Outcome

The BG Change participants' mean frequency of Commitment Change Talk continued to increase over the intervention, and was consistently above that of the BG No Change participants' mean frequency (Figure 33). Although there was not a notable increase at session two, the pattern of increasing Commitment Change Talk across the intervention is in line with hypotheses.

The BG No Change participants mean Commitment Change Talk frequency increased at session two, but then decreased over sessions three and four to a point which was similar at the end of the intervention as it had been at the start. The decrease across the second half of the intervention yielded a sizable effect size ($d = 1.04$), and was in line with predictions. However the increase in frequency at session two suggests these participants spoke about

their commitment to change with increased prevalence at the second session, which is not consistent with the hypotheses.
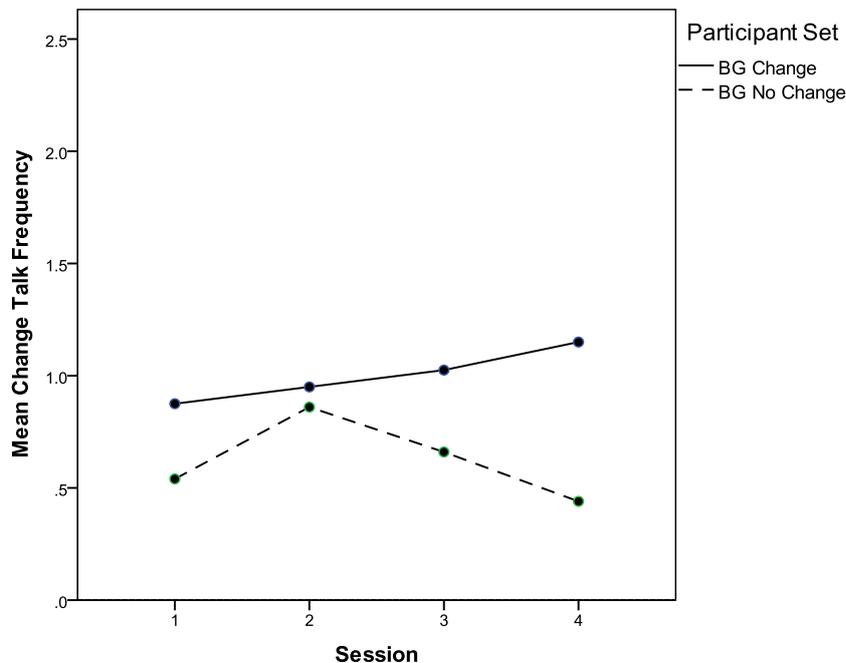
Figure 33. Average Commitment Change Talk frequency across sessions.

In general, both participant sets had a trend of increasing frequency of Commitment Talk across deciles, with the BG Change participants uttering more Commitment Change Talk than the BG No Change participants at most deciles (Figure 34). Across the deciles the BG Change participants uttered an increasing number of statements related to an agreement, intention or obligation to change across deciles, particularly toward the end of sessions, consistent with the hypotheses.

Findings relating to the BG No Change participants however did not match what had been hypothesised, as their Commitment language also increased within sessions, and toward the end of sessions.
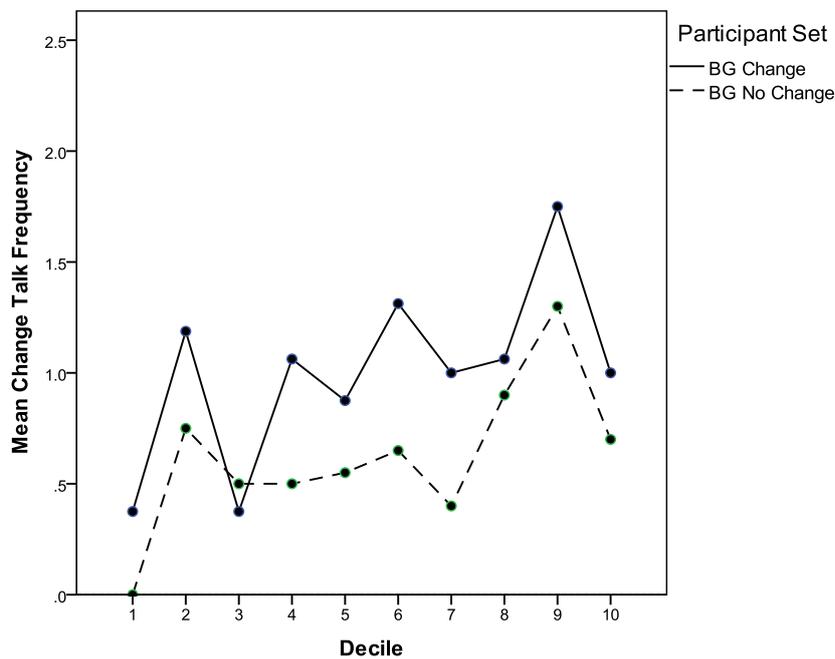
Figure 34. Average Commitment Change Talk frequency across deciles.

3.3.8. Pattern of Taking Steps Change Talk Frequency and Outcome

The pattern of Taking Steps frequency across sessions for the BG Change participants followed its hypothesised path (Figure 35). These participants spoke about having taken specific behavioural steps toward change with increasing frequency across the intervention, and this was particularly evident at the second and final sessions, with a substantial effect size ($d = -2.67$).

The BG No Change participants followed a similar pattern across the first three sessions, but remained at a lower frequency at the final session. The notable increase at session two, however, did not fit with hypotheses.
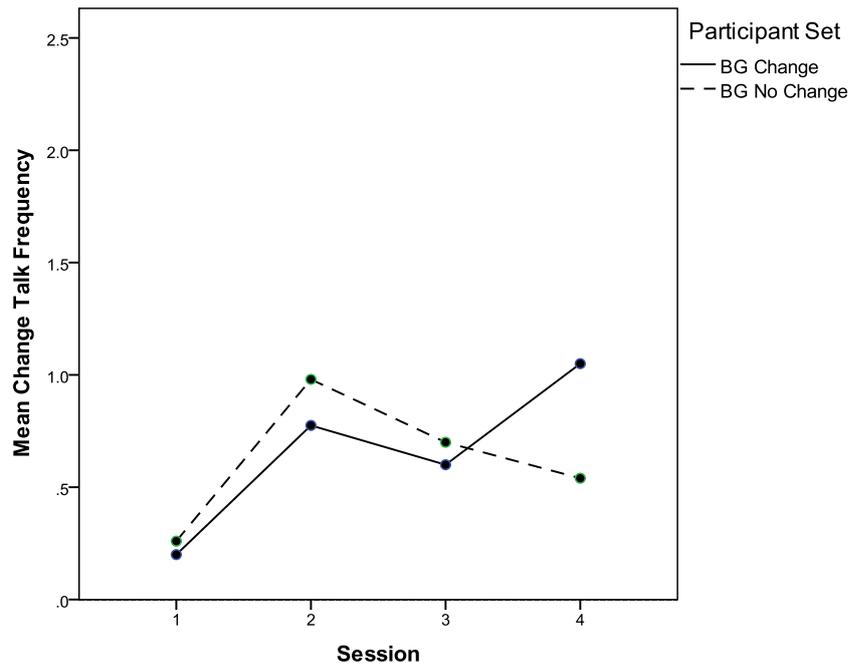
Figure 35. Average Taking Steps Change Talk frequency across sessions.

Both participant sets' mean frequency of Taking Steps Change Talk (Figure 36) decreased significantly across the ten deciles within sessions. Differences between Taking Steps Change Talk frequencies at the beginning and the end of the sessions were considerable for both the BG Change participants ($d = 4.11$), and the BG No Change participants ($d = 3.69$). These patterns suggest that, in general, participants talked about the specific behavioural steps they had recently taken with more frequency at the beginnings of the sessions, than across the later part of the sessions. This decreasing pattern is not what had been hypothesised for the BG Change participant set, however is in line with hypotheses for the BG No Change participants.
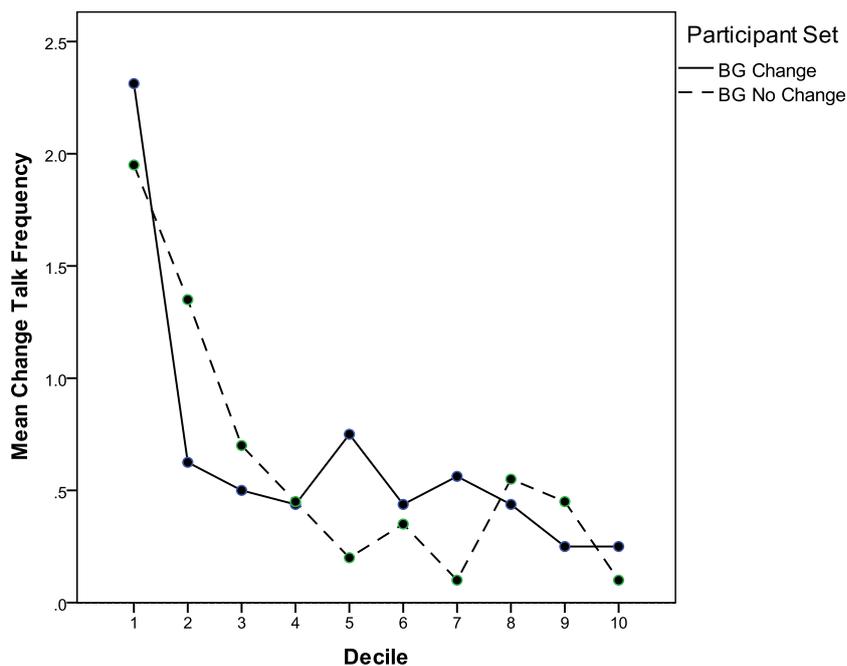
Figure 36. Average Taking Steps Change Talk frequency across deciles.

Pattern of Sustain Talk Frequency

As noted at the beginning of this section, findings relating to Desire, Need, Commitment, and Taking Steps Sustain Talk Language Categories are not included further due to the lack of frequency with which they were uttered. Such a lack of data in these Language Categories may have led to biased conclusions, and thus only Ability and Reasons were included in the following section on pattern of Sustain Talk frequency.

3.3.10. Pattern of Ability Sustain Talk Frequency and Outcome

Apart from session two where the BG Change participants' made more utterances about their perceived inability to change their diabetes self-management, the mean frequency ratings for both participant sets were relatively flat across the intervention (Figure 37). Due to the BG Change participants' increase in statements that suggested their inability to change in

session two, a change that yielded a moderate effect size ($d = -0.66$), the pattern of frequency was not in accordance with the hypothesised decrease across the intervention. Similarly, the BG No Change participants' pattern of frequency was not in line with hypotheses as the mean did not increase over the course of the intervention.
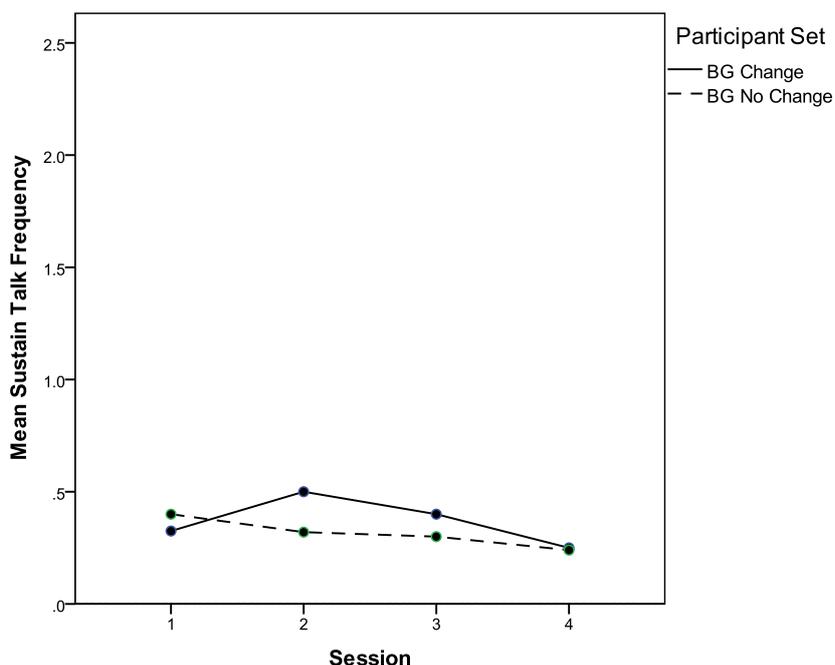
Figure 37. Average Ability Sustain Talk frequency across sessions.

Within sessions, the BG Change participants' Ability Sustain Talk frequency was variable, although they uttered a similar proportion of these statements at the beginning and end of sessions (Figure 38). This pattern does not indicate a decrease in the use of statements of incapability or lack of possibility to change their diabetes self-management across deciles within sessions as was hypothesised for this participant set.

The BG No Change participants' Ability Sustain Talk showed a pattern of increasing strength from the first to the ninth decile, indicating, as predicted, an increase in statements

around their perceived inability to change during the course of the session. However, this

increasing pattern did not continue to the end of the session, as the BG No Change

participants did not utter any Ability Sustain Talk statements in the last few minutes of the

sessions (tenth decile), with a substantial effect size illustrating this drop in frequency ($d = -$

1.56). Due to the drop in the last decile, the hypotheses regarding Ability Sustain Talk were

not met.
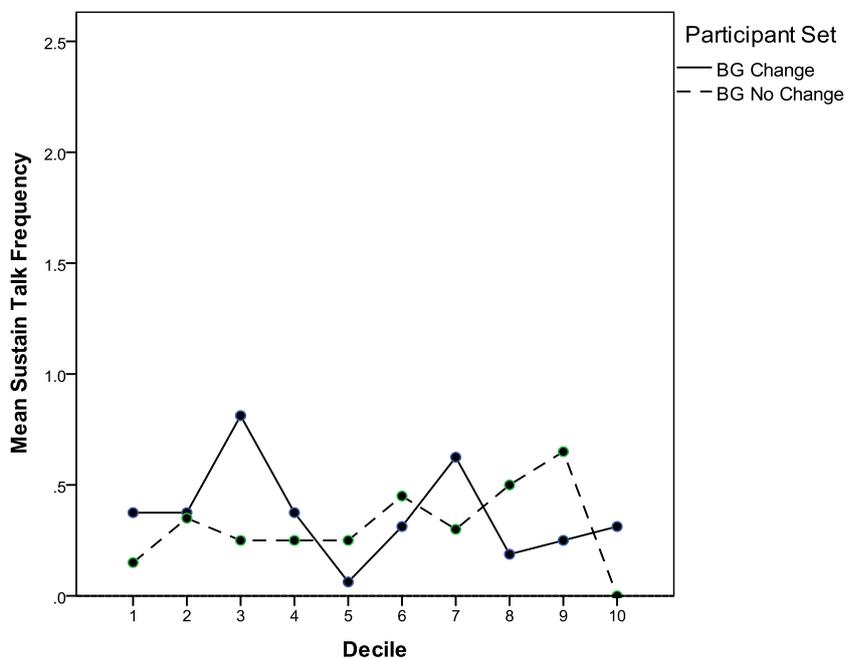
Figure 38. Average Ability Sustain Talk frequency across deciles.

3.3.11. Pattern of Reasons Sustain Talk Frequency and Outcome

The pattern of Reason Sustain Talk frequency showed a similar pattern for both

outcome participant sets with an utterance of approximately six statements in the first session,

which rose to around ten statements in the second session, and then decreased in the third

session (Figure 39). The BG Change participants mean frequency of Reason Sustain Talk

increased at session two, however, at the beginning and the end of the intervention their mean rating was very similar (session one = 0.625, session four = 0.6). This suggests they were uttering an increasing amount of statements about reasons to stay as they were in the second session, but decreasing the number of these statements over the second half of the intervention. These participants did not show an increasing trend across the four sessions and as such was consistent with what was hypothesised.

Across the intervention there was a general increasing trend in the BG No Change participants' mean Reasons Sustain Talk frequency, which produced a moderate effect size (d = 0.769). This was in accordance with the hypotheses and suggested that there was an increasing trend for the BG No Change participants to utter reasons not to change across the intervention.
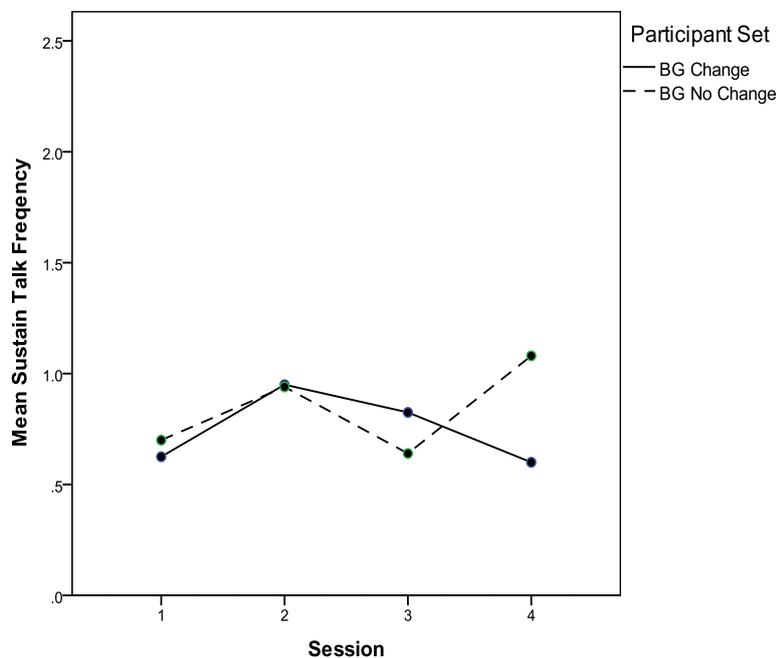
Figure 39. Average Reasons Sustain Talk frequency across sessions.

Across deciles, there was generally a decreasing trend in frequency for both participant sets (Figure 40), with the BG Change participants uttering little or no Reasons Sustain Talk statements toward the end of the sessions. Moderate effect sizes were yielded for the change across deciles for both the BG Change participants ($d = 0.72$), and the BG No Change participants ($d = 0.71$). This pattern suggests that while these participants expressed a moderate number of statements indicating a rationale or justification for not making a change at the beginning of sessions, they expressed very few of these statements at the end of sessions. This decreasing pattern of Sustain statements is consistent with the hypotheses. The BG No Change participants followed a similar pattern regarding their Reasons Sustain Talk frequency, suggesting they also were expressing a reduction in these statements within sessions, which was not consistent with predictions.
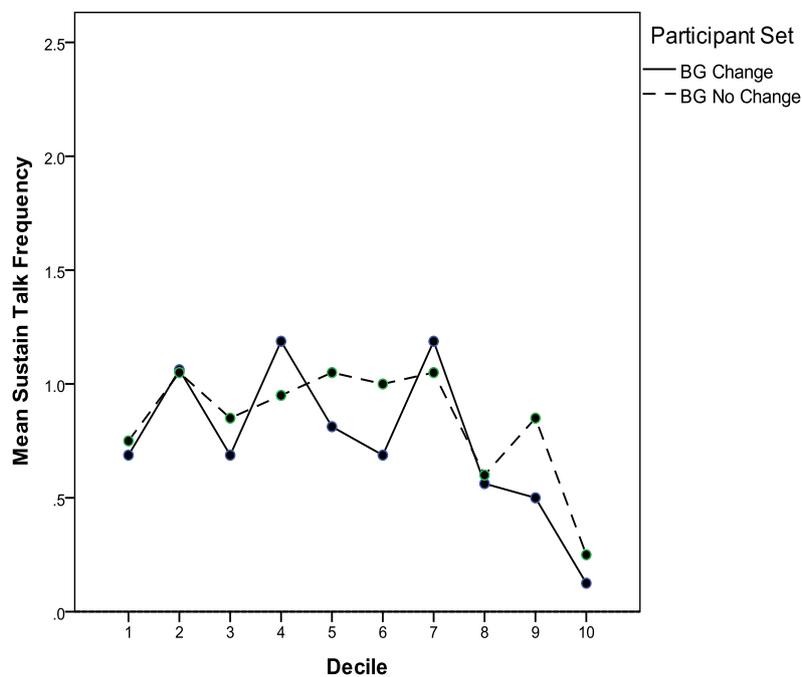
Figure 40. Average Reasons Sustain Talk frequency across deciles.

3.4. Summary of key findings related to patterns of strength and frequency

Table 7 is a summary of findings relating to the patterns within and across sessions, and demonstrates which participant sets met criteria for hypotheses for each Language Category. As mentioned earlier, patterns of strength of each Language Category are measures of the combination of both Change and Sustain Talk strength. It is evident that Reasons strength met all predictions that form hypothesis three (H3), and although some sections of the hypothesis were met for Desire, Ability, and Taking Steps strength, none of the requirements for hypothesis three were met for Need, and Commitment strength. Hypothesis four constitutes predictions regarding within session patterns, and findings suggest that while Need and Taking Steps strength were consistent with both parts of the hypothesis, and Ability with part of the hypothesis, Desire, Reasons, and Commitment strength were not.

Although the Change Talk strength findings did not accord with hypotheses, the Sustain Talk strength findings did, suggesting a decreasing pattern of statements against change uttered by the BG Change participants across and within sessions. Total strength, which combines both Change and Sustain statements, showed an increasing pattern across sessions, within sessions, and at sessions two and four for the BG Change participants. A similar pattern was found for the BG No Change participants however, indicating consistency with hypotheses for the BG Change, but not the BG No Change participant set.

Table 7.

Summary of Hypotheses relating to Patterns Across and Within Sessions

Strength		

	BG Change displayed an increasing pattern across sessions (H3)	BG No Change did not display an increasing pattern across sessions (H3)	BG Change increased at session two and session four (H3)	BG Change displayed an increasing pattern within sessions (H4)	BG No Change did not display an increasing pattern within sessions (H4)
Desire	√	√	-	-	-
Ability	√	-	-	√	-
Reasons	√	√	√	-	-
Need	-	-	-	√	√
Commitment	-	-	-	-	-
Taking Steps	-	√	-	√	√
Change Talk strength	-	-	-	-	√
Total strength	√	-	√	√	-
	BG Change displayed a decreasing pattern across sessions (H3)	BG No Change did not display a decreasing pattern across sessions (H3)		BG Change displayed a decreasing pattern within sessions (H4)	BG No Change did not display a decreasing pattern within sessions (H4)
Sustain Talk strength	√	√	N/A	√	-

Note: H3-4 refers to Hypotheses 3 and 4, respectively. '√' refers to participants having met the hypothesised criterion for the particular Language Category, and '-' refers to a participant set having not met the hypothesised criterion for a particular Language Category.

Variable findings were obtained with regards to the hypotheses relating to the frequency of Language Category utterances (Table 8.). Ability, Commitment, Taking Steps, and Total Change Talk frequency were found to be consistent with both aspects of hypothesis

five, whereas Desire, Reasons, and Need Change Talk frequency were consistent with one part of hypothesis five. In addition, only Ability was consistent with hypothesis six which indicates an increasing pattern of Change Talk frequency within sessions, while Need, Commitment, and Taking Steps Change Talk frequency were consistent with part of the predictions. As indicated, Desire, Reasons, and Total Change Talk frequency were not consistent with either of the predictions that made up hypothesis six, suggesting that the BG Change participant set did not show an increasing pattern of Change Talk frequency within sessions, and that the BG No Change participants may have shown an increasing frequency within sessions.

The Ability Sustain Talk frequency findings were not consistent with what had been predicted by both hypothesis five and six for the BG No Change participants, suggesting the prevalence of their utterances of capability across and within sessions did not increase (Table 8). Reasons Sustain Talk frequency was consistent with hypothesis five, but only the findings for BG Change participants were consistent with hypothesis six on this measure. Taken together, the pattern of Total Sustain Talk frequency was consistent with predictions made for the BG No Change, but not for the BG Change participant set in hypothesis five. This suggests an increasing frequency of Sustain Talk across sessions for both the BG Change and BG No Change participant sets across the intervention. Conversely, this finding was reversed for hypothesis six where the pattern of Total Sustain Talk frequency met predictions for the BG Change, but not the BG No Change participants. This suggests that both the BG Change and the BG No Change participant sets did not display an increasing pattern of Sustain Talk frequency within sessions.

Table 8.

Summary of Hypotheses relating to Patterns Across and Within Sessions

Frequency of Change Talk

	BG Change displayed an increasing pattern across sessions (H5)	BG No Change did not display an increasing pattern across sessions (H5)	BG Change displayed an increasing pattern within sessions (H6)	BG No Change did not display an increasing pattern within sessions (H6)
Desire	-	√	-	-
Ability	√	√	√	√
Reasons	-	√	-	-
Need	-	√	√	-
Commitment	√	√	√	-
Taking Steps	√	√	-	√
Overall	√	√	-	-

Frequency of Sustain Talk

	BG No Change displayed an increasing pattern across sessions (H5)	BG Change did not display an increasing pattern across sessions (H5)	BG No Change displayed an increasing pattern within sessions (H6)	BG Change did not display an increasing pattern within sessions (H6)
Ability	-	√	-	√
Reasons	√	√	-	√
Overall	√	-	-	√

Note: H5-6 refers to Hypotheses 5 and 6 respectively. '√' refers to participants having met the hypothesised criterion for the particular Language Category, and '-' refers to a participant set having not met the hypothesised criterion for a particular Language Category.

4.0. DISCUSSION

The purpose of the present study was to explore the link between client language in MI and outcome in the field of health behaviour change. Of the nine diabetes patients who had received MET in the original Britt (2008) study, the current thesis explored differences in language that related to whether these participants did or did not achieve a clinically significant change in their blood glucose level post intervention. In order to understand if or how language differed between the two outcome groups, and because of the uncertainty around which language measures would differentiate sets in this area, numerous measures were investigated. The measures included strength of Change Talk, Sustain Talk, Total strength language, and the strength of the six Language Categories on both overall mean difference, and the difference in pattern across decile and session. In addition, frequency of Change Talk, Sustain Talk, Total frequency, and frequency of each of the six Language Categories were analysed.

4.1. Reliability

Reliability results obtained in the current study were in line with other studies using the MISC 2.0 (e.g. Campbell, 2007, Magill et al., 2010, Guame et al., 2007). Guame et al. found their reliability to be generally 'Good', and ranged from 'Fair' to 'Excellent' on measures of client Change Talk strength in a study on alcohol related findings. Similarly, Campbell's Client Behaviour counts ranged from fair to excellent with her summary frequency and strength reliability ratings. More recently, Magill and colleagues attained ICC ratings from the "good" to "excellent" range, however this data includes both therapist and client language variables.

4.2. Strength

4.2.1. Mean strength

Overall, there was a trend for the BG Change participants to utter Change Talk on average with more strength than the BG No Change participants. Although not statistically - significant, the large effect size suggests that these findings compare favourably with other substance related studies that have found Change Talk related to more positive outcomes (e.g. Moyers et al., 2007).

The BG Change participants also uttered on average a slightly greater Total strength than the BG No Change participants. The direction of these results was consistent with what was hypothesised, and with Campbell's (2007) drinking related outcomes. In her study, controlled drinkers had higher mean Total "All Change & Sustain Talk" (p. 66) strength than uncontrolled drinkers, and this effect approached significance.

The direction of findings regarding overall Sustain Talk strength however were not in line with predictions as BG Change participants uttered Sustain Talk with fractionally more strength on average than the BG No Change participants. These findings were also not in line with Campbell's (2007) study in which controlled drinkers engaged in statistically significantly lower frequency of Sustain Talk than uncontrolled drinkers. Findings relating to the *pattern* of Sustain Talk strength, although not statistically significant, appeared to be more indicative of change in that they were more in line with predictions.

The hypothesis regarding the mean combination strength for each of the six Language Categories being greater in the BG Change participants than the No Change participants was found to be the case for Desire, Need and Taking Steps language, with Desire being

statistically significantly greater. This statistically significant finding regarding Desire language suggests that the BG Change participants were uttering statistically significantly stronger language indicating wanting or wishing to change and/or weaker statements against a desire to change.

The result that Desire language was the only Language Category that was found to differ statistically significantly between participant sets in the hypothesised direction was surprising, as Desire strength has not been found to be a significant predictor of outcome in previous research (Amrhein et al., 2003, Campbell, 2007, Baer et al., 2008). In addition, in order to increase reliability, along with Ability and Need language, Desire language has been included in a recent version of the Motivational Interviewing Skills Code (MISC 2.1, Miller, Moyer, Ernst, & Amrhein, 2008) as a sub code to Reasons language, rather than being assigned its own unique Language Category. Along similar lines, Campbell (2007) collapsed Reasons, Desire, and Need into the Reasons Language Category in her modified version of the MISC 2.0, but left Ability language as a standalone category due to its strong relationship with self-efficacy and importance in her research. To date, Desire strength has not been a successful candidate for uniquely predicting outcome, however the findings in this pilot study suggest it could be a target for future research regarding behaviour change in the health arena.

Reasons language had effects across the two sets of participants that were very similar, a finding that did not match hypothesised predictions. Campbell (2007) found a difference that approached statistical significance between the favourable outcome group and the less favourable outcome group in Reasons strength, however her measurement of Reasons strength resulted in a construct that was a poor comparison for the current study.

The mean Commitment strength was only slightly higher in the BG Change participants. Although this minor difference was not what had been hypothesised, it was in

accordance with Campbell's (2007) findings which also did not find a significant effect of outcome for Commitment strength.

Surprisingly, Ability strength had a statistically significantly higher mean in the BG No Change participants than the Change participants. This finding was in contrast to the findings of Campbell, who found that Ability strength was statistically significantly higher in participants with a more favourable outcome than the less favourable outcome. It may be that in the area of health behaviour change, and diabetes self-management, that a perceived ability to change is less important than other factors, such as Need or Desire to change.

4.2.2. Pattern of strength across sessions

When looking at the pattern of strength across sessions for each Language Category, the third hypothesis predicted an increasing pattern of strength for the BG Change participants, particularly at the second and final sessions. The third hypothesis also predicted that this pattern would not be evident for the BG No Change participants. The hypothesised pattern of increasing strength for the BG Change, and not the BG No Change participants was found for Desire and Reasons language. In addition, the BG Change participants uttered Ability language with increasing strength across the intervention, however this pattern was also found for the BG No Change participants. This suggests a general increasing strength for both sets of MET participants. Furthermore, Reasons was the only category that was spoken by the BG Change participants with a pattern of increased strength at the second and final sessions, and as such met all criteria for hypothesis three. In contrast, the BG Change participants did not display an increasing pattern of Need, Commitment, and Taking Steps strength across sessions, or an increase in such language at sessions two and four.

The BG No Change participants' pattern was especially clear when looking at Desire strength. While the BG Change participants appeared to utter slightly stronger desire for

change across the intervention, the BG No Change participants uttered statistically significantly less desire for change or an increased desire against the TBC at the final session of the intervention. Thus, at the end of the intervention the No Change participants were uttering more statements indicating not wanting, wishing or willing to change, or expressing the desire to continue with the status quo.

The MISC 2.0 specifies that Reasons language typically indicates a justification, incentive, motive, or rationale for making or not making the TBC. It is possible that the increase in Reasons strength across the intervention for the BG Change participants was a reflection of the behavioural changes that these participants had started making. Their Reasons language may have been an indication and rationale of why they had started making these changes, and as the behaviour increased, the Reasons strength increased simultaneously. Similarly, the BG No Change participants could have uttered less strong Reasons near the end of the intervention to justify a lack of changes made toward the TBC. This is in line with the finding that the BG Change participants' Taking Steps strength, which indicates having taken specific behavioural steps toward change (in the 1-2 weeks), increased in the final session relative to the BG No Change participants.

Findings regarding Ability strength were also worth noting. The BG Change participants' mean Ability language strength increased at the final session while the BG No Change participants' mean decreased, however, both sets of participants could be said to show an increasing pattern across the intervention, and as such are not entirely consistent with hypotheses. This suggests that the participants who achieved a more favourable outcome uttered statements relating to their perceived ability to change with less strength or more caution than those who had a less favourable outcome, particularly in the first three sessions. In the final session, however, the BG Change participants were indicating more strength in

their capability or possibility to change, while the BG No Change participants indicated a decreased strength regarding their capability to change. Self-efficacy, referred to as the perceived ability or capability for individuals to do what they set out to do (Bandura, 1998), is thought to be an important concept and guiding principle in MI (Miller & Rollnick, 2002). Miller and Rollnick acknowledge that clients need to have a belief in their ability to change, and that self-efficacy is thought to be a key element of motivation for change. Supporting and building clients' self-efficacy is therefore central to the MI process. It appears that in the current study, this concept was operating for all participants. Although the strength with which participants perceived they had the capability to change was generally greater for the BG No Change participants, the pattern that differentiated participant sets was the increase (BG Change) or decrease (BG No Change) at the final session if the intervention. It appears that MET may have had a positive influence on the BG Change participants' self-efficacy. In addition, the pattern and timing of building self-efficacy across the intervention may also have had an influence on behaviour change. It is possible that an increase in self-efficacy at the end of an intervention is the most important time for this to occur. As an individual is having to confront the challenge of behaviour change or maintenance without the immediate support of a practitioner, a newly strengthened perception of their ability or capability to accomplish something, may aid in self- motivated behaviour change.

Findings regarding Commitment strength and its relationship to the participant sets were not what had been hypothesised. It was predicted that the participants with more favourable outcome mean Commitment strength would increase to a higher point than the less favourable outcome's mean at the final session, in line with data from other studies (Campbell, 2007). However, both participant sets had the same mean Commitment strength at the first and final sessions, suggesting that near the end of the intervention, the participants

were all uttering on average the same strength of intention or obligation toward (or against) change. The inability to differentiate between participant sets on this measure may have been due to the fact that this sample was not taken from a substance use population on which the aforementioned studies are based, and thus may reveal different findings. Alternatively, the BG Change participants' pattern of increasing strength of Commitment language in the first half of the intervention, followed by a plateau towards the end may indicate this language led to greater actual change at the second half of the intervention, and therefore resulted in less need for Commitment by the final session. Caution however must be taken in any interpretation of these findings due to the small sample size and preliminary nature of these findings.

The findings related to Need strength were the reverse of what had been hypothesised, with the BG Change participants' mean strength decreasing while the BG No Change participants' mean increasing in the final session. It may be that Need was not being expressed as strongly by the BG change participants by the end of the intervention because they had already started making changes (as suggested by the strength of their Taking Steps utterances). The BG No Change participants' sense of urgency or need to change however may have increased due to the knowledge that they were coming to the end of the intervention and had not made substantial changes in their diabetes self-management.

Taken together it appears that Desire and Ability language Language Categories may be likely candidates for further study. Overall, the BG Change participants uttered less mean strength of Ability language, so it appears in the current study that it was more important to have increased Ability strength at the end of the intervention when behavioural changes may have started to occur. It may be that voicing perceived self efficacy is more indicative of positive outcomes when it is uttered toward the end of an intervention, as was found in

Campbell's research. Further research into the pattern of Ability language and health behaviour is recommended.

4.2.3. Pattern of strength within sessions

There was a large amount of variability in both BG Change and BG No Change participants within sessions. Only Need and Taking Steps strength displayed an increasing pattern across deciles in the BG Change participants, and not in the BG No Change participants. The BG Change participants' mean Desire, Reasons, and Commitment strength did not show an increasing pattern within sessions, and as such not in line with what had been hypothesised.

Although an increasing trend in Reasons strength across the ten deciles did not occur in the BG Change participants, both participant sets' Reasons strength appeared to increase toward the end of sessions. This suggests that MI may generally increase awareness of reasons for change within sessions. If this is the case, it would be consistent with MI, which promotes raising awareness of a client's situation, and highlighting the perceived gap between the positive or less positive results of taking certain actions and engaging in certain behaviour (Miller & Rollnick, 2002). This awareness in turn can result in heightened perceived vulnerability for the individual, which, in the context of the supportive environment provided by a MI framework, could possibly lead to increased motivation for change.

The BG Change participants uttered Ability language with a slightly increasing general trend within sessions, as was the case for the BG No Change participants' Ability language. The BG No Change participants' strength however was at an overall higher level. It may be that the BG No Change participants' stronger Ability strength indicates that they

were over-optimistic about their perceived ability to change, whereas the BG Change participants may have been more realistic about their capacity to change. Importantly, in the current study, it seems that the trend of an increasing pattern of Ability strength across sessions, rather than within sessions, appears to be associated with a positive outcome. This finding also appears to also hold true for the Desire and Reasons categories.

4.2.4. Patten of summary strength measures

The pattern of overall Change Talk, Sustain Talk and Total (Change and Sustain Talk) strength both at the end of sessions, and toward the end of the intervention at the last session was predicted to differentiate participant sets. Although speaking with a higher level of Change Talk strength in the first three sessions than the BG No Change participants, the BG Change participants did not utter increasingly stronger Change Talk across or within sessions. Conversely, the pattern of Sustain Talk strength across the intervention produced findings that were initially predicted. The BG Change participants uttered stronger statements against change in the first two sessions of the intervention than the BG No Change participants, however this pattern reversed, and in the second half of the intervention, the BG Change participants' language against change decreased more than the BG No Change participants as hypothesised. The pattern of uttering stronger language against TBC at the beginning of the intervention and then changing to speaking with less strong Sustain Talk in the second half of intervention appears to be a more notable finding within the participants who successfully reduced their blood glucose levels than findings regarding the pattern of Change Talk strength. Total strength findings were also consistent with hypotheses regarding the BG Change participants who uttered a pattern of increasingly strong Total strength across the intervention, and towards the end of sessions. The BG No Change participants also displayed similar patterns of increasing strength, suggesting that all participants had a similar pattern of

increasing strength, and that the pattern of Total strength did not differentiate the two participant sets.

Taken together these findings indicate that differing trends in data can only be found when Change Talk and Sustain Talk strength are examined separately. The BG Change participants uttered both Change Talk and Sustain Talk with more strength in the first half of the intervention, which may demonstrate participants were voicing their ambivalence for change. Then, toward the end of the intervention, while their *Change* Talk was not greater than the BG No Change participants, the strength with which they uttered *Sustain* Talk decreased comparatively more, suggesting that BG Change participants' ambivalence about change may have somewhat resolved in the direction of change. It appears that what may differentiate the participant sets with regard to pattern of strength is this change across the intervention to a reduction in language against the TBC toward the end of the intervention. This difference however was only found when analysing the data across sessions, and not found across deciles.

Although not found to be statistically significant, mean Total Change Talk strength was generally higher in the BG Change than the BG No Change participants, which suggests that participants who had more favourable outcomes spoke with a somewhat greater level of strength in the direction towards change. It is possible that further study in the area of mean Change Talk strength, and pattern of Sustain Talk strength may add to the current findings and highlight the importance of if and when to eliciting levels of Change and Sustain Talk strength when health behaviour change is desired.

4.3. Frequency

4.3.1. Mean frequency

The BG Change participants were hypothesised to have had a higher mean frequency of Change Talk than the BG No Change participants for each of the six Language Categories. Other studies such as Campbell (2007) did not investigate the frequency data of separate Language Categories, and in general, due to the lack of findings related to client language frequency when compared to client language strength, the interpretations from these findings are preliminary and need to be interpreted with caution. It appears that the Desire Language Category was generally in line with what had been hypothesised across all of the measures, suggesting that the BG Change participants spoke about their wanting, wishing or willingness to change with more strength, particularly at the end of the intervention, and with more frequency than the BG No Change participants. Also in line with hypotheses was the finding that mean Commitment language was statistically significantly more likely to be uttered by the BG Change participants than the BG No Change participants. This was the only Language Category that achieved statistical significance within the frequency measures, and although consistent with hypotheses, this finding was differs from the findings of Amrhein and colleagues (2003), who found that the pattern of strength rather than the frequency of Commitment language separated the outcome groups. In the current study however, those who had more favourable outcomes uttered more statements of intention, agreement, or obligation to change than those with a less favourable outcome, suggesting perhaps the *frequency* of Commitment language could be an area of further study in the field health behaviour change, and diabetes specifically. It is possible that, in addition to the well documented findings regarding strength of Commitment, frequency of Commitment language may be a factor to be taken into consideration with MI for health behaviour change.

The frequency of Taking Steps language was only slightly more elevated in the BG Change participants than in the BG No Change participants, and the Ability frequency was

almost the same. This suggests similar profiles on these measures for both participant sets. In contrast to what had been hypothesised, the BG No Change participants uttered Reasons and Need statements more frequently than the BG Change participants.

The hypothesis regarding the frequency of Sustain Talk predicted that Sustain Talk would be elevated in the BG No Change participants and not elevated in the BG Change participants, however this was not the case for the majority of the measures. Furthermore, Sustain Talk frequency was generally low for all participants without any clear or significant findings that could differentiate between participant sets. Reasons and Taking Steps Sustain Talk frequency were slightly higher for the BG No Change participants, which was consistent with hypotheses. For the remainder of the frequency Sustain Talk measures, however, participants with more favourable outcomes uttered more Sustain Talk than those with less favourable outcomes.

Summary measures

The Overall Sustain Talk frequency was higher in those who had more favourable outcomes than those who had less favourable outcomes. This finding reflected the non-statistically significant results and trends which were not in line with the hypotheses for each Language Category regarding Sustain Talk frequency. Such data was also inconsistent with Campbell's findings, which obtained significant main effects for Sustain Talk frequency and outcome.

Overall Change Talk utterances were also slightly more common in those with a more favourable outcome than a less favourable outcome, which was in the hypothesised direction. This suggests that the BG Change participants uttered on average more Change *and* more Sustain Talk than their fellow participants. It is postulated that increasing ambivalence for

change is one of the key components to elicit from clients (Moyers et al., 2007). It is possible that the increase in frequency of both Change *and* Sustain Talk in the BG Change participants, may reflect a heightened process of ambivalence toward change that these participants engaged in within the MET intervention. These findings were not however statistically significant, and conclusions cannot be drawn.

Taken together, it appears that the pattern of strength across the intervention and within sessions appeared to have effects regarding participant set. It seemed that across the intervention, a notable finding was the different trends in patterns of strength that the BG Change and No Change participants displayed. The main difference in trends between these sets appeared to be that the BG No Change participants appeared to comparatively reduce their strength of Desire, Ability, and Reasons statements in the last session. The BG Change participants' strength either retained or reduced its mean strength in these particular Language Categories. In the current sample, these findings suggest that, retaining strength in participants' wishes or wanting to change, their reasons to change, and their ability to change were important. These findings add to similar findings regarding Change Talk strength toward the end of MI interventions, and emphasises that with continued investigation, an attempt to retain an individuals' level of Change Talk strength in the final session of a four session MET intervention, may be a factor to promote in MI training.

4.3.2. Change Talk across sessions

Hypothesis five proposed that the BG Change participants would display an increasing pattern of frequency of Change Talk across the four sessions, and that the BG No Change participants would not display this pattern. The Ability, Commitment, and Taking Steps Language Categories were consistent with these patterns, whereas the BG Change participant's utterances of Desire, Reasons, and Need language were not. The Overall pattern

of Change Talk however met both parts of the hypothesis, suggesting that in general, Change Talk frequency increased across the MET intervention for the BG Change, and not for the BG No Change participants.

4.3.3. Change Talk within sessions

Similar to the findings related to strength, hypotheses around the increasing utterance frequency within sessions were not often met. As demonstrated previously, data charts displayed a variable pattern of results that need to be interpreted with caution. Ability was the sole category which met the full criteria for hypothesis six, suggesting an increasing pattern of utterances related to the BG Change participants' perception of their capability of change. Need and Commitment Language Categories also increased in frequency across the deciles within sessions for the BG Change participants, however a similar pattern was found for the BG No Change participants, implying statements of intention and necessity were uttered with increasing frequency by both participant sets as sessions progressed.

Although the BG Change participants' Desire and Reasons, and Taking Steps Change Talk frequency did not increase over the ten within session, their Desire and Reasons Change Talk occurred with increasing frequency until the ninth decile. Additionally, Total Change Talk data suggests that both the BG Change and BG No Change participants' Change Talk increased within sessions until the eighth or ninth decile, before decreasing again at the final decile. This within session pattern appears to be a distinctive feature of Change Talk frequency, but not strength in the current data.

Amrhein and colleagues (2003) found a similar pattern for strength, rather than frequency data, suggesting that in the final decile, participants continued to utter Change Talk, albeit with reduced conviction, while in the current study, statements that were made

were not necessarily reduced in strength, but they were uttered less frequently. This difference may have been due to the different manual-based protocols in each study. Practitioners in Amrhein et al. (2003) introduced different modal topics at each decile. The topic 'What may constitute a plan for client change' was to be introduced in the ninth decile, while discussing how the client would know if the plan was working or what would interfere with the plan in the final decile. Because different topics were introduced at each decile, it may be that participants would utter a similar amount of Change Talk at each decile, but that their level of conviction and strength of these statements are dependent on whether the topic of conversation was about the constitution or the impediments to change. Alternatively, the protocol in the Britt (2008) study included a checklist for each session including ending sessions with a closing summary, and practitioners were instructed to move toward commitment to change as appropriate for the individual participant. In practice, this format may have promoted less frequent Change Talk utterances, although if they were made, such utterances were not necessarily reduced in strength. Thus, it is possible that for health behaviour change, and diabetes self-management in particular, it is important for positive outcome for patients to speak Change Talk with increasing strength, rather than with increased frequency, whereas the reverse may be important for positive outcome for substance abuse. It is recommended that future research explores this further and with other areas of health behaviour change.

When assessing the hypotheses regarding increasing levels of frequency across the deciles, the Language Categories which displayed this general increasing trend until decile nine, and then notably decreasing at the final decile were Desire and Reasons. This implies that all Language Categories apart from Taking Steps language, displayed an increasing trend of within session frequency until the ninth decile. A review of the intervening weeks typically

occurring at the beginning of the sessions. Due to this session structure, if the BG Change participants had been engaging in change behaviour in the preceding weeks, they may have been more likely to utter Taking Steps statements nearer the beginning rather than nearer the end of sessions when discussion has more of a future orientation.

Although these findings must be interpreted with caution because of the small sample size, it could be surmised then that in general, Change Talk frequency appeared to increase within sessions for the BG Change participants from the first until the ninth decile.

4.3.4. Sustain Talk across sessions

Of the two Language Categories that were included in further Sustain Talk frequency analysis, Reasons, but not Ability findings were consistent with the fifth hypothesis. The BG No Change participants voiced their rationale or justification against making a change or staying the same with increasing frequency across the intervention, while this was not the case for their Ability Sustain Talk.

Notably, although the BG Change participants' Reasons and Ability Sustain Talk patterns did not increase across the intervention as was hypothesised, their language did in fact increase at session two, and then decreased for the remainder of sessions. In MI, the client is given the opportunity to express reasons for not changing and to weigh these up against reasons for change. Similarly, individuals are given the opportunity to express their perceptions of their current levels of inability or capability to change. There is a possibility that Talk frequency increases and then decreases across an intervention as ambivalence is resolved and this pattern is indicative of positive outcomes, as was the case here.

4.3.5. Sustain Talk within sessions

Within sessions, neither the BG Change nor the BG No Change participants displayed an increasing pattern of Ability or Reasons Sustain Talk frequency. This was consistent with hypotheses regarding the BG Change, but not the BG No Change participants. Across deciles, the BG No Change participants uttered a generally increasing frequency of Ability Sustain Talk until the ninth decile, however they uttered none of these statements at the final decile. Although the pattern of Total Sustain Talk frequency was inconsistent with the hypotheses, with all participants uttering Sustain Talk with less frequency during the course of a session. It accords with the theory of MI, and research, which proposes the minimising of Sustain Talk is associated with favourable outcomes (Campbell et al. 2010, Miller, Benefield and Tonigan, 1993, Moyers et al., 2007). It is possible that while all participants may have been receiving a high standard of MI, positive outcomes may not reliably be associated with a reduction in frequency of Sustain Talk within the course of a MET session.

In sum, unlike Amrhein and colleagues, the frequency of Change Talk also made an impact in the current study, particularly from deciles one to nine. frequency measures appeared to increase across the intervention for the participants with a positive outcome, and the frequency of Commitment Change Talk was greater for these participants than for the participants with a less positive outcome, suggesting that frequency may be an area of interest in future MI health behaviour research.

Overall, it appeared important for the current BG Change participants to leave each session having uttered an increasing amount of Change Talk up until ninth decile, and that their strength of Change Talk was maintained. As has been found in previous MI research, it seems that conversation around change that happens toward the end of sessions and toward

the end of the intervention as a whole is most indicative of trends toward change, and thus at these times are more important to elicit.

4.5. Limitations

The greatest limitation of this study was the small size of the sample (n=16 sessions for n = 4 participants in the BG Change participant set and n=20 sessions for n = 5 participants in the BG No Change participant set). This resulted in the study lacking power, which compromised implications made from the tests of statistical significance and heightened the probability of type 2 error (Cohen, 1992). In addition, the generalizability of the findings are also limited.

There were very few statistically significant results, which may have been due in part to the small sample size. Findings were thus reported as a discussion of trends and directions in the data, rather than emphasising the few statistically significant findings. There have been criticisms and challenges of the logic of null hypothesis testing of significance for decades (see Morrison & Henkel, 1970, *The Significance Test Controversy*), leading to psychologists findings ways to supplement tests of significance that question whether the data supports the research hypothesis, rather than rejecting the null hypothesis (Kirk, 1996). In order to judge the size of the effect which signifies "Practical significance", rather than just simply statistical significance, it has been suggested that researchers give the sizes of the effects as well as the p values of significant tests when reporting findings (Rosenthal, Rosnow, & Rubin, 2000). There were several moderate to large effect sizes found in the current study. These effect sizes may in fact be a more worthy indication of the true differences between participant sets than the significance tests, subsequent studies with larger sample sizes that

also includes the use of effect sizes to quantify the magnitude of changes would be appropriate.

4.5. Conclusions

The current study set out to explore the nature and processes of Change Talk and Sustain Talk in a four-session MET intervention for clients with difficulties in their diabetes self-management. This research also attempted to provide some understanding about the relationship between these Change Talk measures and two outcomes; a positive outcome where participants went on to achieve a clinically significant decrease in their blood glucose levels, and a less positive outcome where this target was not reached. It provides preliminary evidence that the BG Change and the BG No Change participant sets portrayed differing trends according to their spoken language within the intervention. In particular, they differed statistically significantly on Desire and Ability strength, and Desire strength at the final session of the intervention. In addition, Commitment Change Talk was spoken with statistically significantly greater frequency in the BG Change participants than in the BG No Change participants. Although the majority of which were not statistically significant, the most notable findings were related to Desire language, Change Talk frequency, and Sustain Talk strength. Specifically, the BG Change participants' Desire strength was significantly greater than that of the BG No Change participants, and had an increasing pattern of Desire strength across sessions, whereas the BG No Change participants did not show this pattern. In addition, the BG Change participants generally uttered an increasing amount of Change Talk as the intervention progressed, while the BG No Change participants' utterances did not follow this general pattern. Furthermore, the BG Change participants uttered Change Talk with a general pattern of increasing frequency within-sessions from the first to the ninth

decile. Finally, Sustain Talk strength appeared to show a generally decreasing trend across and within sessions for the BG Change participants, while for the BG No Change participants, this decreasing pattern of strength only occurred within sessions. This pattern of Sustain Talk strength may be the component of Total strength that differentiated participant sets with regard to an increasing pattern across the intervention, as when Change Talk strength alone was analysed, it did not generally appear to increase across the intervention for the BG Change participants.

Given this research is the first study to our knowledge of this nature, research with which to compare and contrast findings was scarce. However, the main findings relating to pattern of strength were generally consistent with previous research on substance use, which suggests an increasing pattern of strength across an intervention. Unlike the findings of Amrhein and colleagues however, frequency measures appeared as important as strength measures, as indicated by some large effect sizes. Taken together, it seems that some notable preliminary patterns have been highlighted in the link between Change Talk and change behaviour in diabetes patients with self-management difficulties. Further research needs to be undertaken in order to support and expand these preliminary findings so that the process components of MI, particularly with health behaviour change, are more thoroughly understood. In this way, MI practitioners would be better informed in which utterances to attempt to elicit, at what point in the intervention, in order for the most effective outcomes.

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