The Application of the Transtheoretical Model to Dietary Behaviour

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Abstract

In this thesis the application of the transtheoretical model (Prochaska and DiClemente 1992) to dietary change is investigated. Four studies were conducted examining the core constructs of the model these are (a) stages of change, (b) processes of change, (c) concepts of change.

An exploratory cross sectional study found that process and concept use differed significantly between precontemplaters and post action stages. With self efficacy however the main differences were between preparation and other stages. Semi-structured interviews with then conducted with 20 participants in the process of improving their dietary behaviour. Results showed that strategies similar to those outlined in the transtheoretical model social support and consciousness raising were strongly emphasised, regarding decisional balance more benefits than disadvantages were associated with dietary change.

Following this a 6-month longitudinal study tested the effectiveness of stage matched and general pamphlets for clients with type two diabetes. 955 participants completed questionnaires with 327 participants receiving stage matched interventions, 309 receiving general interventions and 319 participants being allocated to a control group. Intervention copies were distributed at 3 months and a second questionnaire at six months.

Significant differences were found between the pre action and post action stages with low fat dietary behaviour. Precontemplaters scored significantly lower than other stages with all processes and with the pros and cons of decisional balance and contemplaters scored lower than post action stages with several processes. Maintainers scored highest in self efficacy. The use of processes and concepts did not match fully that outlined in the transtheoretical model. Interestingly when participants were classified on the basis of low, medium and high fat behaviour, process and concept use followed a broadly linear pattern.

At follow up detailed analysis was made problematic by high subject attrition. However, higher scores in consciousness raising were associated with forward stage movement and low scores in social support with retrograde movement. There was no significant difference in effectiveness of stage matched and general pamphlets. There is, however, weak evidence that interventions in general improve low fat dietary behaviour. The stage classification may however give insights not available with standard classifications. Indicating advantages in combining stage and traditional classifications. Suggestions for future studies to investigate the model more thoroughly are also discussed.
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Chapter 1

Introduction

The Need for Nutritional Change

The Health of the Nation document (1992) contains as one of its main objectives “The reduction of the amount of premature death and ill health related wholly or in part to eating and drinking habits” (Lamb and Joshi 1996 p 43). A firm conclusion of the document is that a large number of people throughout the UK eat and drink in a manner, which over time contributes to significant health problems. The Health in England report (1998 p121) found that as many as 18% of adults could be classified as having a less than healthy diet. While it is accepted in both these documents that food needs to be enjoyable, it is also emphasised that the daily diet should provide the essential balance of nutrients and fats. One of the major eating habits associated with an unhealthy diet is the intake of excessive fatty foods, one example of this being the daily frying of foods such as chips in solid fats or the consumption of other fried foods daily. Indeed the documents notes that obesity and overweight were increasing health problems with 8% of men and 12% of women being obese and 37% of men and 24% of women being overweight. More recent research found that obesity has reached a point where it claims 30,000 lives annually, throughout England. A House of Commons public accounts committee estimated the cost to economy as a whole of obesity being £2.5 billion the report also warns that unless effective action is taken 20% of men and 25% of women could be obese by 2005 (http://news.bbc.co.uk, 2002). Therefore throughout all these reports a strong emphasis is placed in particular on the benefits derived from a lower percentage of fat in the daily diet.

Indeed numerous health educators have consistently focused on the relationship between high fat diets and premature morbidity (Cohen, Brownell and Felix 1990). Stewart and Brook (1983 ) reviewed 21 studies and concluded that being severely overweight is associated with premature mortality, with strong links being found between a high fat diet and heart disease, stroke,
cancers, diabetes and gallstones. Therefore a simple example of the benefits of a low fat diet is the prevention of heart disease.

In addition to this however there is speculation that a very low-fat diet may actually help reverse heart disease. This may become increasingly important, as the improvements made with surgical treatments are often not permanent. With bypass surgery for example approximately 50% of bypassed vessels are clogged again within five years and with angioplasty, 33% of vessels are blocked again within 6 months. Low fat living (http://www1.xe.net/lowfat/articles/). In addition to the significant health problems linked with overweight, throughout the western world significant social stigma is also attached to obesity, (Wardle 1995). Tiggeman and Rothblum (1988) found that when young students were given a choice of marriage partner many preferred to marry a shoplifter, embezzler or a blind person than an obese one. Obese people are also rated as less hardworking, intelligent or active than slimmer people (Harris and Bochner1982). Not surprisingly therefore with the social stigma and health problems significant psychological stresses are also associated with being overweight. Brownell and Wadden (1983) believed the psychological and social hazards of obesity are more important to dieters themselves than the medical problems. Hirsch (1973) summarised the psychological and social effects as ranging from mild feelings of inferiority to serious impediments to socialising and sexual activity with resulting problems in many areas of a person's life including marriage, education and employment. Brownell (1982) believed that the seriousness prevalence and resistance to treatment of obesity make it one of the most difficult psychological and medical problems in modern western society.

Not surprisingly therefore with the numerous problems associated with high fat diets, a reduction in the percentage of fat in the diet is one of a number of key targets contained in Health of the Nation document (1992 p 39). With regard to fat intake the goals are that 60% of the population derive less than 15% of their food energy from saturated fats and 50% derive less than 35% of their food energy from all fats. With the total proportion of obese adults in the nation being 7% or less. This compares with the estimated national average at the time of 17% of energy from saturated fats and 42% from all fats. Yet despite the many major problems associated with high fat diets and the significant benefits associated with low fat diets the Department of Health
estimates the average contribution made by fat to energy derived from food in the nation as a whole is still too high. The National Food Survey (2000) estimated the percentage of energy derived from fat in the diet remains at 38% still above the maximum intake of 35% recommended by the committee on Medical Aspects of Food Policy (Health of the Nation 1992). This is not a problem confined solely to Britain. In America “The Nationwide Food Consumption Survey” (1987-1988 cited in Greene and Rossi 1994) concluded that only 14% of the population reached the more stringent target of less than 30% of energy being obtained from fat. McDonnell, Roberts and Lee (1998) noted that while 80% of Australians believed that the high fat content of their diets is a major concern surveys have shown that the average Australian still consumes above the recommended level of fat in their diet.

Why then are dietary habits so resistant to change? One reason may be that food habits themselves are formed early in life and the risk factors associated with poor diet develop over many years. An individual for example consuming a high fat diet may not be aware of the potential damage of consistently eating the wrong foods. Therefore an urgent need exists for increased understanding of the processes behind dietary change and for the creation of improved new interventions to enhance adherence to dietary regimes.
The effectiveness of Dietary Behaviour Interventions

The Health of the Nation document (1992) showed that dietary change remains stubbornly difficult to bring about for many people. The question to be addressed is firstly how effective are present interventions for dietary change and how can their effectiveness be improved? Undoubtedly many well designed treatment and self-help programmes either attract very few participants, or are subject to a high percentage of dropouts. Prochaska, DiClemente and Norcross (1992 p1105) illustrated the poor response rate using the example of two extensive studies conducted in the late eighties. One conducted on the west coast aimed at smokers, found that despite initial interest shown by 70% of the target population only 4% actually enrolled. Recruitment rates of only 3-12% were also found among those eligible for home based weight control programmes. Undoubtedly therefore the vast majority of people who could profit from health interventions do not avail of them. A significant and worrying problem therefore exists in getting people who could profit from interventions to partake.

In addition to this individuals adopting or intending to adopt dietary change face a variety of problems from individuals making changes in more straightforward health behaviours such as addictions. This makes dietary behaviour one of the more difficult health behaviours to improve and maintain. Sternberg (1998 p521) commenting on the particular difficulties associated with dietary change pointed out that dietary change in particular low fat dieting calls for "controlled food use", however as a concept this is vague and difficult to define. For many health behaviours, for example quitting smoking and addictions to chemical substances abstinence is the goal. A smoker for instance knows when they are observing abstinence they are simply smoking or they are not; similarly an alcoholic abstains from alcoholic drinks. For the person on a low fat diet, however, controlled food use is not as clear cut. McDonnell, Roberts and Lee (1998) commented that consumers require specific nutrition information and the general public often misunderstands implementing dietary advice and the many concepts related to food and nutrition. Very few people can say with confidence for example when the total fat content in their diet falls below 35%. In addition to this many of the behavioural goals in dietary change are multifarious, that is improvements are required in food selection, preparation and purchasing techniques (Kristal, White, Shattuck, Curry, Anderson 1992 p554). Also an almost infinite number of combinations of foods can lead to the desired target behaviour; for example two
people on totally different diets may still have less than a total of 35% of fat in their daily intake. Kristal White, Shattuck and Curry (1992 p554) commented that long term significant dietary change is extraordinarily difficult to achieve and maintain. They found the main exceptions to this were research studies that provided the necessary food to participants, or used intensive or expensive intervention protocols such as one to one counselling. Beresford, Curry, Kristal and Laxovich, (1997 p610) noted that many dietary research studies are targeted at individuals at particularly high risk, with the interventions being based on intensive individual or group counselling. However, the provision of this type of intervention to the large target groups where dietary interventions are acutely needed is often expensive and impractical. A good example would be a group of perhaps 4,000 people with type 2 diabetes attending an outpatient clinic at an established inner city hospital. Clearly in depth interventions are highly unlikely in this scenario.

The question then arises as to what type of interventions could be used and how might their effectiveness be enhanced? Beresford et al (1997) suggested that low intensity interventions such as self-help materials might have an important role to play. It is possible to make these materials available to a wide range of people at comparatively low cost therefore having a greater overall effect than highly intensive changes being made available to a small percentage of a target population. The next question, which then arises, is how such self-help materials may be improved? One approach, which has received increased attention in recent years, is the tailoring of messages as closely as possible to each participant’s individual requirements. Petty and Cacioppo (1981) elaboration likelihood model (E.L.M) suggest that information, which is personally relevant to an individual, is more likely to be processed thoughtfully. Kreuter, Bull, Clark and Oswald (1999 p 488) believed that messages tailored to individuals have a greater chance of being successful as they promote more issue relevant thinking, self assessment and modify the intention to take action.

Health interventions to date are based largely on either continuum or stage models of behaviour (Weinstein , Lyon, Sandman and Cuite 1998). Weinstein Rothman and Sutton (1998) illustrated the concept of a stage model using the example of AIDS prevention. With safer sex behaviour a large number of variables are involved including efficacy beliefs, social norms and risk
perception. Individuals may also fit into certain specific categories for instance with those not considering behaviour change may need to be made more aware of their vulnerability whereas an individual considering change may need training in the skills negotiating condom use. Stage theories address issues such as these by classifying individuals into categories and addressing the issues relevant to advancing individuals from one category to the next. In contrast with this Weinstein et al (1998) commented that with continuum models an individual is placed at a particular point on a continuum and the goal of the intervention is to move the person along this. Quantitative differences between people are acknowledged, however there are not the distinct qualitative categories outlined in stage models in which different interventions at different points are deemed necessary. A simplistic explanation of this may be seen in the Health Locus of Control Model (Wallston, 1992) and Self Efficacy theory (Bandura 1977). To improve health behaviours participants are encouraged to either increase their self efficacy or switch from internal to external locus of control. When these beliefs and cognitions are transformed and maintained to a significant degree the likelihood of improved health behaviours is greatly increased. The concept of either distinctly different concepts being introduced at separate points or that the use of the intervention at certain points may be more destructive than constructive is rarely considered. In contrast to this in stage models it is implied that individuals are at distinct stages with specific varying barriers to progress at each stage. For example it may be of no benefit to increase the self efficacy of an individual who has no intention of changing, it may however be of value to increase their awareness of the danger of their habit to themselves or others. Likewise with an individual who has recently taken action there may be little point in increasing awareness of the dangers of a habit but every point in introducing frameworks for social support and increasing self efficacy. Issues such as this are addressed in the stage models, which at present enjoy increasing popularity. Three of the main models in current use will now be discussed.

As a method of enhancing adherence to numerous health behaviours ranging from the adoption of preventative measures, stopping unhealthy behaviours, and using medical services, stage models are attracting increasing interest. To date the four stage models developed in relation to health behaviours are the transtheoretical model (Prochaska, DiClemente and Norcross 1992), the precaution adoption process model (Weinstein 1988) the health action process model
(Schwarzer 1992) and the health behavioural goal model (Gebhardt 1997). Of these the three most popular models to date are the transtheoretical model, the precaution adoption process approach and the health action process approach. A brief summary and comparison of these three models now follows. All models consist of several stages. The transtheoretical model contains 5 stages, these are (1) precontemplation, (2) contemplation, (3) preparation, (4) action and (5) maintenance. Later research introduced an additional stage of termination meaning there is no prospect of a relapse to old behaviours. The precaution adoption model consists of 7, these are (1) being unaware of the health action, (2) aware but not personally engaged, (3) engaged and trying to decide what to do (4) deciding not to act, (5) deciding to act but not having yet acted (6) acting and (7) maintaining. The health action process model (Schwarzer 1992) consists of at least 2 stages (1) a motivation phase, and (2) volition phase, with the volition phase possibly dividing into planning action, action and maintenance phases. All models contain a division between stages in which the person has no intention of taking action, is thinking about taking action and taking action and maintaining it.

It is also implied in all models that participants go through the stages in a fixed sequential order from 1-5 or 1-7 and that distinct barriers exist at each stage with different strategies necessary for forward movement. For example, with the transtheoretical model cognitive affective processes are emphasised in the pre-action stages with behaviour orientated processes being introduced in the post-action stages. In addition to processes of change the psychological concepts of decisional balance and self efficacy also play a crucial role. With decisional balance an increase in the pros and a decrease in cons is predicted with stage movement. With self efficacy a high score in the pre-action stages is predictive of success in the later post-action stages.

Similarly in the precaution adoption model individuals’ perceptions of their personal vulnerability are crucial in moving individuals between stages 3 and 5, with situational variables being more influential in movement at the later stages, for example from intention to change to actually changing (Weinstein et al 1998). Support for the model found in research with home radon testing (Weinstein and Sandman 1992) and hepatitis B vaccination (Hammer 1997). With home radon testing risk treatment interventions were more effective in getting undecided people those in stages 4-5 to order a test, than getting decided to act people those in stages 5-6 to order.
In the motivational stage of the health action process model (Schwarzer 1992) it is predicted that individuals assess their priorities that is the pros and cons of behaviour change. Emphasis is also placed on the formation of intentions with self efficacy and outcome expectancies being major predictors. These concepts are also emphasised in the transtheoretical model. In the volition (action) phase of the health action process model emphasis is placed on cognitive, behavioural and situational concepts. This is in contrast to the transtheoretical model, which focuses on behavioural concepts at this point. To date however the health action process model has not been tested in field studies.

It is acknowledged in all of these models that participants may relapse to early stages. In the transtheoretical model participants may relapse from maintenance to preparation or contemplation or perhaps right back to precontemplation. A similar process is also possible in the precaution adoption model and the health action process approach. This means that change may in fact be a spiral rather than sequential movement. However, the central concept of the effectiveness of different interventions at each stage remains unaffected by relapse. In other words with the transtheoretical model interventions are the same for first time contemplaters as those who have relapsed into contemplation from either maintenance or action.

A crucial factor of a stage model is that it accepts movement before actual behaviour change. In the transtheoretical model a move from precontemplation to contemplation or preparation or in the precaution adoption model a move from being unaware to being aware is regarded as movement forward. However, cognitive changes such as these will go unacknowledged when behaviour change is regarded as an all or nothing phenomenon, meaning that a potentially beneficial intervention may be abandoned. In fact, Oroford (1992) likened the development of stage models to a “Kuhnian paradigm shift”. Of the current stage models the transtheoretical model perhaps because of the simplicity of the model has received the greatest attention being tested empirically with a range of behaviours. In a key paper Prochaska, Velicer, Rossi, Goldstein and Marcus (1994), found commonalities in the pattern of change in decisional balance and stages of change consistent with the transtheoretical model in 12 problem behaviours ranging from smoking cessation, high fat diets, delinquent behaviour and mammography screening. With the research and theories being developed the exciting prospect is being
forwarded that stage models may have the potential to offer a clear account of how people change and in turn greatly increase the effectiveness of interventions.

However, further investigation of stage models is essential if their full value is to be assessed. In deciding to investigate stage models the question arises as to which model to focus on? A wide-ranging investigation focusing on all three models is impractical and may leave unanswered questions with all three models. Therefore a thorough examination of one model is proposed. Also assessing the validity of one model may in fact shed light on the validity of the remaining models or assist in the shaping of future models. All the above models are based on established psychological theories and contain an instinctive sense of being applicable to health behaviours.

However of all the models the transtheoretical model possesses the most established pedigree. Prochaska and DiClemente (1992) noted that initial research on this model commenced in 1977 when a thorough analysis seeking out the commonalities within the various theories of psychotherapy was embarked upon. Yielding the first of basic components of the transtheoretical theory in 1984. The transtheoretical model has been applied to a wide range of health behaviours, therefore an investigation of its validity in relation to dietary behaviour will assist in establishing its validity in similar areas such as exercise or weight control. Also establishing the validity of stage interventions in relation to this model will add to the knowledge regarding the validity of existing or future stage models.

Therefore the focus of this thesis will be on the transtheoretical model and its application to dietary behaviour as opposed to either the precaution adoption model or the health action process approach. As with all stage models the underlying principle is that a number of psychological processes and concepts are linked to specific stages of change thus enabling interventions to be targeted more effectively. However, to understand how this is to be achieved in relation to the transtheoretical model a detailed understanding of this model is necessary, therefore a thorough review of the underlying theory and literature regarding the background and application of the transtheoretical model is included in the following section.
Background to the Transtheoretical Model

Prochaska in 1977 with the aid of his students began a search examining numerous systems of psychotherapy in an attempt as he put it to identify “The commonalties across the most rigid boundaries of the most popular theories of Psychotherapy”. In 1984 this cumulated in the first step in the forming of the transtheoretical model, with the identification of 10 separate processes of change common to all theories of psychotherapy. At this point Prochaska acknowledged that while this theoretical construct had appealing face validity it remained a theoretical construct with no empirical basis. However, in a breakthrough paper, reviewing evidence in relation to self initiated and professionally assisted change in relation to addictive behaviours, a model was proposed, which contained 3 major components. These were (A) 10 processes of change, (B) 5 stages of change and (C) 3 levels of change (Prochaska, DiClemente and Norcross 1992).

Of interest at this point is a brief summary of the factors, which prompted Prochaska et al to initiate this quest for a transtheoretical system of change.

A debate arose in the psychotherapeutic community in the late 1970’s and early 1980’s regarding the ability of specific systems to address the total needs of clients. This is summarised in a quote by Raimy (1976) who noted that “Many schools drive their therapists to develop their thinking and their techniques but also imposed limited horizons, which clamped their proponents into rigid moulds”. Indeed several psychoanalytic researchers at the time commented on the possible benefits to psychoanalysis in incorporating strategies from other approaches. Applebaum (1979) believed psychoanalysts could learn significantly from gestalt therapy and Alexander (1963) predicted a successful integration between psychoanalytic therapy and learning theory leading to advances in the practice of both psychotherapies.

Goldfried (1980) in a landmark paper, which summarised psychotherapy approaches, questioned whether all the answers could be found in any one therapeutic system. He argued that many common strategies existed across different approaches, the two examples he gave of this were the provision of new corrective experiences and the offer
of direct feedback between patient and client. Goldfried's wish was for a more integrated approach to be developed, with the practitioners of the many different therapeutic approaches working towards some consensus of the steps necessary to bring about improvement in clients. Goldfried suggested an examination of the processes of change across all therapies as a starting point. Prochaska and DiClemente (1992) commented that the proliferation of psychotherapeutic systems confronts the clinician with a daily dilemma in deciding the proper approach to clients with differing problems. In response to this development in psychotherapy with no one therapeutic system being perceived as adequate they attempted to establish an integrative perspective to accomplish 5 main goals. These were (a) preserving the insights of the major systems of psychotherapy, (b) providing practical answers for clinicians, (c) bringing order to the chaotic diversity in psychotherapy (d) offering an alternative to the single system and comparative types (e) developing a systematic approach which at the same time retained the flexibility to promote collaboration, creativity and choice.

Prochaska and DiClemente in addition to examining the principles, which promoted successful change in professional treatment, believed it was vital to include also the principles, associated with successful change without formal psychotherapy. The purpose in including self-changers being to give insight into a significant group which may often be ignored in traditional studies of therapeutic interventions. In a demonstration of this Schachter (1982) found that the overwhelming professional consensus with opiate use, cigarette smoking and obesity was that these complaints were highly resistant to long term change. Schachter, however questioned this overly pessimistic stance commenting that many individuals in everyday life in fact work through these problems without recourse to professional help. Indeed, Schachter argued that two factors might account for the high failure rate in professional treatment. Firstly individuals resorting to this may be encountering significantly more problems than the average person might. Secondly the inferences made regarding therapeutic effectiveness are often based on a single attempt whereas many individuals make repeated attempts before quitting successfully.
As previously stated Prochaska and DiClemente’s research resulted in a model consisting of processes, stages and levels of change. The first concept in this model the processes of change will now be discussed.

Transtheoretical Model: Processes of Change

Prochaska and DiClemente (1992 p302) defined a process of change as “Any activity initiated or experienced by an individual in modifying thinking, behaviour or affect related to a particular problem”. They emphasised that a process differed from a coping mechanism, in that while a large number of coping mechanisms existed, processes represented the basic principles underlying coping mechanisms.

The first step in discovering the processes involved in change consisted of an investigation of 24 of the most widely used forms of psychotherapy (Prochaska 1979). The selection of these recommended change techniques across different theories resulted in the term “Transtheoretical Model”. Analysis showed 10 major processes playing a significant role in behaviour change. These were consciousness raising, self reevaluation, self liberation, counter conditioning, stimulus control, reinforcement management, helping relationships, dramatic relief, environmental revaluation and social liberation. The use of these processes is further supported in research with 872 smokers and ex-smokers in the Rhode Island area over two years (Prochaska and DiClemente 1985). The same sample also completed questionnaires on techniques they used for coping with weight control and psychological distress. Principal component analysis showed a stable component structure consisting of 10-12 processes which accounted for at least 68% of variance in each problem area. In addition to the original processes 2 additional processes of substance use and interpersonal systems control were also identified. The very similar structures emerging across problems suggest that the model can be generalised across health behaviours. In relation to dietary behaviour (low fat intake), Bowen, Meischke and Tomoyasu (1994) found 8 processes resembling those identified by Prochaska and DiClemente to be associated with change. Prochaska and DiClemente acknowledged that they may not have isolated all possible processes of change, but they believed the main
processes they identified to be applied across mixed problem behaviours. However future researchers may locate additional processes particularly in relation to more diverse problems. A brief description of each of the ten original processes identified by Prochaska and DiClemente now follows.

**Consciousness Raising:** Increasing information about self and problem, an individual using consciousness raising might actively pursue and recall knowledge regarding the problems associated with their behaviours. Overall the person becomes more aware of their problem.

**Dramatic Relief:** Accessing the feelings regarding problem behaviour, and using these to motivate the person and bring about change. In attempting to move people emotionally role playing and personal testimonies are often used.

**Self Reevaluation:** How maintaining problem behaviour makes the person feel about themselves, for example do they feel disappointed or upset if they continually smoke, drink etc. Person may be encouraged to look back firstly and evaluate their past life with problem behaviour and secondly to look forward and imagine their life free from problem.

**Self Liberation:** Recognising the freedom associated with change in addition to making positive commitments to change. Person may be encouraged to make public rather than private commitments and also to become aware of the options available to them. For example with obesity different low fat foods, support groups and friends available to help them.

**Environmental Reevaluation:** Noting the impact of problem behaviour on society in general but also the impact on person's social environment for example strains put on family friends an local community. Smokers might be made more aware of the problems the loss of their health causes not only to themselves but to those around them and also the dangers from passive smoking to others.

**Social Support:** Enlisting the help of someone close to tackle problem, or possibly the use of support groups or networks familiar with problem to assist. Person may be encouraged to build his or her own social skills to enlist social support.
Reinforcement Management: The use of rewards or punishments to encourage adherence to health regime. Self or others can make rewards or punishments. Emphasis however is on reinforcement for progress. Prochaska (1999) in particular encouraged participants to make their own reinforcements, rather than dependence on others. Lack of reinforcement from others who may take progress for granted might lead to relapse, but if reinforcement is under participants own control this is less likely.

Counterconditioning: The substitution of problem thoughts or behaviours with helpful ones, examples include desensitization or positive self-statements to counter distress-provoking cognition.

Stimulus Control: Restructuring one’s social and physical environment to trigger more healthful behaviours. Participant might remove all triggers to smoking or high fat foods from their home and replace with stimuli that promote positive behaviour.

Social Liberation: Becoming more aware of the alternatives available in society to improve and maintain health behaviours. Issues such as smoking not being socially acceptable or the availability of low fat alternatives to high fat foods.

Prochaska and DiClemente (1985 p324) hypothesised that the ability of individuals to utilise these processes is directly related to cessation success, with successful changers employing a co-ordinated use of all processes. Further to this, failure to change or to successfully maintain change is the result of possibly three problems with process use. These are firstly individuals may be unaware of several of these processes, resulting a restricted range of options. Secondly even when an individual is aware they may not employ the majority of these processes and thirdly even if all processes are used they may be applied inappropriately at different points in the modification attempt.

Prochaska and DiClemente (1992) commented that most systems of therapy used only two or three of these processes with their clients, however their earlier studies indicated that clients changing on their own engage in all these processes. An example of this is the processes used to modify problem behaviors such as smoking (Prochaska 1984). They pointed out that this indicates that many therapists are using only a limited set of
processes in comparison to the processes used by self changers and therefore that many therapists are not as cognitively complex as the majority of their clients when conducting therapy. Also as previously stated improper or lack of use of these processes may result in unsuccessful behaviour change. A crucial aspect of the transtheoretical model is that processes are appropriately applied at different points in the modification attempt. This leads to the next major component of the model, the stages of change.

Stages of Change

Early research by Beitman (1987) and Egan (1986) indicated that intentional change was not an all or nothing phenomenon but a movement through different stages. Prochaska and DiClemente (1992) suggested that this might be a serious flaw made by many therapists in that they assume that clients presenting for therapy are at a similar point. In their initial work with a group of 67 ex-smokers they noted that the importance of each process of change varied in relation to their progress in quitting the habit. These recent quitters differentiated between four distinct stages of change. These were (1) Thinking about stopping (2) Becoming determined to stop, (3) Actively modifying their habit and environment and (4) Maintaining change (Prochaska and DiClemente 1985 p325). In addition to these stages Prochaska and DiClemente included a stage for individuals who displayed no intention of changing their behaviour. This classification was further supported in empirical research. McConnaughty, Prochaska and Velicer (1983) found support for this stage classification using self-report measures and discrete measures. DiClemente and Hughes (1990) also verified this model of stages of change with outpatient therapy clients and self-changers suffering with alcoholism. Regarding the generalisation across problem behaviours of this model, Prochaska, Velicer, Rossi, Goldstein and Marcus (1994) found similarities and support for the validity of the model across twelve problem behaviours; these included addictive, non addictive and preventative behaviours. On the overall basis of these and other studies behaviour change is believed to consist of five distinct stages. These are precontemplation, contemplation, preparation, action and maintenance. Distinct characteristics and patterns of process use are believed to be associated with each stage. In order to move from one stage to the next
the issues associated with each stage need to be addressed fully. The next step in this thesis will be to summarise the characteristics associated with each stage. However, a final point to note is that while Prochaska, DiClemente and Norcross (1992) and Prochaska et al (1994) emphasised the application of this model across problem behaviours, they also stressed that their theory focused on the process of intentional change or voluntary change and not societal, developmental or enforced change. However, awareness of the model may still be helpful to professionals working in for example correctional institutes if the long-term goal of releasing individuals back into the community were to be achieved. This might be accomplished by encouraging clients to enter the change process at the contemplation stage. Prochaska et al (1992) summarized the characteristics associated with each stage as follows.

**Precontemplation:** Individuals at this point have no intention of changing their behaviour in the foreseeable future. They may even be unaware they have a problem, or if they are aware they tend to dismiss it believing perhaps it is no greater than the problems of others and there is no real need to change. However, associates are often aware of difficulties. Usually when precontemplaters attend therapy it is often because of the pressure from peers or an employer. Change may even apparently take place but once this pressure is finished there is strong likelihood old destructive habits will be resumed. Individuals are categorized, as precontemplators if they show no serious desire to change their behaviour within the next six months. It is acknowledged, however, that even precontemplaters may show a vague wish to change at times. But this cannot be equated with a serious intention to change. The explanation for the timeframe associated with precontemplation being 6 months, is that this is about as distant into the future as most people plan who are seriously committed to behaviour change. The initial goal in therapy with a precontemplater is to enable them to progress to the next stage in which they at least consider change. The following stage is contemplation.

**Contemplation:** At this point the person takes ownership of the problem in that they recognize that it exists and that it would be beneficial to change it. Again the timeframe
associated with this is six months. This indicates the person is thinking about changing their behaviour but will not have made any firm commitments. Prochaska et al (1992) summarised this as the person knowing they need to make changes but feeling they are not quite ready to go forward yet. DiClemente (1991) pointed out that contemplators struggle with the pros and cons of their behaviour. Balancing the problems caused by their behaviour with the effort and sacrifices needed to change it. Again within the transtheoretical model the goal is to make the person more aware of the benefits of change and to make a definite commitment to change. At this point they move to the next stage, preparation.

**Preparation:** Individuals are classified as being in preparation when they have made a definite commitment to change. The timeframe for this is intending to take action within the next month but in addition to this they may have unsuccessfully taken action within the last year. There may be some behavioural changes with for example smokers reducing their intake by 50% or changing to low tar cigarettes. Alcoholics may also reduce their intake at this point. Individuals at this point see themselves as working hard to change. Prochaska et al (1992) called this a decision making stage and some researchers believe it to be the early beginnings of the next stage which is action.

**Action:** In the action stage significant change such as abstinence from an addictive behaviour takes place. The timeframe for action is that the required behaviour change is maintained from 1 day to 6 months. It is essential at this point that the actual behaviour criterion is reached and not just steps taken toward it which for example may take place in preparation or contemplation. Prochaska et al point out the dangers of equating action with having achieved permanent change or success. This is a trap that they believed many including professional practitioners fall into. This in turn leads to the neglect of the steps needed to consolidate progress and move the individual into the final stage of maintenance.
**Maintenance:** The hallmark of maintenance is the successful adoption of the necessary behaviour criterion for at least six months. Prochaska and DiClemente perceived maintenance as a point in which interventions are still necessary and with addictive behaviours in particular this could last for an indeterminate period perhaps even for a lifetime. The essential factor is not to see this as a static stage but a point where clients actively work to prevent relapse and build on the breakthrough made in action. Individuals at this point may comment that “They may need a boost now to maintain changes”. Prochaska and Norcross (1999 p497) give stabilizing behaviour and the prevention of relapse as the significant factors in maintenance. Wolfe (1992) believed that to maintain maintenance, that is to avoid any relapse, it was necessary “To have a sense of self that is highly valued by oneself and at least one significant other”. This introduces a point at which the concept of social support, which is one of the key processes in the transtheoretical model, may be particularly beneficial. An important aspect of the model therefore is that maintenance like action is not seen as the end point but a stage where a close examination of conditions likely to lead to relapse is advised.

The stages summarised above are the five stages, which ideally represent the five points an individual adopting health behaviour will sequentially pass through. However, an important aspect of health behaviour change, which is also addressed in the transtheoretical model change is relapse. Brownell Marlatt Lichtenstein and Wilson (1986) estimated that the rate of relapse with addictive behaviours might be high as 90%, while the rate with obesity is unclear but is undoubtedly a significant problem also. Brownell et al pointed out that figures might overstate the problem as many are based on clinical cases and only one attempt at change is investigated. In fact for the majority of people relapse may be a necessary part of change. Acknowledging the concept of relapse, Prochaska and Norcross (1999) also commented that this may be the rule rather than the exception with many health behaviours. Prochaska, DiClemente and Norcross (1992) in acknowledging this dimension of change concluded that a spiral pattern of change rather than a sequential one may be more representative of health behaviour change in the real world. In this individuals may go for example from the later stages such as action and
maintenance to earlier stages such as preparation or perhaps even right back to precontemplation. Schachter (1982) found that with many smokers 3-4 attempts at quitting were necessary before long-term maintenance was achieved. So while linear progression from precontemplation to maintenance is the ideal, this may rarely be achieved in reality. On a positive note, however, research by Prochaski and DiClemente (1984) showed that the 85% of self-changers that relapse move back to the contemplation or preparation stages to consider plans for their next action attempt. This may explain the several attempts at change, which Schachter noted.

In a later publications, Prochaska and Norcross (1999 p498) introduced the concept of termination of a problem behaviour, defining it as “When a person no longer experiences any temptation to return to troubled behaviours and no longer has to make any efforts to keep from relapsing”. No specific criteria are given for identifying when this takes place, though Horwath (1999) suggests this may take approximately 5 years. Prochaska and DiClemente believe that therapy is often terminated too early and as a result of this clients may suffer unnecessary anxiety and distress. Their recommendation therefore is that the client and their therapist discuss thoroughly the termination of therapy in order to avoid unnecessary relapses.

Levels of Change
In discussing health behaviour change, Prochaska and DiClemente (1992) commented that it might not always be possible to approach it as a single well defined problem, recognising that it may take place in the context of difficulties at different levels. In their research they identified 5 distinct but interrelated levels of change. These are (1) Symptom / Situational problems, (2) Maladaptive cognitions, (3) Current interpersonal conflicts (4) Family systems conflicts (5) Intrapersonal conflicts. Again therapists are criticised for focusing interventions solely on one of these levels. A family therapist for example would focus at the family systems level, a behaviourist at the level of symptom or situation or a cognitive therapist on the level of cognitions. Prochaska and DiClemente accepted those problems requiring interventions at deeper levels, for example, family
systems and intrapersonal conflicts will require longer and more complex therapies. Prochaska and DiClemente accepted that initially the preference is for an intervention to be focused at the highest contemporary level, that is the situational symptom level. Firstly this usually represents the primary reason an individual enters therapy and it is the point that clinical assessment and judgement can initially be justified. In addition to the stages of change, levels of change and processes of change two other concepts, decisional balance and self efficacy, are central to the transtheoretical model and require further explanation. 

Decisional Balance

The concept of decisional balance was first examined in the Janis and Mann (1977) decision-making model, where decision-making is conceptualised as a conflict model. In this model there is a careful scanning of the potential gains and losses of any behaviour. Four categories of the major consequences of gains and losses were formalised. These were (a) gains and losses for self (b) gains and losses for significant others (c) approval and disapproval from significant others (d) self approval or self disapproval. Velicer, DiClemente, Prochaska and Brandenburg (1985) tested the decisional balance concept with a 24-item questionnaire on 700 participants across the stages for smoking. Analysis of results found that there are two critical constructs the pros and cons of behaviour rather than 8, which need to be balanced in measuring the consequences of a decision. Similar results found by Marcus, Rakowski and Rossi (1992) and O’Connell and Velicer (1988). A significant element in the decision to move from one stage to the next is the importance given to the pros or cons associated with change. In matching this concept to the transtheoretical model, Prochaska, Velicer, Rossi, Goldstein and Marcus (1994) believed that those in precontemplation would see the pros of a problem behaviour as outweighing the cons, while those in action and maintenance would view the cons as outweighing the pros. Thus a smoker in precontemplation would see more problems associated with giving up smoking than keeping it up. As the pros and cons are perceived as equal the person will move into contemplation, resulting in a vague commitment to change. Prochaska et al concluded therefore that the pros and cons of a problem behaviour should
cross over in the contemplation or preparation stages, at this point the pros begin to outweigh the cons and a decision for definite behaviour change is made. Participants in action and maintenance would still see more problems associated with relapsing to a problem behaviour, than continuing to abstain. Prochaska and DiClemente (1985 p333) noted, however, the longer the health behaviour is maintained the less importance is attached to this concept, as it simply becomes a non-issue to the person. Therefore participants at the maintenance stage might score lower than participants in the late pre and early post action stages on questionnaires, which measure these concepts.

Self Efficacy
Self efficacy is a person’s judgement of their ability to cope effectively in a given situation (Bandura 1977). A central construct of social cognitive theory, it has been found to strongly predict behaviour change (Ling and Horwath 1999). A simple example of this is that a smoker who does not believe they can give up smoking will simply not bother to try. Clark, Abrams and Niaura (1991) found high self efficacy to be predictive of change in numerous studies of addictive behaviours, in particular problem drinking and tobacco use. Bernier and Avard (1986) found with obesity that pre and post treatment self efficacy was significantly related to weight loss in a 6 week follow up. Velicer, Prochaska (1998 www.uri.edu/research/cprc ) found in relation to smoking cessation that self efficacy monotonically increased across the stages, that is participants in contemplation scored higher than those in precontemplation, with participants in maintenance scoring highest. Regarding dietary behaviour, Glanz, Patterson and Kristal (1994) found in a study of 17, 121 employees in the Working Well Trial that participants in the later stages i.e action and maintenance had the highest levels of self efficacy, with participants in contemplation or preparation showing the lowest. Research by Brug, Hovers and Kok (1997) and Brug, Glanz and Kok (1997) broadly supported this with participants in the post action stages again showing higher levels of self efficacy than participants at pre-action stages. Oumpuu, Woolcott and Rossi (1999) noted that self efficacy may be useful as a means of monitoring and predicting stage transition for eating behaviours. The particular points where they believed it may be of benefit being the transition through
preparation, action and maintenance. Overall the research evidence shows this to be a construct which can be successfully matched to distinct stages.

**Application of Transtheoretical Model**

Undoubtedly the transtheoretical model is an exceptionally detailed model which in addition to emerging from empirical research contains a strong element of common sense rationale in suggesting that the problems confronting and interventions required by individuals at different points in change vary considerably. The next step therefore is to examine in detail the strategy recommended by Prochaska and DiClemente (1992) for applying the model to health behaviour change, in this instance initially to addictions.

Undeniably the most promising concept to emerge from transtheoretical theory is the matching of different processes and concepts of change to the separate stages of change (Prochaska and DiClemente 1983). Prochaska, DiClemente and Norcross (1992) using smokers as an example suggested that one of the major reasons clients drop out of therapy is because the processes suggested are not matched to the stage of the client. A consistent problem being that many treatment programmes are orientated towards or take for granted that a client is either in the action stage or close to it. Also many programmes measure success as whether or not a client changes behaviour totally, for example if a smoker or alcoholic achieves abstinence or not. With the transtheoretical model, stage movement such as moving a client from precontemplation to contemplation itself is regarded as a major step towards a successful outcome. In addressing the first problem that in reality many clients do not enter treatment ready for change and open to programmes orientated to the preparation or action stages, Prochaska et al suggest that to optimise treatment, processes of change should be matched to stage of change in the manner suggested in table 1.1. With this the cognitive and affective processes are deemed to be more effective in the pre-action stages and the behavioural processes particularly suited to the post-action stages. Therefore in the early stages greater insight on the part of the client requires development, with the therapy being focused on the client’s maladaptive
cognition but when the client moves towards action the initiation of behaviour therapy for specific interventions at the symptom situation level is most effective.

**Table 1.1: Stages of Change matched to Processes of Change**

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<td>Stimulus Control</td>
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While the initial research by Prochaska (1979) concluded 10 processes existed. Prochaska et al (1992) in matching the processes to stages did not specify at which point social liberation is most effective. Bowen et al (1994) in relation to low fat dieting suggested it might be most salient to individuals in long term maintenance. However in relation to weight control (Cancer Prevention Centre [www.uri.edu/research/cprc](http://www.uri.edu/research/cprc)) it has been suggested that it may be most beneficial between contemplation and action. In a recent review of the model Prochaska (1999) however again did not stipulate at which point social liberation is effective. Prochaska focused on the benefit of matching nine processes to specific stages. It is unclear therefore as to the role of social liberation in relation to the model, but the specific matching of nine processes provides researchers with sufficient detail to test the validity of the model in future research. However, before focusing on the research for and against this model it is necessary to thoroughly develop
the theory regarding the matching of processes to stage. Therefore a summary of the idealised interaction between processes, constructs and stage movement as outlined in the model now follows.

Precontemplation - Contemplation
In their research on matching stage to process, Prochaska and DiClemente (1983) found as expected that pre-contemplators used processes of change significantly less than any other group. Obviously if therapists were to use processes associated with movement from preparation to action on a group of precontemplators then the results may not be very rewarding. Factors such as this may explain results such as those found by Schmid, Jeffrey and Hellerstedt (1989) in which recruitment rates for smoking cessation programmes were only 1 -5% of eligible participants, with similar results in weight loss programmes when less than 12% of those eligible enrolled. With this model the ideal is the matching of stage of change to the correct processes of change to enhance the retention rate and effectiveness of therapy. Prochaska and DiClemente (1992 p304) noted that to move a client from precontemplation to the contemplation stage, it may be most productive to use consciousness raising strategies, that is making the person aware of the causes and consequences of their situation, and the cures which are available to them. In conjunction with this dramatic relief could be used in which clients are provided with helpful affective experiences to raise emotions related to problem behaviours. For example, problem related events such death or serious illness of a friend or family member may move precontemplators emotionally. Also environmental evaluation, in which the client assesses the impact the behaviour is having on the lifestyle of family and friends, is of value. Initially therefore the goal is to move a client from precontemplation to contemplation rather than expecting a dramatic leap to the action or maintenance stages.

Contemplation to Preparation
Once the client moves into the contemplation stage processes such as consciousness raising, dramatic relief and environmental reevaluation are still of significant value.
Prochaska and DiClemente (1992) believed that contemplators in particular benefit from the effects of environmental reevaluation. With this they become more aware of the damage their behaviour is causing to those close to them. A typical question put to them may assess their feelings regarding the deteriorating environment they are putting their family and friends in. It is at this point when the client awareness of the their problem has increased that they experience increased freedom to evaluate themselves cognitively and affectively. Therefore self reappraisal in which the client reassesses their sense of self in relation to maintaining or changing their behaviour, that is their worth or value as a person is emphasised at this point. Increased awareness of and use of these processes is recommended to move them into the preparation stage. Prochaska and DiClemente (1992) also noted that at this point a balance must be struck between forcing premature change and allowing the person to become a chronic contemplator.

**Preparation - Action**

In the preparation stage clients have demonstrated a willingness to change in the near future. As many individuals at this point will have previously relapsed, this is an important point where they reflect on the mistakes and helpful strategies from past attempts. DiClemente, Prochaska, Fairhurst and Velicer, W.F., (1991) recommend the setting up of an action plan, or taking small steps towards action, such as stimulus control. An example of this is people with addictive habits reducing the situations where they come into contact with or are reminded of addictive substances. Also during this stage many people will take the first small steps towards action. Crucially on entering into action individuals need to develop a sense of self liberation, that is the belief that they have the autonomy to change their lives (Prochaska and DiClemente 1992). It is also recommended they set up a clear action plan and if necessary focus on the behavioural processes that will soon be required in action. Overall in the first three stages it is recommended that cognitive and affective measures are used.
**Action - Maintenance**

The timeframe for action stage is the maintaining of the health behaviour for 6 months. Prochaska and DiClemente (1992 p306) point out that when the person moves into the action stage greater use needs to be made of behavioural processes such as counterconditioning, stimulus control and reinforcement management. This can be an exceptionally stressful time for the client, in which they experience new limits on their personal freedom. Helping relationships and social support become increasingly important, as it may be vital in stressful times that there is at least one person who is freely available to help. With this in mind the therapist may take the role of a friend and in this way reduce the stress of the many changes the client needs to make. The role of self-help groups is also emphasised at this point.

**Maintenance**

After six months in action the client moves into maintenance. Prochaska and Norcross (1999 p503) stress the importance of preparing the client for maintenance. In maintenance they recommend that all of the previous processes be built on. The emphasis however is still on the behavioural processes, that is stimulus control, helping relationships, reinforcement management and counterconditioning the same processes as used in the action stage. It is also important at this point that the client makes a full assessment of factors likely to cause relapse. This should involve an open assessment of the alternatives they have for coping with problem situations rather than relapsing into their problem behaviour. A crucial aspect at this point is the instilling in the client of the sense that they are developing into a person they are happy to be. For example an ex smoker needs to derive a greater sense of self worth from being a non-smoker than being a smoker. Wolfe (1992) also commented that in order for behavioural processes to be most effective this greater sense of self worth should also be shared with one significant other. The pattern above is an ideal stage transition, however, as previously mentioned health behaviour change may consist of several attempts with participants recycling through stages. DiClemente and Prochaska (1985 p338) commented that this should not be regarded as a
completely negative situation. Pointing out that many individuals who relapse move back
to contemplation seriously considering an attempt to alter behaviour again in the future.
In their two-year study with smokers 27% of those who relapsed initially were no longer
smoking. While no exact distinction is made between contemplators and preparers who
have relapsed from earlier attempts and those entering contemplation and preparation for
the first time, DiClemente and Prochaska recommended particular attention to the
cognitive measures of self efficacy and decisional balance to reassure participants who
have relapsed that future attempts can be successful.

In addition to being of benefit in therapy itself Velicer and Prochaska (1999) suggest that
the transtheoretical model may also greatly increase the numbers participating in and the
effectiveness of interventions. In a review of the literature, Brug, Campbell and Assema
(1999) found three criteria necessary for effective interventions. These were (1) Attention
being givern to motivators and reinforcers which are particularly relevant to people in the
target group, (2) Personalised self evaluation or self assessment techniques, (3)
Participants being given the opportunity to actively participate in the intervention.
Undeniably the most effective method of intervention which provides all of these criteria
is face to face counselling. The application of the transtheoretical model will enable face
to face counselling to be addressed effectively to meet these requirements. Unfortunately
as face to face counselling is expensive and time consuming it may never become
available to large groups of people. However, an alternative approach which may be of
benefit is the use of self help pamphlets as these can be distributed to a large percentage
of any eligible population.

Prochaska and DiClemente (1992), Velicer, Fava, Prochaska, Abrams and Emmons
(1995) and Velicer and Prochaska (1999) noted that the biggest problem with many
interventions is that they are designed for people ready to quit. However, in reality as
research based on the transtheoretical model points out this is only a small proportion of
participants. Therefore tailoring information on the basis of stages of change may address
the issues raised by Brug et al (1999) and this will enable interventions particularly self-
help pamphlets to be tailored to the stage of the person and in this way increase participation rates. Research to date shows that tailored interventions may be more effective in numerous ways. Kreuter, Bull, Clark and Oswald (1999) found that tailored information tended to be processed more thoughtfully as the person felt it was more relevant. Brug, Steenhaus, Assema and De Vries (1996) found tailored information was more likely to be read and remembered, discussed with others, perceived as interesting and more relevant. Therefore if valid, the transtheoretical model offers the opportunity to improve not only face to face counselling but also the quality, quantity and effectiveness of readily available self-help pamphlets. Velicer and Prochaska (1999) in a comparison of the advantages and effectiveness of clinic based programmes, home based programmes, community based interventions and public health policies, noted that while clinic based interventions such as one to one counselling have the highest success rate they are very limited in the amount of people they can reach. However, self-help pamphlets in particular those designed to reflect an individual’s stage of change have the potential to be available to large groups of people at low costs which in reality will yield better results in terms of health behaviour change.

Research Supporting The Transtheoretical Model

The potential of the transtheoretical model to dramatically increase adherence to health behaviours has led to considerable research regarding its validity. A summary of the general research regarding the model now follows.

Early research on stages of change was conducted mainly with smokers (Prochaska and DiClemente 1983) and other addictive behaviours (DiClemente and Hughes 1990). Prochaska and DiClemente’s research in a cross sectional study of 872 smokers changing their habits on their own found in line with theory that different processes were emphasised at different stages, with precontemplataters using the least amount of processes. Those in contemplation focused on consciousness raising with self reevaluation being used in both contemplation and action. Also in action self liberation, reinforcement
management and helping relationships scored highly. Those in maintenance scored highly on counterconditioning and stimulus control, with these processes also being used highly in the action stage.

In a later study Prochaska and DiClemente (1992) found that with 570 smokers assigned to home based treatment programmes stage of change was predictive of successful treatment, with only 3% of precontemplators taking action after six months. However, if the precontemplators moved to contemplation by 1 month their chance of success doubled. Similar results were found with contemplators. Research at the Rhode Island Cancer Research Unit, also found that computer generated interventions based on the transtheoretical model performed significantly better than the standard manuals of the American Lung Association. Therefore if treatment is specific to stage it appears the chances of success can double. Medieros and Prochaska (1993) found that stage of change was the highest predictor of drop out from psychotherapy with again precontemplators being more likely to drop out. The same study also found that participants in the action stage at onset were more likely to terminate therapy quickly but also appropriately. These studies lend support to the model but a key question is whether the model will generalise across health behaviours.

Perhaps the most dramatic demonstration of the model across health behaviours is the research by Prochaska, Velicer, Rossi and Goldstein (1994) with 3,858 participants demonstrating a range of problem behaviours. The behaviours studied were smoking cessation, quitting cocaine, weight management, high fat diets, adolescent delinquent behaviour, safer sex, condom use, sunscreen use, radon gas exposure, exercise acquisition, mammography screening and physicians preventive practices with smokers. Prochaska et al commented that the behaviours covered were both addictive and non addictive, with some socially acceptable and others not, with some being illegal and others not. However all of the behaviours required long term adherence to improved health behaviour. Prochaska et al (1994) focused on the commonalities with stages of change and decisional balance across groups. The results partially supported the pattern
outlined in the transtheoretical model. With the 12 behaviours the cons were higher than
the pros with precontemplaters. However, in the action stage with 11 behaviours the pros
outweighed the cons. Interestingly with all behaviours the pros were higher for
contemplaters than precontemplaters. However, the point of crossover between the pros
and cons was not fully consistent. With 8 behaviours in line with the model this took
place between contemplation and preparation. On the other hand with sunscreen use,
delinquent behaviours, high fat diets and mammography screening crossover did not
occur until action. Disappointingly no research was conducted on the processes of
change. However Steptoe, Doherty, Rink, Kerry and Kendrick (1999) found brief
behavioural counselling based on the model to be effective in reducing smoking, dietary
fat intake and regular physical activity.

Laforge, Velicer , Richmond and Owen (1999) in further support for the model found
similarities with stage distribution for 5 health behaviours (smoking, low fat diets, regular
exercise, reducing stress and losing weight) in samples in the United States and Australia.
Suris, Carmen Trapp, DiClemente, Cousins. (1998) concluded the model was applicable
to Mexican American women suffering with obesity. Lopez, Gonzalez, Mateos, Kearney
and Gibney (2000) found stage classification to be applicable to nutrition attitudes in
Spanish populations. These studies imply that the model may offer a useful tool for the
classification of participants and the pattern of interventions across cultures. However not
all researchers have accepted the validity of the transtheoretical model in relation to either
addictive or non-addictive behaviours. A brief summary of their research and
conclusions now follows

**Criticism of the Transtheoretical Model**

Several researchers most notably Bandura (1997), Sutton (1996, 2000, 2001), Ashworth
(1997) and Whitlaw, Baldwin, Bunton and Flynn (2000) have criticised the concept of a
stage model and its validity in relation to even addictive behaviours. Bandura (1997)
points out that human function is simply too diverse to fit neatly into discrete sequential
stages. Criticising the transtheoretical model directly Bandura claimed that the first two stages were merely differing degrees of intention, with the remaining stages simply being “Gradations of regularity or duration of behavioural adoption rather than differences in kind”. For example Bandura pointed out someone exercising regularly for less than six months is suddenly propelled from one stage (action) to another stage (maintenance) once they continue exercising for more than six months. Bandura argued this is not a valid distinction as one is merely a continuation of the other and therefore not a qualitative transformation to another point. The concept of relapse inherent in the transtheoretical model is also criticised by Bandura. In a true stage model he argued this is not possible. For example in nature a butterfly cannot return to being a caterpillar, or in Piaget’s theory of cognitive development a formal operational person cannot revert to a pre-operational person. Overall Bandura believed that in classifying people on the basis of those who have no intention to change, those who have some intention to change and those maintaining change for varying lengths of time the theory revealed little not already known to practitioners. Also as the stage classifications were faulty any interventions based on them must also be inherently defective or certainly weaker than full interventions which covered all of the determinants of health behaviour.

Sutton (1996) in agreement with Bandura and in an extensive criticism of the transtheoretical model, pointed out again that the categorisation of individuals into different stages in which it is assumed at certain times individuals cross certain thresholds and start using different processes is highly artificial. Sutton again agreed with Bandura that there was no evidence to suggest that a smoker having spent 6 months in the action stage will suddenly make a qualitative change to the processes used in maintenance. Sutton suggested that the only time such thresholds might apply is in clinical treatment programmes when on a given date a relapse prevention programme is introduced.

Sutton (1996) also criticised the early evidence supporting the transtheoretical model. For instance in the McConnaughy et al (1989) study using the University of Rhode Island change assessment questionnaire it was found in support of the theory that the
correlations between adjacent stages were higher than the correlations between non adjacent stages. Sutton criticised this on 2 points, firstly in the McConnaughy et al (1989) study correlations were almost as high between non adjacent stages, perhaps showing no significant differences with the correlations between adjacent stages. Also in later research Abellanas and McLellan (1993) found high correlations between adjacent stages and a negative correlation of -.5 between precontemplators and contemplators. Sutton (2000) again criticised the cross sectional evidence for stages of change suggesting that the use of processes in many studies follows a linear pattern. Meaning they are in fact pseudo stages and not true stages. Budd and Rollnick (1996) in a study with 174 heavy drinkers also found a lack of discriminative validity between the first 3 stages. Suggesting that these 3 stages may really be one stage, which indicates a willingness or readiness to change. Sutton argued that data such as this showing that individuals could have high scores on 2 stages simultaneously, which in effect indicates that they were at 2 stages simultaneously, contradicts the entire theory of the model. Sutton (1996) believed it to be more helpful to think in terms of states of change rather than stages in that states carry no order of sequencing.

Sutton (1996) also criticised the second major dimension of the transtheoretical model that is the matching of the stage with different processes. Sutton argued that because different processes are emphasized at different stages this does not mean they may necessarily be helping the person move between stages. With an individual at the contemplation stage who was using consciousness raising for perhaps 2 years, it could be argued that this process was not helping them change. Sutton also criticised the methods used by Proschaska, Velicer, Guadagnoli., Rossi., DiClemente, (1991) pointing out that comparisons were not made between contemplaters who did not progress and those who did. Concluding that it was only by comparisons such as this that it would be possible to infer that consciousness raising was truly influential with contemplaters. In addition Sutton queried the sample sizes in the initial studies in that the precontemplation to contemplation and contemplation to action groups consisted of 14 and 17 participants.
Sutton also queried whether in fact stage matched interventions were more effective than standardized interventions. He pointed out that in studies by Prochaska et al (1993) and Velicer et al (1993), with smokers no significant difference emerged between stage matched treatments and standard treatments. Differences in fact only emerged when contact was increased with the participants. Therefore any improvement may be more due to the repeated contact rather than any difference in interventions. In a later paper Sutton (2000) in evaluating the current research on the transtheoretical model pointed out that many of the studies are cross sectional and therefore not true tests of a stage model. Also in studies that compared scores on self efficacy across the first three stages (precontemplation, contemplation and preparation) the pattern of scores in several studies did not follow a discontinuity pattern expected of a stage model, but in fact followed a linear pattern more suited to a pseudo – stage model. Overall Sutton describes the theory as an ideal model which may have some value in designing interventions in treatment and clinical or highly controlled settings, but it is not a model which describes how people change particularly outside of treatment programmes. Ashworth (1997) called for more studies comparing stage based and non-stage based interventions. Whitelaw et al (2000) called for increased quality quantitative studies in conjunction with practitioner orientated qualitative case studies. In addition they queried whether the current popularity of the model based largely its simplicity might lead to the neglect in the study or application of other interventions.

Having covered the general background of the model as the focus of this thesis is dietary behaviour a review of the research in relation to dietary behaviour now follows.

**Application to Dietary Behaviour**

As the application of the transtheoretical model to areas outside of the addictions has increased several researchers have examined the validity of the model in relation to dietary behaviour. The results of several of the core studies are now summarised. Curry, Kristal and Bowen (1992) found in two samples consisting in total of 1241 participants in a cross sectional study that fat intake decreased with progress through stages. Scores for those in precontemplation and contemplation did not differ significantly but differed
significantly from scores in preparation action and maintenance, with scores in these
stages again not differing significantly. Greene, Rossi, Reed, Willey and Prochaska
(1994) again in a cross sectional study found that fat intake decreased linearly with
progress through the stages however it appeared many in the action and maintenance
stages still consumed above the recommended level of fat. Steptoe, Wijetunge, Doherty
and Wardle (1996) in a sample of 366 south London residents again found that total fat
intake tended to decrease with stage progression, with 75.8% of participants in
maintenance and 70% of participants in action scoring exceptionally low on fat intake.
Steptoe et al also noted however that many participants in precontemplation also scored
low with fat intake. Therefore problems may arise in some cases with stage classification.

Brug, Hospers and Kok (1997) again in a cross sectional study with fat intake found again
that while it decreased across stages many in maintenance still consumed above the
recommended level. Greene and Rossi (1998) in a longitudinal study with 296
participants over 18 months found that interventions targeted to stage had the potential to
accelerate fat intake reduction but not always to less than 30% of dietary intake.
McDonnell Roberts and Lee (1998) with a cross sectional sample found that dietary fat
intake differed significantly between those in maintenance and all other stages. Simmons
and Mesui (1999) in a sample of 105 Pacific islanders found that those in the
maintenance and action stages rated the advantages of a low fat diet as greater than the
disadvantages with the reverse true for those in the pre-action stages. Nitzke, Auld and
McNulty (1999) found that dieticians were more likely to be in the action or maintenance
stages for fat intake.

In addition to fat intake, Campbell, DeVillis and Strecher (1994) researched the intake of
fruit and vegetables in relation to the model. Glanz, Patterson, Kristal and DiClemente
(1994) found fibre intake to increase in the post action stages this again a cross sectional
study. With the more general concept of healthy eating Graff, Gaag, Kaftos (1997)
concluded that the stages in the transtheoretical model made a useful distinction between
people with different attitudes to diet and as such could be of benefit to nutrition
education. It is worth noting that the vast majority of these studies were cross sectional with only one Greene and Rossi (1998) completing an 18-month follow up. Some support for the transtheoretical model was demonstrated, overall in all studies with it being found that fat consumption reduced with stage progression.

With regard to the constructs associated with the transtheoretical model Steptoe et al (1996), McDonnell et al (1998) and Simmons and Mesui (1999) found in relation to low fat dieting that decisional balance broadly followed that outlined in the model with the pros increasing and cons decreasing with stage progression. Brug Hospers and Kok (1997) found social support in line with the model to score highly in action, with self efficacy being low in preparation and contemplation. Implying that these are points in which interventions focused on self efficacy may benefit future change. To date regarding the application of the model to dietary behaviour is inconclusive and is perhaps best summed up by Steptoe et al (1996) who concluded that support for the model is at best moderate. At this point it is of interest to focus on some of the unique problems associated with applying the transtheoretical model to dietary change.

Firstly dietary behaviour unlike smoking is non-addictive, therefore in applying the model considerable methodological and conceptual problems arise. Whereas addictive behaviours require elimination, Glanz et al (1994) point out that dietary behaviour merely requires modification, it is not for example advisable for participants to eliminate fat intake completely. Sternberg (1985) commented that the concept of controlled food use is difficult to define as no clear demarcation exists between the controlled and uncontrolled use of food. As a consequence of these, it is unclear how to properly measure a change of behaviour. Brug et al (1997) observed that many participants in the action and maintenance stages though having lower fat intake were still above the recommended levels. This may be a crucial factor as Brug, Van Assema, Kok, Lenderink and Glanz (1994) noted that individuals who rate their fat intake as high are more likely to reduce consumption. Therefore it appears likely that individuals who in reality need to change dietary behaviour further may in fact classify themselves in post action stages.
Brug et al (1994) found that up to 55% of participants who assessed their fat intake as low, that is below 35% of total intake, were unrealistic in their assessment, with the majority underestimating badly. Therefore while such individuals may rate themselves as maintaining a low fat diet, in reality it could be argued that they are precontemplaters who are unaware of their problem. However, arguing against this approach Kristal and Glanz (1999) suggested that many individuals will make clinically important change, which if stage classification were based simply on strict dietary criteria would be lost. For example if a participant in a dietary trial reduced their fat intake from 40% to 32% and maintained this for a year, could it be properly argued that this person was still in precontemplation because they had not reached a strict 30% fat intake criterion. Kristal and Glanz believed a strict dietary nutrient classification might mean an intervention which brought about considerable improvements being disregarded simply because it did not reach a mandatory cut off point. Mhurchu, Margetts and Speller (1997 p14) in discussing this point queried whether the model itself might be comprehensive enough to completely encompass dietary change. The transtheoretical model is in theory a sequential model meaning that once an individual has progressed beyond one stage they cannot be simultaneously at another stage. That is they should not have made change and at the same time be contemplating further change, this would imply they were in maintenance and contemplation at the same time. Again this is impossible with addictive behaviours like smoking where clearly someone who is abstaining from smoking cannot be thinking of abstaining further.

Jeffery and French (1999) in a study of weight change with 228 women over 3 years found that stage of change did not predict success in weight control. In fact while the results were not significant they were the opposite of that predicted with participants in action initially actually gaining more weight over three years than participants initially in precontemplation. There was however limited support for the model with participants in contemplation recording more weight loss than those in precontemplation. Significantly this is one of the few longitudinal studies conducted in relation to dietary change. Jeffery and French believed this called into question the generality of the stages classifications.
across behaviours. They pointed out that with addictive behaviour abstinence for more than 6 months is an indicator of success with the person less likely to relapse. Smoking for example is a difficult and stressful process in the short term, which becomes easier over time. Therefore the concentrated use of processes in the short term may be predictive of success. However, with weight control a need exists for a complex use of processes over the long term. Therefore after six months process use decreases in addictions, but this is the point where in fact weight loss is more difficult to maintain and the individual is in fact more likely to relapse perhaps necessitating increased process use.

Povey, Conner, James and Shepherd (1999) also criticised the time scales used as cut off points to categorise stages, e.g. the 6 months used to define movement from action to maintenance. They argued that the classification of people into different stages purely on the basis of time scales is contrary to one of the main conditions for stage models that people at different points are qualitatively distinct, suggesting that dietary behaviour consists of a series of changes rather than set changes. They called for more longitudinal studies which included the comparison of stage matched interventions with unmatched interventions in order to test the validity of the model further. However, it is concluded that even when this takes place many of the questions related to applying the model to a complex behaviour such as dietary change will still be unanswered.

Horwath (1999) in a review of the literature of the application of the model to dietary change found that overall 30 cross sectional studies and four longitudinal studies had been conducted to date. Horwath however pointed out that very few studies focused on the totality of the model and instead focused on single constructs such as the stages of change and their association with nutrient or food group intake. While it is undoubtedly of interest that certain stages indicate dietary habits this does not demonstrate the validity of the model as a whole. In fact of the 30 cross sectional studies 11 focused solely on stage, five on stages and decisional balance, five on stages and self efficacy, five on stages and processes, two on stages self efficacy and processes and two on stages self efficacy and decisional balance. With only study Horwath and Gulliver (1998) examining
all of the concepts stages, processes, self efficacy and decisional balance contained within the model. The four longitudinal studies focused on the relationship of stage to either fat intake fruit and vegetable intake or fibre intake. Horwath argued that this paucity of research on the model as a whole and in particular on the processes of change is a major failing on research related to the model in relation to dietary behaviour. Additional criticisms are the lack of proper longitudinal studies containing comparisons between stage matched and general interventions. Horwath (1999) in addition commented that it could not yet be stated with certainty that dietary behaviour followed a stage process. Horwath believed, however, that the potential of a model such as this to target large groups of people and perhaps greatly improve participation in studies means that further investigation is merited.

Overall with dietary behaviour it appears the transtheoretical model if applicable will require modification and that further research including longitudinal studies and comparisons between stage matched and general interventions is necessary to establish how extensive that modification needs to be.

**Summary**

The transtheoretical model was developed originally in the treatment of addictions (Prochaska and DiClemente 1992) but since then it has been applied to many fields including exercise adoption (Lee 1993), HIV prevention (Prochaska, Redding, Harlow, Rossi and Velicer 1994) and dietary change (Povey and Conner 1999). Research appears to support its validity in many fields. Prochaska et al (1994) found evidence supporting its application across 12 problem behaviours. Researchers such as Sutton (1996) and Bandura (1997) have criticised the model overall for being too artificial, and too ideal a concept of how people change. Without doubt the model needs further examination and development and this applies particularly in the areas other than addictions. Certainly with dietary behaviour where it is not 100% clear when behaviour changes and where the individual’s perceptions are often inaccurate the model faces significant problems. However, the possible significant advantages of tailored information and fitting processes
to stage means the model should not be dismissed as the potential benefits are considerable.

The next step therefore is an examination of the steps necessary to test the validity of the model in relation to dietary change. With this in mind the first step in this research will be an exploratory cross sectional study. This will focus on dietary fat intake and how the concepts of stage of change, processes of change, self efficacy and decisional balance interact with stage of change and level of fat intake. The purpose of this exploratory study is to establish a basis on which to research the transtheoretical model further in a more extensive longitudinal study. However before embarking on this study a brief summary of the overall research aims and contents of this thesis follows

**Research Aims**

(A) As stated in the introduction there is a pressing need for greater understanding of the factors surrounding dietary behaviour. Despite the destructive consequences to health and the cost to the nation in lost productivity maladaptive dietary behaviour, such as high fat intake is very resistant to change. Therefore a central aim of this thesis is gather information on the processes used by successful changers and to gain an insight into the factors which prevent the initiation and maintaining of dietary change.

(B) Linking in with this is the requirement for research on the information necessary to design effective interventions. In particular the content of widely available cost effective self help brochures, which crucially because of their availability have the potential to influence a substantial group of people and in so doing perhaps have the potential to outperform more time consuming interventions such as one to one counselling. A comparison will be made of the effectiveness of a standard intervention and a stage matched intervention.

(C) The current debate in psychology regarding the nature of health behaviour change and whether this follows a continuum or stage pattern model of change needs further
Therefore a cross sectional and longitudinal investigation of the processes and concepts associated with dietary change will be conducted. This will focus thoroughly on the processes and concepts of change associated with the transtheoretical model with the aim of testing the validity of this model in relation to dietary fat intake in addition to the pattern of low fat behaviour change over time.

(D) This thesis also provides the opportunity to assess the usefulness of the transtheoretical model in a sample of suffering a specific health problem in this instance type two diabetes which necessitates dietary change as part of it’s successful treatment. The successful strategies adopted by this group and their assessment of dietary interventions will hopefully provide insights into dietary behaviour change, which are transferable to other populations.

(E) The measurement of dietary behaviour and the processes associated with dietary behaviour are areas constantly developing and requiring research. In assessing the issues involved with dietary change and in assessing dietary fat intake an aim of this thesis is the development of items and questionnaires, which will contribute to future accurate measurement of these concepts.

(F) A final aim of this thesis is in addition to advancing the knowledge concerning dietary behaviour change is produce new questions regarding the nature of dietary and health behaviour change, in particular issues regarding the staged or continuum nature of change which can be tackled by future researchers.

**Contents of Thesis**

The present chapter has introduced the background information regarding the benefits of dietary behaviour change and the research to date supporting the transtheoretical and other stage models and the views of those researchers opposing the concept of a staged approach to health behaviour change. The unanswered questions arising from both these viewpoints and the question mark over the validity of a model developed with addictive
behaviours being applied unaltered to a range of health behaviours demonstrated the need for further research.

Chapter two covers a quantitative exploratory study at the University of Surrey, testing the processes and concepts associated with the transtheoretical model in a sample of staff and psychology students. The study examines the relationship between stages of change, the processes of change, self efficacy, decisional balance and a short low fat behaviour questionnaire. The purpose of this study being to gain an initial insight into the psychological processes and concepts associated with dietary change and from this to form a basis to conduct more detailed research. In addition to analysis on the basis of stages of change comparisons are also made using classifications of medium low and high fat intake based on the results of the low fat behaviour questionnaire.

In chapter three a qualitative investigation builds on the data from the quantitative study. The study contains 20 semi-structured interviews conducted with staff and students at the University of Surrey. Qualitative interviews give a more detailed insight into dietary behaviour change providing additional material for the revised questionnaires to be used in the main studies.

Chapter four consists of analysis of the results of a cross sectional study with clients with type two diabetes at a west London hospital followed by a detailed discussion. Analysis of results was conducted on the basis of stages of change and again on the basis of level of low fat behaviours. A pattern similar to the exploratory study at the University of Surrey emerges with process use increasing linearly as low fat behaviours increase. However more differences are found between stages with process use. Similarities and differences emerging with the pattern of process use outlined in the transtheoretical model are discussed.

Chapter five details the results of a 6 months longitudinal study with type two diabetics at Hammersmith hospital and the reactions of clients to stage matched and general self-help
pamphlets. Analysis is conducted within and between subjects. A picture emerges of specific cognitive and behavioural processes being significant in the pattern of dietary change. Interventions based on stages of change were not found to be more effective than general interventions.

Chapter six gives a detailed discussion of the research findings and an integration of the conclusions from all the studies. Implications for the application of the transtheoretical model to dietary behaviour arising from this thesis are outlined and the direction for future research in relation to the model and dietary behaviour in general are discussed.
Chapter 2

An exploratory study of the transtheoretical model and its application to dietary fat intake

Introduction
This aim of this exploratory study is to conduct a preliminary investigation of the issues arising from research regarding the transtheoretical model and dietary behaviour, in this instance dietary fat intake. However, the first step is to discuss briefly the methods used in the past to investigate the transtheoretical model and dietary change.

As mentioned in the literature review Horwath (1999) in a review of the research regarding the application of the model to dietary behaviour, found that 30 cross sectional studies and four longitudinal studies had been conducted to date. However, only one study Horwath and Gulliver (1998) examined all of the concepts related to the transtheoretical model that is stages of change, processes of change, self efficacy and decisional balance. Of the remainder some focused solely on stage of change, or on stages and perhaps one or two concepts, for example self efficacy and decisional balance.

Horwath commented that while many of these studies undoubtedly raised interesting points for example that certain stages indicate differing dietary habits, or that decisional balance pros increase with stage progression they have not demonstrated the validity of the model as a whole. Horwath argued that this lack of research on the entirety of the model is a major failing in research related to the model. An additional criticism made by Sutton 1996 regarding the transtheoretical model in general is the lack of proper longitudinal studies and the overabundance of cross sectional studies. Sutton argued to support the model it is necessary to demonstrate as outlined in the model that someone in precontemplation or contemplation actually uses consciousness raising to move forward. There are also very few studies with comparisons between stage matched and general interventions.
The first step in this thesis is to establish the means to address these problems. That is to design questionnaires focusing on all these aspects suitable for a longitudinal study. This will be done by firstly conducting an exploratory cross sectional study examining the four central constructs of the transtheoretical model discussed in the previous chapter. These are stages of change, processes of change, self efficacy and decisional balance. The study will test the following hypotheses:

**Hypotheses**

1: It is predicted that low fat behaviours will differ significantly between the stages. It is expected that differences between the pre action stages (precontemplation, contemplation and preparation) will not be significant but differences between pre and post action (action and maintenance) will be.

2: Regarding decisional balance, it is predicted that significant differences will be found between the perceived benefits and perceived obstacles between the stages. Research to date shows that in the early stages the cons or obstacles score higher than the benefits or pros in the precontemplation and contemplation stages with a cross over occurring in preparation with the benefits scoring higher in action and maintenance.

3: Process use will mirror that outlined in the transtheoretical model. That is cognitive and affective processes will be emphasised in the pre action stages and behavioural processes emphasised in the post action stages.

4: Self efficacy will show significant differences between the stages. In particular it is expected that self-efficacy will be lower in the pre than post action stages.

This exploratory study will examine these issues using a simple staging algorithm containing 5 possible responses to a question regarding fat intake, a decisional balance questionnaire consisting of 20 items, a process of change questionnaire consisting of 42 items and a self efficacy questionnaire containing 20 items. The following section
consists of an outline of the study with a description of the rationale and construction of the questionnaires and items used.

Method

Sample:
The sample consisted of 133 students and staff at the University of Surrey, with the sample of students including undergraduate, postgraduate and research students.

Procedure:
Participants were approached in lectures and asked if they were willing to complete a questionnaire examining attitudes to dietary behaviour. Several staff were approached in the psychology staff room and asked if they were willing to participate.

Materials
One questionnaire was used consisting of 6 sections, constructed as follows.

Section one
This section focused on demographics. Participants gave details of their age, sex, education level and either their occupation or if they were under 24 their parent's occupation. Copy in appendix one.

Section two
This consisted of the staging algorithm developed at the Cancer Prevention Research Centre Rhode Island and used by Greene and Rossi (1998). This contained one question "Do you consistently avoid eating high fat foods". Participants had the option of one of five replies and were allocated to a particular stage on the basis of their reply. For example, a participant who responded "Yes I have been for more than 6 months" would be allocated to the maintenance group. Copy in appendix one.

Section three
This consisted of a brief food behaviour questionnaire consisting of seven items selected from a 12 item scale developed by Bowen et al (1994). With item number 5 the American term broil was replaced with its English equivalent grill. Responses were measured on a
1-5 Likert scale. Sample item “I buy low fat foods to follow a low fat eating plan”. Full copy in appendix one.

Section four
This section was adapted from the “Decisional Balance” questionnaire for weight loss developed by O’Connell and Velicer (1988). Throughout the questionnaire the term “Losing Weight” was replaced with the term “low fat diet”. The questionnaire consisted of 20 items rated on a 1-5 Likert scale. Ten questions focused on the benefits of a low fat diet and ten questions focused on the problems with a low fat diet. Sample item benefits “My self respect would be higher on a low fat diet”. Sample item problems “Going on a low fat diet would be hard work” (Full copy in appendix one).

Section five
The fifth section examined the processes of change. It contained 42 items again rated on a 1-5 Likert scale. The questionnaire consisted of items drawn from 2 questionnaires: the “Processes of Change” for weight loss questionnaire of the university of Rhode Island Cancer Prevention Research Centre (Greene and Rossi 1998) and “Processes of Change” questionnaire from Bowen et al (1994).
Items 1-5 focused on consciousness raising and were taken from Bowen et al (1994). Sample item “I pay close attention to television programmes about low fat diets”.
Items 6-10 focused on social support and helping relationships. Items 6, 7, 8 and 10 were taken from Bowen et al (1994) and item 9 was taken from the Cancer Research Centre Scale. Sample item “I have someone in my life who cares about my diet”.
Items 11-15 focused on dramatic relief. Items 11 and 12 were taken from Bowen et al (1994) and items 13-15 from the Cancer Prevention Research Centre scale. Sample item “I react emotionally to health warnings about high fat foods”.
Items 16-20 focused on environmental reevaluation and were taken from Bowen et al (1994). Sample item “I think about the need for more people to understand the importance of a low fat diet”.

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Items 21-25 examined self reevaluation. All items were taken from Bowen et al (1994). Sample item “Choosing low fat foods gives me a feeling of control”.

Items 26-30 focused on reinforcement management. Items 27 and 29 were taken from Bowen et al (1994) and items 26, 28 and 30 from Cancer Research Centre Scale. Sample item “I am rewarded by others when I keep to low fat foods”.

Items 31-34 focused on self liberation. All items were taken from Cancer Research Centre Scale. Sample item “I make commitments to eat low fat foods”.

Items 35-38 focused on counter conditioning. Item 35 was taken from Bowen et al (1994). Items 36-38 were taken from Cancer Research Centre Scale. Sample item “Instead of eating high fat foods I engage in physical activity”.

Items 39-42 focused on stimulus control. All items taken from Cancer Research Centre Scale. Sample item “I remove things from my home that remind me of eating high fat foods” (Copy of complete questionnaire in appendix one).

Section six
Section six examined self efficacy in relation to the 5 primary factors for weight control identified by Clark and Abrams (1991). It consist of 20 items, for each item participants rated their confidence for avoiding high fat foods on a scale from 1-9. The questionnaire was adapted from the Clark and Abrams (1991) “Self Efficacy in Weight Management Scale”. Items 1, 6, 11 and 16 measured negative emotions, items 2, 7, 12 and 17 measured availability, items 3, 8, 13 and 18 measured social pressure, items 4, 9, 14 and 19 physical discomfort and items 5, 10, 15 and 20 positive activities. The phrase “eating high fat foods” was introduced into each item. Sample items “I can resist eating high fat foods when I am at a party” and “I can resist eating high fat foods even when I have to say no to others” (Full copy in Appendix one).

Prior to data analysis an examination of the factor structure of the questionnaires and their reliability is necessary. The results of this analysis are as follows.
Data reduction and scale reliability

The validity and reliability of questionnaires were assessed using a principal component analysis of the processes, self efficacy and decisional balance scales and an alpha reliability analysis of the subscales. Firstly with the processes of change questionnaire a principal component analysis using direct oblimin rotation converged in 38 rotations giving 9 factors with eigen values greater than one which in total explained 71% of the variance (copy in appendix one). The factors loaded broadly in line with the structure of the questionnaire. Items 1-5 consciousness raising with the exception of item 2 loaded on a single factor ($a=.79$). Items 6-10 social support again loaded on a single factor ($a=.80$). Items 11-15 dramatic relief loaded on a single factor ($a=.87$). Items 16-20 environmental reevaluation loaded on a single factor with the exception of item 20 ($a=.72$). Items 21-25 self reevaluation loaded on a single factor ($a=.90$). Items 26-30 reinforcement management however did not load as a single factor, 3 items loaded with social support and 2 with counter conditioning. However, alpha reliability equaled .84. Items 31-34 self liberation with the exception of item 34 loaded as single factor ($a=.84$). Items 35-38 counter conditioning loaded as single factor ($a=.76$) Items 39-42 stimulus control loaded as single factor ($a=.89$).

With decisional balance principal components analysis giving 2 factors converged in 6 iterations explaining 50% of variance (copy in appendix one). The pro items numbers 2, 4, 6, 8, 10, 12, 14, 16, 18, 20 loaded on to a single factor ($a=88$). The con items numbers 1, 3, 5, 7, 9, 11, 13, 15, 17, 19 loaded a single factor with the exception of item 17 which although it scored above .3 on the pros scored higher on the con scale and therefore is included in the con scale ($a=.86$). Self efficacy consisted of a unitary factor $a= .93$.

The results of data reduction broadly supported the structure of the scale as outlined in the literature discussed. Therefore analysis was conducted on the results on the basis outlined in the questionnaire.
Results

Of the 150 questionnaires distributed 133 were returned. Participants had a mean age of 25, minimum age 18, maximum age 54. 106 were females and 22 were males with 5 participants failing to complete this item. 56 of the participants were educated to A level standard, 18 to O level standard, 40 to degree level and 15 to MSc level, with 4 participants failing to answer this item. With stage 45 participants or 34% were in precontemplation, 17 or 13% were in contemplation, 8 or 6% were in preparation, 15 or 11% were in action and 48 or 36% were in maintenance all respondents answered this item. Distribution for stages summarized in figure 2.1.

Figure 2.1: Bar chart showing Stage Distribution

Precon = Precontemplation Con = Contemplation Prepare = Preparation, Action = Action Mainten = Maintenance
Differences between the five stages in terms of processes, decisional balance pros and cons, self efficacy and low fat behaviours were analysed using one way anovas. In each case Levene's test for equality of variance was used to test for of applying anova tests. In all cases except for stimulus control the data were suitable for analysis by anova tests. For the analysis of stimulus control a Kruskal-Wallis test was used. These results are shown in table 2.2 and figures 2.2 and 2.3.

**Low fat behaviours**

The scores on the 7 items measuring low fat behaviours were combined to give an overall score for each individual (range of 7-35 for overall score). As expected precontemplators scored lowest they were followed by preparation, then contemplators followed maintainers and lastly by action. Significant results were found for the interaction between stage and fat intake, $F(4) = 21.04$, $p < .001$. However the Scheffe post hoc tests found significant differences only between the precontemplators and contemplators ($p < .01$), precontemplators and action group ($p < .01$) and precontemplators and maintainers ($p < .01$), differences between precontemplators and preparers were not significant, nor were there any significant differences between any other groups. Results summarised in table 2.1.
Table 2.1: Mean scores for transtheoretical processes and concepts for each stage

<table>
<thead>
<tr>
<th>Process</th>
<th>Precontemplation</th>
<th>Contemplation</th>
<th>Preparation</th>
<th>Action</th>
<th>Maintenance</th>
<th>F value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consciousness raising</td>
<td>11.5(3.75)&lt;sup&gt;a&lt;/sup&gt;</td>
<td>14.0(4.1)&lt;sup&gt;b&lt;/sup&gt;</td>
<td>13.3 (3.25)</td>
<td>13.9(4.2)</td>
<td>13.4(3.7)</td>
<td>2.39*</td>
</tr>
<tr>
<td>Dramatic relief</td>
<td>9.3(3.1)</td>
<td>11.9(4.6)</td>
<td>10.3(4.0)</td>
<td>12.1(4.6)</td>
<td>11.1(4.5)</td>
<td>2.09</td>
</tr>
<tr>
<td>Environmental reevaluation</td>
<td>11.3(3.6)</td>
<td>12.8(4.8)</td>
<td>10.6(3.5)</td>
<td>12.9(3.3)</td>
<td>12.5(3.8)</td>
<td>1.22</td>
</tr>
<tr>
<td>Self reevaluation</td>
<td>10.2(4.4)&lt;sup&gt;a&lt;/sup&gt;</td>
<td>15.6(5.8)&lt;sup&gt;b&lt;/sup&gt;</td>
<td>15.2(5.7)</td>
<td>17.0(3.8)&lt;sup&gt;b&lt;/sup&gt;</td>
<td>14.0(5.4)&lt;sup&gt;b&lt;/sup&gt;</td>
<td>7.77**</td>
</tr>
<tr>
<td>Self liberation</td>
<td>8.3(3.4)&lt;sup&gt;a&lt;/sup&gt;</td>
<td>11.6(3.8)&lt;sup&gt;b&lt;/sup&gt;</td>
<td>12.0(3.0)</td>
<td>14.9(2.6)&lt;sup&gt;b&lt;/sup&gt;</td>
<td>11.8(3.9)&lt;sup&gt;b&lt;/sup&gt;</td>
<td>11.86**</td>
</tr>
<tr>
<td>Reinforcement management</td>
<td>8.1(3.4)&lt;sup&gt;a&lt;/sup&gt;</td>
<td>11.7(4.7)&lt;sup&gt;b&lt;/sup&gt;</td>
<td>10.1(3.3)</td>
<td>11.4(3.0)</td>
<td>11.6(4.3)&lt;sup&gt;b&lt;/sup&gt;</td>
<td>4.87**</td>
</tr>
<tr>
<td>Social support</td>
<td>11.1(4.0)</td>
<td>13.78(5.5)</td>
<td>11.8(3.3)</td>
<td>14.87(5.6)</td>
<td>12.7(4.5)</td>
<td>2.26</td>
</tr>
<tr>
<td>Counter conditioning</td>
<td>7.6(3.4)</td>
<td>8.7(3.2)</td>
<td>7.1(2.9)</td>
<td>8.8(2.7)</td>
<td>9.5(3.1)</td>
<td>2.54*</td>
</tr>
<tr>
<td>Stimulus control</td>
<td>5.2(1.9)&lt;sup&gt;a&lt;/sup&gt;</td>
<td>7.7(3.1)&lt;sup&gt;b&lt;/sup&gt;</td>
<td>6.6(3.0)</td>
<td>7.1(3.3)</td>
<td>6.4(3.2)</td>
<td>13.18 (Chi)**</td>
</tr>
<tr>
<td>Low fat behaviours</td>
<td>14.7(4.6)</td>
<td>21.0(4.3)</td>
<td>18.7(6.0)</td>
<td>24.0(4.5)</td>
<td>23.0(4.9)</td>
<td>21.04**</td>
</tr>
<tr>
<td>Decisional balance pros</td>
<td>23.4(8.2)&lt;sup&gt;a&lt;/sup&gt;</td>
<td>33.9(9.7)&lt;sup&gt;b&lt;/sup&gt;</td>
<td>35.0(4.5)&lt;sup&gt;b&lt;/sup&gt;</td>
<td>30.3(8.0)&lt;sup&gt;b&lt;/sup&gt;</td>
<td>27.6(7.3)</td>
<td>7.38**</td>
</tr>
<tr>
<td>Decisional balance cons</td>
<td>31.3(8.5)&lt;sup&gt;a&lt;/sup&gt;</td>
<td>29.3(5.5)</td>
<td>33.0(6.4)</td>
<td>25.7(9.0)</td>
<td>25.5(7.7)&lt;sup&gt;b&lt;/sup&gt;</td>
<td>3.92**</td>
</tr>
<tr>
<td>Self efficacy</td>
<td>116.2(32.8)&lt;sup&gt;a&lt;/sup&gt;</td>
<td>114.0(27.0)</td>
<td>82.7(31.4)&lt;sup&gt;b&lt;/sup&gt;</td>
<td>119.13(28.4)</td>
<td>131.4(23.3)&lt;sup&gt;a&lt;/sup&gt;</td>
<td>5.75**</td>
</tr>
</tbody>
</table>

- P<.05; **P<.01; Standard Deviation in brackets. Means with same superscript do not differ at p<.05.
Figure 2.2: Mean scores transtheoretical processes for each stage of change

Precon = Precontemplation, Con = Contemplation, Prepare = Preparation, Action = Action, Mainten = Maintenance
Figure 2.3. Mean scores transtheoretical concepts for each stage of change

Pros = Decisional Balance Benefits, Cons = Decisional Balance Disadvantages, Efficacy = Self Efficacy
Precon = Precontemplation, Con = Contemplation, Prepare = Preparation, Action = Action, Mainten = Maintenance
Following the recommendations for the decisional balance questionnaire (O’Connell and Velicer 1988) all pro or benefit items were combined to give an overall pros score and all con or negative items were combined to give an overall cons score (range of 10-50 for each concept). With the pro items precontemplators again scored lowest, followed by maintainers, then participants in action followed by contemplators, with the highest score in the preparation group. Results of a one way analysis of variance showed a significant effect for stage F(4) = 7.38, p< .001. Scheffe post hoc tests found significant differences between the precontemplators and contemplators (p<.01), precontemplators and preparation (p<.01) and preparation and action (p<.05) . There was no significant difference between the precontemplators and the maintenance group, or between the other groups. With the cons or disadvantages, the preparation group scored highest, followed by precontemplators then contemplators followed by participants in action and then maintenance with a mean of 25.6. A one way analysis of variance gave a result of F(4) =3.92, p<.01 showing a significant difference in cons between stages. Scheffe post hoc tests found a significant difference only between precontemplators and maintainers (p. <.01).

In a comparison between the pros and cons paired sample t test found significant differences with precontemplators t(44) = -6.51, p<.01, with the cons scoring significantly higher than the pros. Differences with the action group also approached significance t(14) = 1.87, p=.08 in this instance the pros scored higher than the cons.

Processes of change

The measures for consciousness raising, social support, dramatic relief, environmental reevaluation, self reevaluation and reinforcement management consisted of 5 items on a 1-5 Likert scale. These were combined to give a range of scores for each process of 5-25. The measures for self liberation, counter conditioning, and stimulus control consisted of
four items again on a 1-5 Likert scale. These were combined to give a range of scores for each process of 4-20. As Levenes test for equality of variance was insignificant for all processes with the exception of stimulus control a one way analysis of variance was conducted all processes with the exception of stimulus control where a Krusal Wallace test of variance was conducted. Results are previously summarised in table 2.1 and figure 2.2.

One way anovas were conducted and significant differences found between the stages with consciousness raising, self reevaluation, self liberation, reinforcement management, counter conditioning, and stimulus control. Scheffe post hoc tests were conducted to locate significant differences between groups. With consciousness raising the test was not sufficiently sensitive to locate differences however the greatest difference was between precontemplation and contemplation and this difference was confirmed as significant in an independent t test t(59) =-2.24,p<.05. With self reevaluation Scheffe post hoc tests found significant differences between precontemplation and contemplation (p =.01), precontemplation and action (p<.01) and precontemplation and maintenance (p =.01) . With reinforcement management Scheffe post hoc tests found significant differences between precontemplation and contemplation (p =.05), precontemplation and maintenance (p <.01), with the differences between precontemplation and action close to significance (p =.09). With self liberation Scheffe post hoc tests found significant differences between precontemplation and contemplation (p<.05), precontemplation and action (p<.01) and precontemplation and maintenance (p<.01), the differences between action and maintenance approached significance (p = .08). With stimulus control as a Kruskal Wallace test of significance was conducted this test does not specify at which point significant differences emerge but the greatest differences were between precontemplation and contemplation. Overall therefore significant differences emerged only between precontemplation and later stages.
Global Self Efficacy
To obtain a global self efficacy score, all items were combined (Range 9-180). Maintainers scored highest followed by participants in action, surprisingly precontemplaters were next then contemplation with the lowest score in preparation. One way analysis of variance found significant differences in global self efficacy between the stages. Scheffe post hoc tests found significant differences between preparation and precontemplation ($p = .05$) and preparation and maintenance ($p<.01$), scores between preparation and action close to significance ($p = .08$). Results summarised in table 2.1.

Self Efficacy Subscales
All efficacy subscales consisted of a combination of 4 items (Range 9-36). Levenes test of equality of variance proved insignificant for all subscales, meaning the data was suitable for analysis of variance tests. Results are summarised in table 2.2.
One way analysis of variance found significant differences between stages for all self efficacy subscales. Scheffe post hoc tests found significant differences between preparation and maintenance for available efficacy ($p<.01$), social efficacy ($p = .01$), physical efficacy ($p = .01$) and positive efficacy ($p<.01$) with emotional efficacy Scheffe post hoc test close to significance ($P = .06$). With available efficacy differences between preparation and precontemplation were also close to significance ($p=.07$). With positive activities efficacy Scheffe post hoc test found significant differences between preparation and precontemplation ($p = .01$), preparation and contemplation ($p = .01$) and preparation and action ($p = .01$).
Table 2.2: Mean scores self efficacy subscales for each stage of change

<table>
<thead>
<tr>
<th>Subscale</th>
<th>Precon</th>
<th>Con</th>
<th>Prepare</th>
<th>Action</th>
<th>Mainten</th>
<th>F ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emotion</td>
<td>20.55(8.5)</td>
<td>19.81(8.1)</td>
<td>13.50(7.8)</td>
<td>21.00(8.7)</td>
<td>22.92(7.5)</td>
<td>2.50*</td>
</tr>
<tr>
<td>Available</td>
<td>22.47(7.6)</td>
<td>20.94(6.4)</td>
<td>16.63(7.2)</td>
<td>23.40(5.9)</td>
<td>26.50(5.3)</td>
<td>5.67**</td>
</tr>
<tr>
<td>Social</td>
<td>23.70(7.9)</td>
<td>20.63(6.8)</td>
<td>16.38(8.1)</td>
<td>22.20(7.1)</td>
<td>25.96(5.9)</td>
<td>4.30**</td>
</tr>
<tr>
<td>Physical</td>
<td>23.60(6.8)</td>
<td>25.56(4.2)</td>
<td>18.38(7.4)</td>
<td>24.93(7.0)</td>
<td>27.04(5.7)</td>
<td>4.08**</td>
</tr>
<tr>
<td>Positive</td>
<td>25.93(6.7)</td>
<td>27.13(6.0)</td>
<td>17.88(6.6)</td>
<td>27.60(4.4)</td>
<td>28.98(5.3)</td>
<td>6.24**</td>
</tr>
</tbody>
</table>

* p<.05, ** p<.01 Means with the same superscripts do not differ at p<.05

Precon = Precontemplation, Con = Contemplation, Prepare = Preparation, Mainten = Maintenance.


Discussion

Of the four initial hypotheses none was fully supported. With hypothesis one regarding low fat behaviours this was expected to increase with stage progression. While this was supported to a degree the increase however was not linear or as expected with the transtheoretical model. To be in line with the model low fat behaviours are expected to significantly increase only after the preparation stage, with no significant differences between the three pre action stages. In this sample, after a significant increase from precontemplation to contemplation, low fat behaviours decreased again in preparation before increasing again in action and maintenance. To be fully in line with the model significant differences are expected to occur also between action and maintenance on the one hand with contemplation and preparation on the other. It is impossible to say from this sample why this may be but there are two possible explanations. Firstly this may be an artifact of the measure, which only contained seven items and therefore may not have been sensitive enough to detect changes. Assema, Brug and Brants (1992) and McDonnell, Roberts and Lee (1998) measured dietary behaviour with questionnaires containing 25-20 items. This number of items may be required to accurately assess a
participant's dietary fat intake. A second explanation may be that with a dietary behaviour unlike an addictive behaviour, which is an all or nothing phenomenon, individuals may commence behaviour change in the early intentional pre action stages with the behaviour being fully adopted in the post action stages. Clearly this is an issue which requires examination in more detail in the following studies in this thesis.

With hypothesis two decisional balance this broadly followed the outline indicated in literature. Research by McDonnel et al (1998) and Steptoe et al (1996) found that the perceived benefits associated with low fat diets increased across the stages though this was not significant until the later stages. In the present study decisional balance pros scored lowest in precontemplation, with scores significantly different from those in contemplation, preparation and action. Scores, however, showed an unexpected decrease again in action and were lower again in maintenance. In fact unexpectedly there were no significant differences between maintainers and precontemplaters. A possible explanation for this is that individuals undertaking or about to undertake action may need to be more aware of the need to constantly reinforce the benefits associated with their behaviour. However, once in action the necessity to do this may decrease and may decrease even further in the maintenance stage. At this point the behaviour is well established and the need to reinforce the benefits may not be as crucial. It is also possible that maintainers may see the benefits in a manner not covered by the questionnaire. Results with the cons or disadvantages were also erratic, while they were broadly lower across the stages being lowest in maintenance followed by action and highest in precontemplation which is broadly in line with the model, the decrease from precontemplation to contemplation, was followed by an unexpected increase in preparation. While this difference was not significant, it is interesting in that cons could be expected to decrease at this point, just before action is taken and a person is more aware of the benefits associated with change. It may be with dietary behaviour that the benefits and disadvantages are particularly emphasized at the preparation stage, as this is the point when an individual is acutely aware of the steps and disadvantages associated with behaviour change. Overall, however, crossover did take place with an increase in pros and decrease in cons as
expected taking place at the contemplation stage and being maintained until the post action stages which, indicates that decisional balance may play a significant role in dietary change. This needs to be investigated further and in particular at which points in the transtheoretical model the crossover between pros and cons takes place.

Results for the differences in the use of processes in the different stages of change were not fully in line with the transtheoretical model. With social support, dramatic relief and environmental reevaluation no significant differences were found between the stages. However, in line with the model scores for social support were highest in action, and counterconditioning scores were highest in maintenance. With environmental reevaluation scores were higher in contemplation as the model predicts, but they remained high in action and maintenance where lower scores are expected. In line with the model scores for the majority of processes were lowest in precontemplation, the exceptions being environmental reevaluation and counterconditioning, which scored lowest in preparation though these differences, were not significant.

Results for consciousness raising, self liberation, reinforcement management, stimulus control counterconditioning and self reevaluation while showing significant differences between stages only achieved this mainly between precontemplaters and other stages. For results to be in line with the transtheoretical model significant differences should appear between the later pre-action stages and action and maintenance. For example, with reinforcement management significant differences are expected between preparation and action but were not found here. With stimulus control, a behavioural process, while precontemplation scored lowest, unexpectedly participants in contemplation scored highest, whereas the model predicts stimulus control to be most effective between action and maintenance. Several processes scored highest in the action stage but not all were the expected behavioural processes. Scores for consciousness raising were virtually identical in action and contemplation, with consciousness raising being a cognitive process this should score significantly higher in contemplation. Self liberation which is predictive of
movement between preparation and action and self reevaluation which is predictive of
movement between contemplation and preparation both scored highest in the action stage.

The results for self liberation were the closest to being in line with the model with the
highest scores in preparation and action. A significant difference was also found between
two pre action stages, precontemplation and contemplation, and the difference between
the post action stages action and maintenance was also close to significance. The
transtheoretical model predicts that this process is most beneficial between preparation
and action and that use is lower in maintenance. Self reevaluation a process believed to be
most effective between contemplation and preparation, in fact scored highest in action.
However, in partial support for the model it also showed a significant difference between
precontemplation and contemplation. It may be with low fat behaviour that self
reevaluation is still emphasised in action when the person has made an initial change and
may still be preparing for more change.

Overall with process use an unclear picture emerges. Clearly processes are used and play
an important role in behaviour change but results in this study show significant increases
mainly between precontemplation and other stages with the differences between the
remaining stages where significant differences should emerge not being as clear cut.
Clearly further research with more detailed questionnaires is necessary.

The results with self efficacy proved to be the most interesting. Research by Brug et al
(1997) and Glanz et al (1994) showed self efficacy increasing throughout the stages and
peaking in action with a slight decrease in maintenance. However, in this sample while
scores in maintenance and action were the highest, they were not significantly different
from scores in precontemplation and contemplation. With total self efficacy and all
subscales, scores dipped dramatically lower in preparation and increased again
dramatically in action and maintenance. In the present study, however, self efficacy was
it was measured using two items. This implies that more detailed assessment of self
efficacy may give more detailed and different results. An explanation for this extreme dip in preparation scores may be that individuals in preparation are particularly alert to situations and emotions in which they will not resist fat intake. With regard to interventions it may be crucial at this point to plan a programme to reinforce participant’s self efficacy. Unfortunately the results suggest that participants in this study are unlikely to maintain low fat behaviours, as previous research demonstrates that individuals with low self efficacy scores are unlikely to maintain health behaviours (Abrams and Niaura 1987). Again the concept of self efficacy and dietary fat behaviours needs further research before any final conclusions are made.

However, before discussing the results further or suggesting improvements to the design for future studies problems with the specific sample in this study will be discussed. Firstly the sample was predominately female and consisted almost entirely of students. The lifestyle of students and the young age of the participants suggest a group with different attitudes and outlooks from the average person. While this may mean a homogenous lifestyle for participants partaking in this particular study, it is most certainly a different lifestyle and attitude from for example clinical populations where the transtheoretical model originated. It is expected that a clinical sample attempting to change their diet may have a more focused approach than students who may at best be mildly interested in dietary improvement. The distribution of the present sample across the stages was extremely uneven, with the smallest group (preparation) containing 8 participants and consisting of less than 10% of the total sample. This, however, is in line with the results found by previous researchers, for example Graaf, Gaag, Kaftos, Lennermas and Kearney (1997) found in a sample of 14,331 participants across the European Union that only 10% were in the contemplation, preparation or action stages. The percentage distribution of participants in the present study is actually a slight improvement on this. However for the type of analysis used ideally samples need to be of equal size and with similar demographics.
On closer examination of the data, scores were extremely low on some subscales indicating that several processes were virtually irrelevant to participants at any stage. With stimulus control for instance the highest scores were in the contemplation group at 7.7, indicating that it is virtually never used. Similar scores with reinforcement management and counterconditioning indicate again that these processes are rarely used at any stage. Scores on social support, environmental reevaluation, dramatic relief and consciousness raising are used only occasionally at best. Only self reevaluation achieved a score which indicated regular use. So while these processes play a part in promoting dietary change, other unknown strategies may also be playing a greater role. However, it is also possible that questionnaire items may not have fully measured the options or situations in which the process is applicable. Scores on decisional balance and self efficacy, which contained more items, produced results showing more than occasional use. In future studies it may be necessary to extend the process questionnaire, to contain at least 6 items to measure each process.

In conclusion this exploratory study suggests that while processes are used across the stages, many are only used occasionally with the majority of significant differences emerging between precontemplaters and the later stages. The remaining concepts of decisional balance and self efficacy also play a role with significant differences being found. However, improvements for future studies will include an improved dietary fat questionnaire, an extended process of change questionnaire and groups of equal size. This will be discussed further in the baseline study with a sample of type 2 diabetics at a west London hospital presented in chapter four. However the next step in this thesis is to examine the results of this study from another perspective in this instance participants level of low fat behaviour.
Analysis based on low fat behaviour groups

Following the preliminary analysis based on the stages of change it was decided to analyse the results from another more traditional direction, that is simply on the basis of low fat behaviours. As previously stated the transtheoretical model developed initially with the treatment of addictions. With addictions it is clear to the individual when they have ceased the addictive behaviour and when they relapse into it. However, with dietary behaviour the situation is not as clear cut, with many individuals being unaware of whether or not they are following recommended dietary guidelines. For example Greene, Rossi, Reed and Willey (1994) questioned how many participants in the average population could determine when their diet reached the recommended dietary intake of less than 30% fat. In support of this argument Lechner, Brug, De Vries, Van Assema and Mudde (1998) found that while as many as 52% of participants classified themselves as being on a low fat diet using self-assessment. When a more rigorous classification was made based on the results of a proper food frequency questionnaire only 17% could clearly be classified as on a low fat diet.

To examine further the relationship between low fat behaviours processes and concept use, participants were divided into high, medium and low fat behaviour groups on the basis of their responses to the dietary behaviour questionnaire. Dietary behaviour questionnaires were used to assess dietary intake in studies by Greene et al (1994), Kristal Shattuck and Henry (1990) and Hargreaves, Schlundt, Buchowske, Hardy, Rossi and Rossi (1999). By focusing on the behaviours associated with diet, they are easier to administer and may give an overall picture of the individual’s dietary intake whereas food frequency questionnaires focus on the intake of specific foods. However, Beerman and Dittus (1994) while accepting the advantages of dietary behaviour questionnaires and acknowledging that they distinguish between high and low fat intake, believed their ability to distinguish between high and medium fat intake is not as clear-cut.
The present questionnaire consisted of 7 items with responses measured on a 1-5 Likert scale, giving a range of scores from 7-35. Participants were divided into the 3 groups using the following criteria. Participants scoring from 7-14 were using very few of the processes and assigned to a high fat behaviour group. Participants scoring from 15 -24 were using the processes to a degree and assigned to a medium fat behaviour group and participants scoring 25 - 35 were using most of the processes and assigned to a low fat behaviour group. Three hypotheses were tested, these were

**Hypotheses**

1. Process use will differ significantly between the groups, with participants in the low fat behaviour groups using processes significantly more than participants in either the medium or high fat behaviours groups. It was expected that process increase would be linear, that is as low fat behaviours increase process use will increase.

2. Significant differences will emerge between these groups with decisional balance pros and cons, with the pros increasing significantly as low fat behaviours increase and the cons decreasing significantly as low fat behaviours increase.

3. The scores for self efficacy will be significantly different between groups, with scores increasing as low fat behaviours increase.

**Results: Low fat behaviour groups**

The majority of participants, 79 in total, were in the medium fat behaviours group, 24 were in high fat behaviours group and 29 in low fat behaviours group. In the post action groups, action and maintenance, there were no high fat behaviour scores. Both groups however, contained medium fat behaviour scores, 30 in maintenance and 10 in action. Additionally there were 18 low fat behaviour scores in maintenance and 5 in action. Overall both groups consisted of people who appeared to be making some effort to
control their high fat dietary behaviour. In the pre action groups, however, the picture was not quite so clear. The precontemplation group consisted of 21 high fat behaviour scores, 23 medium and 1 low, apparently even in precontemplation many individuals were taking steps to control their high fat behaviours. A similar pattern was found in the contemplation and preparation groups. The contemplation group consisted of 1 high fat behaviour score, 11 medium and 5 low, while preparation consisted of 2 high fat scores, 5 medium and 1 low fat. It appears therefore that regarding low fat behaviours even individuals in the precontemplation stage may initially adopt fat reducing behaviours, with these behaviours increasing as expected in contemplation and preparation. It is, however, in the post action stages that the majority of low fat behaviour scores are located. Results are summarised in table 2.3.

Table 2.3: Level of low fat behaviours in relation to stage of change

<table>
<thead>
<tr>
<th>Stage</th>
<th>High fat</th>
<th>Medium fat</th>
<th>Low fat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Precontemplation</td>
<td>21</td>
<td>23</td>
<td>1</td>
</tr>
<tr>
<td>Contemplation</td>
<td>1</td>
<td>11</td>
<td>5</td>
</tr>
<tr>
<td>Preparation</td>
<td>2</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>Action</td>
<td>0</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>Maintenance</td>
<td>0</td>
<td>30</td>
<td>18</td>
</tr>
<tr>
<td>Total</td>
<td>24</td>
<td>79</td>
<td>30</td>
</tr>
</tbody>
</table>

Where appropriate one way anovas were conducted comparing participants’ scores on the processes and concepts on the basis of their fat behaviour score rather than their stages of change. Results are summarised in table 2.4 and figures 2.4 and 2.5. Levenes test of homoogenity of variance was used to test the applicability of anova tests for each of the processes and concepts. In all cases it was not significant except for stimulus control where Kruskal Wallace test was used.
Decisional Balance

Significant differences were found between groups for both decisional balance pros and cons. With the pros $F(2) = 5.40$, $p<.01$ and the cons $F(2) = 5.8$, $p<.01$. Overall the pros increased and the cons decreased as low fat behaviours increased. Scheffe post hoc tests showed the difference with the pros to be significant between the high and medium fat behaviour groups ($p=.01$) and high and low fat behaviours groups ($p=.01$). Differences were not significant between the low and medium fat behaviours groups. With the cons a different pattern emerged with differences being significant between the low and medium fat behaviour groups ($p<.05$) and the low and high fat behaviour groups ($p<.01$). Paired sample t tests found significant difference with the low fat behaviour group in the rating of pros and cons $t(28) = 3.08, p<.01$ with the pros being rated significantly higher than the cons. With the high fat behaviour group paired sample t test also found significant differences $t(23) = -4.60$, $p<.01$. But this time it was in the opposite direction with the cons being rated higher than the pros. This is the pattern of scores expected if these concepts play a significant role in dietary behaviour change. The crossover pattern is shown clearly in figure 2.5.

Processes of change

Results for the processes are summarised in table 2.4 and figure 2.4. Significant differences were found between groups for all processes, except for dramatic relief which was close to significance ($p = .06$). Scheffe post hoc tests found significant differences between all groups for consciousness raising, differences between high and medium groups, $p<.01$ between high and low groups $p<.01$, and between medium and low groups $p = .01$. With self reevaluation Scheffe post hoc tests found significant difference between all groups, differences between high and medium groups $p<.01$, high and medium groups $p<.01$ and medium and low groups $p = .01$. With reinforcement management Scheffe post hoc test found significant differences between all groups, differences between high and medium groups, $p<.01$, between high and low groups $p<.01$. 

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and medium and low groups $p<.01$. With self liberation Scheffe post hoc tests found significant differences between all groups, differences between high and medium groups $p<.01$, between high and low groups $p<.01$ and medium and low groups $p<.01$. With counterconditioning Scheffe post hoc tests found significant differences between all groups, differences between high and medium groups $p<.01$, high and low groups $p<.01$ and medium and low groups $p<.05$. With social support Scheffe post hoc tests found significant differences between the low and medium groups $p<.01$ and low and high groups $p<.01$. With stimulus control Scheffe post hoc tests found significant differences between low and medium groups $p<.01$ and low and high groups, $p<.01$. With environmental reevaluation Scheffe post hoc tests found significant differences between high and medium groups, $p<.05$ and high and low fat groups $p<.01$.

Self efficacy

A one way analysis of variance found no significant differences between groups, $F(2) = .189 \ p>.05$. 

Table 2.4. Mean Scores: Transtheoretical processes and concepts for each level of fat behaviour

<table>
<thead>
<tr>
<th>Process</th>
<th>High fat</th>
<th>Medium fat</th>
<th>Low fat</th>
<th>F value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consciousness raising</td>
<td>9.75(2.89)</td>
<td>12.99(3.77)</td>
<td>15.34(3.26)</td>
<td>16.57**</td>
</tr>
<tr>
<td>Dramatic relief</td>
<td>8.9(3.0)</td>
<td>11.0(4.3)</td>
<td>11.34(4.3)</td>
<td>2.85</td>
</tr>
<tr>
<td>Environmental reevaluation</td>
<td>10.0(3.1)</td>
<td>12.3(3.7)</td>
<td>13.3(3.9)</td>
<td>5.20**</td>
</tr>
<tr>
<td>Self reevaluation</td>
<td>8.9(4.1)</td>
<td>13.4(5.0)</td>
<td>16.6(5.4)</td>
<td>15.74**</td>
</tr>
<tr>
<td>Self liberation</td>
<td>7.3(3.4)</td>
<td>11.0(3.8)</td>
<td>13.7(3.1)</td>
<td>20.55**</td>
</tr>
<tr>
<td>Reinforcement management</td>
<td>7.2(3.4)</td>
<td>10.0(3.6)</td>
<td>12.9(4.8)</td>
<td>15.2**</td>
</tr>
<tr>
<td>Social support</td>
<td>10.7(4.5)</td>
<td>11.7(4.3)</td>
<td>16.0(4.0)</td>
<td>12.83**</td>
</tr>
<tr>
<td>Counterconditioning</td>
<td>5.9(2.0)</td>
<td>8.7(3.0)</td>
<td>10.3(3.3)</td>
<td>14.53*</td>
</tr>
<tr>
<td>Stimulus control</td>
<td>4.4(1.1)</td>
<td>6.5(3.0)</td>
<td>7.3(3.0)</td>
<td>16.3** chi square</td>
</tr>
<tr>
<td>Decisional balance pros</td>
<td>22.7(9)</td>
<td>28.4(8.5)</td>
<td>29.7 (7.5)</td>
<td>5.4**</td>
</tr>
<tr>
<td>Decisional balance cons</td>
<td>31.0(8.5)</td>
<td>29.3(7.8)</td>
<td>24.2(7.8)</td>
<td>5.8**</td>
</tr>
<tr>
<td>Self efficacy</td>
<td>116.7(34.8)</td>
<td>119.9(30.2)</td>
<td>121.9(27.6)</td>
<td>.189</td>
</tr>
</tbody>
</table>

*P<.05; **P<.01: Standard Deviation in brackets. Means with same superscripts do not differ at P<.05.

High = High fat behaviours, Medium = Medium fat behaviours, Low = Low fat behaviours
Pros = Decisional Balance benefits, Cons = Decisional Balance disadvantages, Efficacy = Self Efficacy. High = High fat Behaviour, Medium = Medium Fat Behaviour, Low = Low Fat Behaviour
Discussion

The first hypothesis that processes would be significantly different across the three groups was supported with 8 out of the 9 processes, the exception being the use of dramatic relief, which was close to significance. With 5 processes significant differences were found between all three groups this indicates that as low fat behaviours increase process use also increases, regardless of whether it is a cognitive or behavioural process. The second hypothesis regarding decisional balance was also supported as significant differences were found with the pros and cons of low fat behaviours. With the pros the significant difference only occurred between the high fat behaviour and both other groups. With participants in the medium fat behaviour group there was no significant difference from the low fat behaviour group. With the cons significant differences only emerged between participants in the low fat behaviour and other groups. This suggests that low fat dietary behaviours need to be strongly established before there are no perceived disadvantages but only moderately established before there are perceived benefits. Crossover took place marginally after medium fat behaviour were established. Overall the results demonstrate that increases in decisional balance pros and decreases in decisional balance cons may be fundamental to dietary change. The third hypothesis, however, was not supported, as there were no significant differences regarding self efficacy. The role of self efficacy in dietary behaviour change on the basis of these results remains unclear.

One of the first issues arising from the results is if participants’ stage classification matched their level of dietary fat intake? For example it is expected that the maintainers group to consist mainly participants on low fat behaviours and precontemplaters would consist mainly of participants on high fat behaviours. With the extreme scores this was the case; no participants who rated themselves as in the high fat group classified themselves in the post action stages and only one low fat behaviour participant was classified in the precontemplation group. However, with medium fat intake the picture was not as clear with many participants with similar levels of low fat behaviours being
classified in precontemplation and maintenance. This suggests that many participants, particularly those in action and maintenance may regard themselves as being on a low fat diet, while in fact maintaining a level of low fat dietary behaviours equivalent to many participants in pre action stages, for example precontemplation and contemplation. This is in line with the research by Lechner, Brug, De Vries, Assema and Mudde (1998) which found that a large percentage of participants wrongly classify themselves in post action stages. It may therefore be necessary to reclassify many participants on the basis of their responses to dietary behaviour questions rather than their response to a staging questionnaire. Kristal, Glanz Curry and Patterson (1999), however, criticised this approach commenting that it may mask clinically important change, in that for example it may classify an individual who had cut their fat intake from 45% to 36% as a precontemplater. The results in this study lend support to this viewpoint, as participants in maintenance and action were at a minimum in the medium fat behaviour group indicating an attempt to limit their fat intake. However many participants making similar changes still regarded themselves as being in precontemplation. Clearly a future study with a more detailed dietary behaviour questionnaire is needed to clarify this issue further.

The second issue arising from the reclassification on the basis of fat behaviour is that more significant differences were found than with the stage of change classification. In the classification based on the stages of change significant differences only emerged between stages with 6 of the 9 processes and mainly only occurring between precontemplation and the post action stages. However, when the participants were reclassified on the basis of fat intake, significant differences were found for 8 of the 9 processes and with 5 showing significant differences between all three groups. All processes also showed linear movement in that they were used least in the high fat behaviours group, their use increased in the medium fat behaviours group and increased further in the low fat behaviours group. This suggests that there may not be a tailing off of particular processes as implied in the transtheoretical model, but that the use of all processes continues to be an active component even in later stages such as maintenance.
For example it is implied in the transtheoretical model as an individual increases their low fat behaviours, cognitive processes such as consciousness raising decrease and behavioural processes such as social support increase. However, these results suggest this may not be the case with low fat dietary behaviours as increases in all processes continues suggesting that some cognitive processes such as consciousness raising are emphasised at the earlier and later points in dietary change.

However, moderate support for the transtheoretical model is found with the use of two processes environmental reevaluation and social support. With environmental reevaluation a cognitive process significant changes were found only between high fat behaviours and medium, and high fat behaviours and low fat behaviours. There was no significant difference between low and medium fat behaviours. The move from high to medium is similar to the movement from precontemplation to contemplation or preparation where it is suggested the use of this process is most effective. Also social support a behavioural process only showed a significant increase between medium and low fat intake, but not between high and medium; this again gives limited support to the pattern outlined in the transtheoretical model. This point is similar to the move into action and possibly maintenance when social support and helping relationships are expected to be most beneficial. However, consciousness raising a cognitive process increases significantly across all three groups whereas like environmental reevaluation the expected increase is between high and medium. It may be that with dietary behaviour, which requires constant modification and monitoring, some cognitive strategies such as consciousness raising in combination with behavioural strategies continue to play a role even when dietary change is established.

The results regarding decisional balance and low fat behaviour were as expected broadly in line with what was expected with the pros increasing and cons decreasing as fat intake was reduced. The pros, however, increased significantly earlier when fat behaviours reached a medium level, while the cons did not significantly decrease until the low fat behaviour group. Overall in both classifications it was demonstrated that decisional
balance concepts play a strong role in dietary behaviour change. The classification based on low fat behaviours found no significant differences between groups with self efficacy. The stages of change classification did pinpoint differences between those in preparation and other stages, which demonstrates how the transtheoretical model may have advantages in some areas over a simple low, medium and high fat behaviour classification.

Conclusion

Overall many questions remain unanswered, but it appears that while many of the processes are used only occasionally their use does increase as individuals become more serious regarding their dietary behaviour with both behavioural and cognitive processes being increasingly emphasised. However, questions such as which processes are necessary to move individuals from early stages like precontemplation into post action stages such as action cannot be fully answered in studies such as this. Clearly, more detailed questionnaires giving more accurate information on the processes and stage classification are needed. If used in combination with longitudinal studies involving active interventions based on staged messages it will become clearer as to how applicable the transtheoretical model is to dietary behaviour.

As discussed following the exploratory study further investigation is necessary of the constructs underlying dietary change. At this point a more detailed study giving an in depth insight is necessary. With this in mind a qualitative study consisting of a semi-structured interview will be conducted. This will give participants greater scope to talk about the processes used, why they decided to make dietary changes and how they maintain them. The end result of this will be a richer source of information to design further questionnaires and interventions. On completion of the qualitative interviews research it will be possible to complete more detailed questionnaires for use in the main studies in this thesis. Therefore the next chapter in this thesis consists of an analysis of 20 qualitative interviews conducted at the University of Surrey. The interviews will focus
on all of the aspects associated with the transtheoretical model, that is the processes of change, concepts of change and self efficacy. However, it is hoped that in addition to providing richer information on these topics any additional strategies participants use which may not normally emerge in questionnaires will be uncovered.
Introduction
To gain a more in-depth insight it is proposed to conduct an exploratory qualitative study using semi-structured interviews focusing on issues concerning the transtheoretical model and the problems encountered with dietary change. Firstly however the advantages of qualitative research will be discussed briefly.

The debate within psychology regarding the scientific basis, effectiveness and validity of qualitative data is ongoing. Robson (1996 p228) noted that interviews provide the opportunity to investigate and follow up responses in a manner which postal and self administered questionnaires do not. However a criticism of qualitative methods is their lack of scientific objectivity in that they frequently do not test or reject hypotheses (Burt and Oaksford 1999). Burt and Oaksford also recognised that one of the main advantages of qualitative analysis may be its ability to generate hypotheses. They compared the standard psychological approach, that is the generating of hypotheses by trawling through the literature as being like an individual sitting in an armchair and attempting to generate hypotheses for example on child abuse. Whereas a more direct approach in this case the qualitative approach may be to approach individuals with actual experience of child abuse. Then by talking to them directly factors and experiences may emerge which do not appear in the literature reviews thus generating totally new hypotheses. It is of course an advantage if the researcher has some theoretical model such as the transtheoretical model to guide the process and obviously any theories developed in this way can then be tested further by more objective quantitative methods.

Grounded theory developed by Glaser and Strauss (1967) introduced a more rigorous analysis into qualitative research. Pidgeon (1996 p87) recommends it as being suitable for any form of qualitative data. Unstructured materials for example interview data are firstly
coded, secondly wider links themes or conceptual understandings are developed and thirdly wider conceptual or theoretical understandings are conceived. With these objectives in mind a number of semi-structured interviews were conducted investigating the transtheoretical model in relation to dietary behaviour. The interviews included 6 questions designed to open up areas relevant to the transtheoretical model to discussion. This provided a loose structure to the interview content while still examining the relevant areas. Once questions were introduced participants were allowed to talk freely with prompts being introduced occasionally to clarify issues or promote further conversation. The study examined the issues frequently associated with the transtheoretical model, that is stages of change, decisional balance, processes of change, behavioural strategies and self efficacy. Firstly the content of the interview is described and explained. Once completion of the interviews the main themes or any particularly relevant data is drawn out and suggestions for improvements to future research discussed. Several sample items are also generated for inclusion in future questionnaires.

**Interview Schedule**

**Question One: How did you come to be on your present diet?**

Prompts
- Any particular factors influential?
- Were these planned or unplanned?
- Tell me what was happening around the time you changed your diet?
- What was going through your mind?

This question attempts to look at overall background, at the factors which prompt people to change dietary behaviour and how they maintain dietary change. In particular in looking at the background the person may give insights into whether they took a gradual or instant decision. This will test the validity of the concept of stages of change with dietary behaviour. Do people tend to go through stages such as precontemplation, contemplation, preparation, action and maintenance and if there are factors such as these,
what are the time scales involved? Or it may be that instant dramatic decisions are made for example like an individual might suddenly decide to improve their diet with no long-term preparation. This question may also shed light on decisional balance. That is were there certain factors or problems which suddenly became very prominent making the person see that changing their diet was worthwhile bringing more advantages than disadvantages into their lives?

**Q2: How do you feel about your quality of life now?**

Prompts
What are the biggest or most noticeable effects?
Areas in your life where you are more relaxed, at ease where it feels good to be on a diet.
Areas in your life where you feel tense, where it feels particularly difficult to be on a diet.
Anything you regret, anything you feel particularly good about, situations you feel happiest about, situations where it is awkward. Have new areas or abilities opened up to you?

This question again looks at decisional balance, if the person believes on overall balance their life has improved or worsened. Simply it examines if they believe there are more benefits than disadvantages to dietary change. Again with decisional balance being a crucial concept with the transtheoretical model this question examines the specific pros and cons of interest. What are the crucial areas they see problems in? With people currently in the process of change this will give insight in to recent problems and how worthwhile it has been overcoming them. With participants on diets for some years will they comment on definite advantages or disadvantages?

**Q3: Looking back over the time you have been on a diet, if you had to make the same decision again how would you feel?**

Why do you feel this?
This question again looks at decisional balance if the person believes overall that changing dietary habits is worthwhile. While this item examines decisional balance again, it is intended to be more focused perhaps making the participant give a more definite answer as to whether or not they feel their life has improved as a result of their changed dietary habits. Also it may give greater insight into exactly why a participant believes they have made gains or losses indicating if they believe the change worthwhile in total. It may also be possible to build on responses to the previous question and gain a thorough insight into the role decisional balance plays.

Q4: There are many methods or techniques people use to help them stay on diets. Can you tell me about techniques which you use?

Prompts
Which do you feel are particularly helpful?
Which do you feel are particularly unhelpful?
Which techniques do you use most?
Which do you use least?
Are these affected by situations you find yourself in?

This question looks at the processes people use; attention will be paid in particular as to whether or not this matches the process use outlined in the transtheoretical model. The transtheoretical model outlines nine main processes. It is of interest to discover if people use as many processes as this, or are perhaps one or two processes particularly crucial. The use of additional processes or strategies may also come to the surface. In the exploratory study it was found that though these processes are used, most are not used frequently by people, even by participants in the later stages where the use of behavioural processes might be expected. In fact with some processes no significant differences were found between stage and with others significant differences only emerged between those in precontemplation and the later stages. However, it may not in reality be the case that process use is infrequent but merely that the questionnaire was faulty. The interview may
help identify the processes used more clearly allowing for the development of a more accurate questionnaire allowing for a wider, more detailed examination of process use.

O5: With time do you feel the processes or techniques you have used have worked?
Prompts
Have different situations and circumstances affected you?
Have you favourite strategies you have stuck with?
Do you find certain techniques have worked and others have not?
This question again looks at the strategies used and how these changed over time. The transtheoretical model of change proposes that different processes are applicable at different stages. With the interview it may be helpful to compare people at different stages or participants may give an account of any stages they feel they went through. This could be times they spent thinking about changing their diet or any relapses they may have had. It is also of interest to see how people themselves feel the processes they have used have changed over stages or time. For example this could address whether there were any big changes in the techniques they used when they first started on their diet and when they had maintained it for longer than 6 months.

O6: How do you feel about your future progress?
Prompts
Will more changes be necessary?
If new changes are necessary how will you go about them?
Will you cope better with situations?
This question focuses on the remaining central concept of the transtheoretical model self efficacy; that is the person’s belief that they can maintain or improve their dietary behaviour further. For example, if there are problems ahead do they have any plans for coping with them and how successful do they feel they will be? Do they for example believe they can maintain their dietary change for the long-term future? Is their level of belief something that has grown over time or are there situations which they believe they may not be able to cope in?
Method

Posters were displayed at various sites in the University of Surrey (copy in appendix two). Individually addressed invitations (copy in appendix two) for volunteers to participate in a semi-structured interview were distributed to postgraduate students in the School of Human Sciences at the University of Surrey. An internal e-mail asking for volunteers to take part in a nutrition related study was circulated to staff in the Psychology Department at the University of Surrey. The sample used was an opportunity sample of staff and students at the University of Surrey.

Results

20 participants took part, 3 men and 17 women, ages ranged from 18 to 40. 10 participants were in the action stage (made major changes in their diet in the last 6 months) and 10 were in maintenance (maintaining dietary change for over 6 months). Participants were on a range of diets, 11 were specifically watching fat intake. The primary concern of the remainder was maintaining a healthy diet. In most cases this meant increasing their daily intake of fruit and vegetables while at the same time monitoring their fat intake. One participant was a type 2 diabetic which involved him maintaining a diet, low in fat and refined sugars. Analysis of results focused on four main areas. These were strategies used, motivating factors, problems and disadvantages and the consequences good and bad of dietary change.

Response Coding

Participant’s responses were transcribed and examined for responses under 4 headings. These were (a) Strategies used (b) Motivating factors (c) Problems and disadvantages and (d) Consequences and reactions. These themes were chosen as they related closely to the concepts being examined in the transtheoretical model.

Strategies used will give insight into the processes used during dietary change, motivating factors will examine the reasons participants changed and possibly if they followed a stage pattern with participants for example contemplating and preparing for change
before actually undertaking change. Problems and disadvantages as a theme will give insight into the concept of decisional balance, for example will participants associate many problems with dietary change or will they believe there are more benefits. With consequences and reactions this again may give insight into the level of decisional balance and also into self-efficacy. Will participants feel for example they will maintain their improved dietary regimes into the future or will there be circumstances in which they will relapse into their old dietary habits. On transcription of the interviews participant’s replies were analysed and coded under these four headings.

With strategies the seven response codes were social support, reading articles or watching television programmes on dietary change, food lapses, focus on benefits, substitute foods, planning and keeping a diary. Examples of response coding as follows participants mentioning using Weight Watchers or depending heavily on the support of a friend this were coded under social support. With motivating factors the four response codes were health, appearance, specific event and environmental concerns. Examples of response codes as follows participants mentioning a general concern for health as a primary factor or participants mentioning a specific event for example a wedding or family occasion. These responses were then coded accordingly under health concerns, specific events or appearance. With problems and disadvantages the response codes were social events, extra workload, anxiety and stress, lack of support, food availability and poor information. For example participants mentioned the high workload and those stressful times such as just before exams when the extra workload caused problems this was coded under stress and anxiety. Under consequences and reactions response coding were feeling good, diet worthwhile, looking better, feeling empowered, feeling healthy and negative emotions. Participants for example who commented that they felt a sense of achievement or more control over their lives were listed as feeling more empowered. Participants may also have stated if they felt dietary change overall was worthwhile and responses coded under this heading.

The coding of responses in this way will group the relevant concepts giving an insight into the patterns, which emerge during dietary change.
Strategies Used

One of the most widely used strategies was social support with 14 participants mentioning its use. With many this was a major factor involving regular attendance at groups such as Weight Watchers. At Weight Watchers and similar groups a specific goal is provided each week. One particularly stringent goal would be an expected weight loss every week tested with a weigh in before every class. One participant described it as “A force in your head telling you that you will be found out” while another described it as a competition and a goal. While the focusing on a target weight and the recognition of it by others was a positive stimulus for many, one participant mentioned a negative side in that if gains were not recognised this had negative consequences. In this instance they commented how a lack of recognition of a loss of several pounds led to them losing heart, leaving a group and going back to old dietary habits. With social support not all individuals depended on support groups like weight Watchers many mentioned close friends, family members or some significant person in their lives being a major factor in making them improve their dietary intake.

The second most widely used strategy was the seeking out of information. Prochaska and DiClemente (1992) identify this as a cognitive strategy under the term consciousness raising. In the model strategies such as this are more closely associated with the early pre-action stages of change. While 14 participants mentioned using this, many used it only occasionally, for example if they came across an article, or if a programme happened to be on television, rather than actually seeking sources of information. Indeed some did appear to use it as a form of social identification. Pointing out that it made them realise they were not on their own, they also found success stories uplifting and that they were a source of information on how other people cope.

Another strategy matching a process outlined in the transtheoretical model was the use of rewards (reinforcement management) at particular points. However the major difference between dietary behaviour and addictive behaviours is that several individuals mentioned
actively rewarding themselves with the wrong foods if they had stuck to their diet for some time. One participant commented “I promise myself if I eat well I will have a piece of chocolate”. Another said “I stick to my programme regardless of whether or not I have binged”. Only one participant saw breaking their diet as a problem in that it meant a loss of focus or serious intent with their programme. This meant that having broken the diet once it was more likely they would break it again.

Stimulus control was also widely used with participants mentioning that they substituted foods, or avoided places where high fat foods were widely available. Other strategies used were encouraging others to alter their diets, exercising more, focusing on the benefits, writing in diaries and diet simply becoming a routine. The strategies mentioned in the interview are summarised in table 3.1.

Table 3.1: Number of people mentioning particular strategies

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Social Support</th>
<th>Reads Television</th>
<th>Food Lapses</th>
<th>focus on benefits</th>
<th>Substitute Foods</th>
<th>Planning</th>
<th>Diary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>14</td>
<td>14</td>
<td>9</td>
<td>7</td>
<td>9</td>
<td>7</td>
<td>3</td>
</tr>
</tbody>
</table>

Motivating Factors
In examining the issues which motivated individuals to change, the majority of participants mentioned health reasons. Some mentioned a specific reason for example a bacterial infection or the onset of a major health problem such as arthritis or diabetes. However, the majority mentioned an overall concern about their health. For example comments included “I had better not eat this if I want to stay healthy, there is the heart and that sort of thing”. Or “I never used to worry about my health but in the last few years I think my heart must be screaming because of all the cholesterol all the fatty foods”.

Several of the participants were students studying health psychology at the college and this made them particularly aware of the health issues involved and the importance of maintaining health behaviours. One person commented that on listening to lectures they
realised how many unhealthy habits they had and they decided to change something, in this instance changing to a healthier diet. Appearance was also a strong factor for motivating individuals to change. One person summed it up as “Well my clothes were getting tighter and tighter, I just woke up one morning and had had enough of it” or “The thought of coming into summer and not being able to fit into my summer clothes”. Specific events were also mentioned by several individuals; one participant mentioned their wedding, which was combined with appearance “I am getting married next year and I want to fit into my wedding dress”.

A particular lifestyle change taking place such as moving away from the parental home and making their own choices regarding lifestyle could also influence dietary choice. Initially this may have had a negative effect, but over time the person accepts responsibility for their health and takes steps to improve their diet. Another factor mentioned was the belief that an improvement in diet would help the person cope with stressful times. One participant mentioned ecological reasons in that mass produced food was damaging the environment. Factors causing change are summarised in table 3.2.

Table 3.2: Number of people mentioning particular motivating factors

<table>
<thead>
<tr>
<th>Motivation</th>
<th>Health</th>
<th>Appearance</th>
<th>Specific Event</th>
<th>Environment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>15</td>
<td>11</td>
<td>7</td>
<td>1</td>
</tr>
</tbody>
</table>

Problems and disadvantages
The most common problems were going out and special occasions such as Christmas. The reaction of participants to these situations varied, the majority appeared to regard it as inevitable that the diet would be broken at certain times. One participant remarked “It does not effect me I would just see it as a relapse and forget it” another spoke of “Leaving a space to eat anything she wanted to”. Only one participant had an organised strategy for dealing with eating out in that they made a point of going to the good restaurants, where the food is not previously prepared and changes can be made to the menu.
Another strategy mentioned is making it clear to the peer group the reason for the dietary changes which may lead to acceptance and respect. One participant described it as “They give you credibility for doing it, they understand it that there is a reason you are doing it..... rather than a lot of pernickety changes for nothing”. One mentioned that while these times were a problem there could also be a positive side when a particular effort was made to include them. One commented regarding one Christmas “A partner of mine went out of his way to give me the right foods...... so sometimes I am made to feel good..... but at other times I feel excluded”. Others mentioned that on these occasions they are pressured to break their programme. With comments being made to them such as “Go on eat it you have been really good this week”.

Nine participants mentioned the work involved as being a problem; one commented “It is harder to do healthier food .... It is easier just to get something out of the freezer. It is harder trying to vary it more and keep it low in fat”. This in particular appeared be a problem in stressful or high demand situations. One student commented “when I have exams and essays to hand in.... I know there will be times when I will not have the time to go out and buy vegetables or do the cooking or anything”. Another commented “When I come to university I just cannot be all night cooking and preparing” another commented on the work involved in preparing separate meals at home. Nine participants experienced heightened feelings of anxiety, stress, boredom or guilt. One mentioned a feeling of disappointment if they did not lose weight each week, another mentioned that outside stressors such as feelings of anxiety caused her to break her diet.

These were the main problems mentioned by participants. Other issues were feelings of stress and lack of social support, for example when a significant other such as a partner believes the problem is purely one of self esteem, then proceeds to make it difficult for the person by bringing a lot of high fat and sweet foods into the house. Missing a favourite food, contradictory information regarding diet and poor availability of proper nutrition generally were also included. Overall people are aware of the problems and no
one saw dietary change as all benefits. This was the case even with individuals who had maintained an improved diet for several months or years. A conflict with decisional balance appears to be ongoing with dietary change. The main problem areas summarised in table 3.3.

**Table 3.3: Number of people mentioning particular main problems**

<table>
<thead>
<tr>
<th>Problem</th>
<th>Social Events</th>
<th>Extra Workload</th>
<th>Anxiety Stress</th>
<th>Lack of Support</th>
<th>Food Availability</th>
<th>Poor Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>16</td>
<td>9</td>
<td>9</td>
<td>5</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

**Consequences and reactions to dietary change**

The vast majority of participants expressed a range of positive feelings and benefits associated with maintaining and improving their diet. These ranged from participants saying they just felt good or better in themselves to being more healthy and alert. Negative emotions, however, were also expressed but these were mainly in relation to breaking a dietary programme. Only 1 participant believed overall that there were more negative than positive emotions associated with dietary improvement.

The positive emotions expressed included increased feelings of self control and pride, one commenting “It is the first thing I have done that I have really stuck to….. I am really proud of myself”. Another described the time when she was overweight as “like being in a trance” while another described the excitement of watching the pounds come off, and others felt satisfaction on fitting into their clothes again. Outside reinforcement in the shape of praise from friends was also a strong factor, for example “People come up to me and say “ Gosh you have lost a lot of weight and this makes me feel really proud”. Another mentioned increased attention from the opposite sex and another feeling good when she was praised for her inventiveness with food. Two participants mentioned, however, that they still believed a bigger improvement was necessary, in that they needed to be more organised and more into the diet. Some negative emotions were also expressed.
these involving participants being disappointed with themselves for breaking their diet. One described it like this: “That while it is not a sin it is a sign of a lack of mental toughness and there will be a bad physical response”. Another described it as feeling like she was battering herself when she ate the wrong foods.

The majority had high self efficacy believing they would stay on their present diet. The majority did not believe, however, they needed to significantly improve on their diet. Some expressed doubts, however, if a major lifestyle change for example getting married or having children came along as to how they would cope with it, believing that it could adversely effect their dietary programme. So while self efficacy was strong it was possible for it to be undermined in exceptional circumstances. Consequences and reactions summarised in table 3.4.

**Table 3.4: Number of people mentioning particular consequences and reactions**

<table>
<thead>
<tr>
<th>Reaction</th>
<th>Feeling Good</th>
<th>Diet Worthwhile</th>
<th>Looking Better</th>
<th>Feeling Empowered</th>
<th>Feeling Healthy</th>
<th>Negative Emotions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>6</td>
<td>6</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>6</td>
</tr>
</tbody>
</table>

**Discussion**

The processes and concepts used loosely matched several of those outlined in the transtheoretical model. They were mainly behavioural processes but consciousness raising, a cognitive strategy, also played a part. With virtually all participants the benefits tended to outweigh the disadvantages and with the exception of dramatic changes in their lifestyle participants expressed belief in their ability to maintain their improved diet. As all the participants were at a point corresponding to the action stages of the transtheoretical model, the predominance of behavioural processes along with the high perception of the benefits and a sense of self efficacy is as expected.
The most significant strategy appeared to be social support, indicating that successful dietary change may mean actively working with others. This was to some extent supported by the identification of social situations and special occasions as situations where pressure to relapse was strong. In these situations there is perhaps very little social support to maintain behaviour and perhaps some encouragement to break it. This indicates that in encouraging individuals to take up diets and follow health programmes a necessary skill in successful maintenance may be the ability to encourage peers and family to support the improved behaviour, or with providing suitable support groups. One participant did, however, emphasise the negative aspect of this pointing out how a lack of recognition in her Weight Watchers group caused her to leave which led to a deterioration in health behaviour. This shows the negative consequences to social support when it is expected but not delivered. But overall the evidence of this study shows it to be a helpful factor.

An equal number of participants reported using consciousness raising as social support, for example by reading magazines or watching television programmes. However for many this was not a central strategy as it was only used occasionally. Interestingly the exceptions to this were several students on the health psychology course. They reported the information received on this course and the consistency of its delivery as a major factor in encouraging their improved diet. This is broadly in line with the transtheoretical model, which suggests that, conscious raising may be beneficial in initial movement from pre-action to post action stages or in everyday terms from inaction to action. However, the information on a health psychology course is intensive, and delivered on a daily basis with individuals studying it carefully. Information in this form is not normally available to the general public and also on a health course strong social support may be available among the participants encouraging further change.

Apart from social situations and special occasions the second major problem identified was the extra workload associated with dietary change. This involved greater efforts in
selecting, preparing and storing foods. This appeared to be particularly the case in stressful or exceptionally heavy workload situations. This implies that organisation and proper planning may also be skills, which will need to be included to maintain dietary improvement. This is slightly out of line with the transtheoretical model, which suggests that the cognitive strategies such as planning ahead are most beneficial in the pre-action stages. However, while this may mainly be the case with addictive behaviours with a simple cut off point, the more complex nature of dietary behaviour change may mean regular strategy reviews.

Again broadly in line with the transtheoretical model several participants mentioned using, reinforcement management, that is rewarding one's self or being rewarded by others for behaviour change. However, this was not in a manner idealised by the model in that several participants rewarded themselves by making a point of breaking their diet. Greene, Rossi and Richards (1993) suggested that behaviours such as this may not be a problem and can in fact be a positive coping strategy providing they do not lead to a full relapse. Ideally rewards should consist of behaviours such as buying new clothes, or special treats and not eating the wrong foods. It may be necessary to encourage people to reward themselves with behaviours other than eating the wrong foods. Again broadly in line with the model, which recommends strategies such as counter conditioning and stimulus control, being used in the action stages several participants mentioned stimulus control in that they substituted or stored only the proper foods at home. One participant placed reminders of the benefits of low fat behaviours around their home in this instance for example a photograph of themselves when they were slim on their fridge door. Indeed one participant mentioned that when all the wrong foods are available in her home it is virtually impossible to maintain a diet suggesting that stimulus control may be a crucial factor for some people. Overall the interviews with the emphasis on behavioural and some cognitive strategies demonstrated that the transtheoretical model is at least partially valid in relation to dietary change.
The next issue emerging is the factors or situations, which initially encouraged participants to partake in improved dietary behaviour. The model suggests to move individuals from precontemplation to contemplation or action, strategies such as consciousness raising, dramatic relief and environmental reevaluation are the most effective. The majority mentioned becoming aware of health problems associated with poor diet and one participant also in line with the model improved their diet purely on environmental grounds. The remaining strategy associated with initial change in the model is dramatic relief. This involves role playing and experiencing and expressing one’s feelings, this did not appear to be actively used by any of the participants in this study. However, outside factors also appeared to play a part, in initiating change, many participants included a specific event such as a wedding or a concern for their appearance at some particular time as sparking change. This implies that while consciousness raising is important, it may not on its own be enough unless perhaps it is very intensive for example attendance at a health course. To a degree this supports the research of Keenan, Abuhshaba, Sigman-Grant, Achterberg and Ruffing (1999) which found that dietary change was often initiated by unplanned factors and the research by Novotny, Han and Biernacke (1999) which found that appearance also played a part in dietary behaviour change.

In examining the consequences or reactions to maintaining dietary behaviour, the majority described this in terms of positive feelings. For example feeling good, feeling empowered, overall positive emotions were used to reinforce the behaviour with only a small number stating they used negative emotions as reinforcement. This perhaps fits loosely with self reevaluation, which is ideally the acquiring of a positive concept of oneself. In the transtheoretical model this is emphasised as an effective strategy in moving participants from contemplation to preparation. However, it is also associated with the person evaluating himself or herself negatively to activate change. Perhaps when change is maintained reevaluations become more positive. Positive feelings and evaluations may become crucial in maintaining health behaviour, by enabling the behaviour to be perceived as being more positive than negative. In this instance the pros
of decisional balance appeared to be more associated with positive feelings than practical considerations, which in fact were often seen as more difficult, that is involving more work. Interventions may need to take this into consideration perhaps emphasising the positive benefits in terms of feelings and suggesting methods of overcoming the practical difficulties associated with dietary change.

Perhaps the data overall from the interviews can be best summarised in the form of a loose model. It is implied firstly that consciousness raising is necessary to make the individual aware of the benefits of improved diet, however unless this is very intensive, it may also be necessary for some outside event to kick start the behaviour. Once having changed the behaviour the majority of individuals may then seek some form of social support for maintenance, behavioural rewards including lapses into poor diet are also used. Strategies such as consciousness raising and planning may still play a part but to a lesser degree once the behaviour is established. Problem areas are situations where the individual starts to lose control, for example social occasions, times of heavy workload, stress or even when there is social pressure to break their diet. However, once the individual maintains the improved behaviour a major benefit is that they consistently perceive themselves as healthier and more attractive in addition to experiencing positive mental states for example feeling more empowered. A summary of the model is given in figure 3.1.

Figure 3.1: Summary of model
However while this proposed model is of interest, it is based solely on the results of this small qualitative study, it will be of interest if in the later studies in this thesis any information emerges which lends support to this model. The remaining studies however will continue to analyse the strategies and concepts central to the transtheoretical model as this is the model with the more established pedigree.

**Implications for future study**

An initial aim of conducting this qualitative study was to generate items for inclusion in further questionnaires examining the transtheoretical model and dietary behaviour. Firstly in looking at decisional balance pros and cons it will be necessary for items to focus on the feelings associated with maintaining improved dietary behaviour. Is the person feeling more energetic, more empowered or simply better all round as a result of staying on an improved diet? Items such as the work involved and having to cut out foods are of interest, but in themselves may not be sufficient to uncover the significant processes within the person. On the basis of the results in the this study it is suggested that in addition to the standard items, items similar to the following be included in decisional balance pros and cons questionnaires

“I feel better on an improved diet”

“I feel more in control of my life on an improved diet”

“Overall my mood would improve on an improved diet”

“I would have to miss out on or I would not enjoy social occasions on an improved diet”

“I would need to read a lot and work hard to maintain an improved diet”

“When I think of the work involved in maintaining an improved diet, I believe it is not worth the trouble”

The deletion of items, which focused on more superficial processes such as eating less appetising foods or having to cut down on favourite snacks, is an option as they may not give the necessary insight into the processes which make a significant difference to people.
Focusing on the process side of the questionnaire is more difficult, in that the majority of the participants in this study were in the action and maintenance stages therefore using mainly behavioural strategies. However, one clear issue arising from the interviews is that the vast majority of participants used social support in some way. Five items in the original questionnaire focused on this, it is recommended that items similar to the following are included in future questionnaires

"I find the encouragement of friends to be a major factor in the improvement of dietary behaviour"

"I make a point of talking to someone at least once a week about dietary improvement"

This may point out those who are following a more active role in social support from others.

Another process, which emerged throughout the interviews, is reinforcement management. Unfortunately one of the strategies individuals used to reinforce their diet behaviour was the occasional breaking of it. Sample items to be included to examine this process further are:

“Occasionally if I have stuck to my diet for at least a week I reward myself by eating my favourite high fat food”

“If I break my diet I do not see it as a problem provided it does not happen more than once a week.”

Self reevaluation was also used in that many participants reported feeling good about themselves if they stayed on an improved diet. This aspect to a degree is covered in the pros and cons questionnaire and the self reevaluation aspect was covered by five items in the original questionnaire. However, items similar to the following could also be included in future questionnaires:

“I feel that by improving my diet I will be a much healthier and happier person”

“I feel that by improving my diet I will be able to deal with difficult or stressful situations much better”
This perhaps will focus on the more positive aspects of self reevaluation rather than some of the negative aspects contained in the original questionnaire. Consciousness raising issues may be dealt with by focusing on aspects other than the gathering of information about diet such as focusing on whether people gather information on how to maintain improved dietary behaviour. Though one item on the original questionnaire deals with this, additional items to examine further this process are:
“\text{I read articles about the techniques people use to stay on low fat diets}”
“I make a point of talking to people about the methods they use to stay on low fat diets”
“At least once a month I seek out information on improving my diet”

Overall the interviews point to dietary change being a process in which individuals use a mix of strategies, therefore using interventions based rigidly on the transtheoretical model may not be ideal. However, to a degree in support of the model, interventions in the later stages may be largely behavioural strategies, with some emphasis still being placed on cognitive strategies such as consciousness raising and planning ahead. This may be necessary because unlike behaviours such as smoking which simply require the elimination of a specific behaviour, improved dietary behaviour accepts occasional relapses. It may also be necessary for individuals to constantly update themselves regarding dietary knowledge as dietary habits even if improved are not fixed with the individual often having to adapt their diet in a variety of situations. For example the quality of food itself may not be stable. In extreme cases issues such as “mad cow disease” or “genetically modified foods” effect dietary choice and even the amount of fat an individual can take may vary over time.

The most successful strategy coming from the interviews for social situations is for individuals to either plan to avoid such situations, or to explain to friends clearly before such an event that they will not be eating certain foods and act accordingly. Unfortunately one factor which promoted dietary change, that is the occurrence of an outside event or some particular target is outside the power of any intervention. However, once these
events occur it is essential that the other supports are put in place to enable adherence to a dietary regime.

**Conclusion**

In summary research to date and the information gathered in both the exploratory study and this qualitative study demonstrates that the transtheoretical model may be loosely applicable to dietary change but this may not be in a manner identical to that tested with addictive behaviours. Further research looking at the processes involved and how to use them effectively over time is still needed. These exploratory studies have also provided additional items for inclusion in future questionnaires. Unfortunately due to constraints of space it is not possible to include all these sample items in the revised questionnaires however a sample of them will be used which will enhance the questionnaires in the following studies.

The next step in this thesis therefore is to build on the information in these studies and research thoroughly the strategies of a group of people actively involved in monitoring their dietary behaviour. The sample used will be clients at an out patients unit of a west London hospital with type two or late onset diabetes. A brief discussion of the background to the complaint is covered in the next section before the two major studies are introduced.
Type 2 Diabetes Mellitus

The high incidence of high fat intake and its role as a factor with numerous health problems including heart disease, cancer and arthritis is undoubtedly a cause of increased concern for health educators. However the increased incidence of obesity has in particular been associated with a greater risk of people developing type 2 diabetes. Type 2 diabetes is a potentially fatal illness with many possible complications such as kidney disease, strokes, blindness and heart disease. Latest figures estimate that 151 million adults worldwide now live with this condition (http://news.bbc.co.uk). It is also estimated this figure will possibly double in the next 25 years. Alberti (2000) pointed out that the increased westernisation of people's lifestyles in particular in developing countries may be leading to a rapid spread of this disease. In the U.K alone 1.4 million people are officially diagnosed with this condition but diabetes U.K estimates 1 million more may unknowingly be victims also. The high incidence of this condition is therefore placing an enormous burden on the economy of this country and countries worldwide. Before progressing further however a precise definition of diabetes and in particular type two diabetes will now be given.

Watkins, Drury and Howell (1996 p3) defined diabetes as “A disorder in which the level of blood glucose is persistently raised above the normal range. Occurring either because of the lack of insulin or because of the presence of factors, which oppose the action of insulin. It is a permanent condition in all but the few situations in which it is transient”. Diabetes itself exists in 2 forms; type 1 and type 2. With type 1 diabetes the body is unable to produce any insulin. This usually starts in childhood or young adulthood and is treated with insulin injections and dietary control. In Type 2 diabetes not enough insulin is produced or the insulin that is made does not work properly. In the past this was associated with affecting people as they get older. Usually appearing after the age of forty. It used to be known as 'maturity-onset diabetes' or 'non-insulin dependent diabetes Clark (2001 p1) defined type 2 diabetes as “Being associated with patients who do not depend on exogenous insulin treatment to remain alive”. Clark while acknowledging this disease is commonly diagnosed in middle aged or elderly people, pointed out that it is now increasingly developing in younger people particularly those in highly susceptible populations perhaps rendering the term maturity onset diabetes obsolete.
Hansen and Roberts (2000) noted that the connection between type 2 diabetes and obesity consisted of several factors. Firstly in relation to developing type two diabetes initially the more overweight a person is the greater their risk and the longer a person is overweight also the higher the risk. With individuals already suffering from type 2 diabetes while low fat dieting is not a cure it can play a crucial role in maintaining glucose levels near normality. Hansen and Roberts estimated that a 10 to 20 pound loss in body weight might be enough for many people with type two diabetes to improve glucose level control meaning fewer health complications. Also as a genetic component may be a factor in disposition, the changes in the health routine of one family member can have a knock on effect making it less likely others perhaps already at increased risk will also develop diabetes. Hansen and Roberts explained that obesity might be a precursor to type 2 diabetes because of its interaction with insulin resistance. With an obese person the excess fat causes the cells not to respond to insulin meaning glucose in the blood is not absorbed as quickly as it should be. While the body is producing insulin the glucose remains in the blood and when this build up passes a critical level type 2 diabetes is diagnosed.

Numerous research studies have also supported this link. Bennet, Rushfort and Miller (1976 cited in Felber Acheson1993) in a study with a population of Pima Indians noted a significant increase in weight 30-60 months prior to the diagnosis of diabetes. Hansen and Roberts (2000) noted that in an intervention study in Sweden that participants with glucose intolerance (a factor which often precedes type 2 diabetes) who lost weight were significantly less likely to progress to type 2 diabetes than an control group whose average weight increased. Therefore a clear connection between excessive fatty foods, overweight, the onset of type 2 diabetes and the prevention of further complications associated with type 2 diabetes exists. Watkins Drury and Howell (1996) believed the teaching of good dietary principles to be the key to successful diabetic treatment. However, in addition to obesity being a predisposing factor a family history of diabetes and being Asian or Afro-Caribbean are also associated with increased risk of type 2 diabetes.

Therefore as a strong element of dietary behaviour change is associated with successful treatment of type 2 diabetes it is a good area to test the applicability of a model such as the
transtheoretical model. Peyrot (1999) in a review of behavioural models applied to diabetes education concluded that the transtheoretical model had not yet been adequately tested in relation to diabetes care. The long term effects of brief behavioural interventions on diabetes is unclear, However Glasgow, La Chance, Toobert, Brown and Hampson (1997) found that interventions consisting of touch screen computer assessment, along with back up phone calls and a video tape intervention produced a significant improvement in dietary behaviour change over usual care. It will be of interest therefore to measure the effect of a brief behavioural intervention based on the transtheoretical model to a client group with type 2 diabetes.

The next chapter covers the baseline results of a longitudinal study with type 2 diabetics attending a London hospital. The methods used for example the structure and design of questionnaires and the results of this initial study are thoroughly discussed.
Chapter 4
An in depth study of the application of the transtheoretical model to the low fat behaviours of a sample of participants with type two diabetes.

Introduction
The exploratory studies in particular the quantitative study left many unanswered questions. Firstly as a consequence of the small sample size some stages contained very few participants. For example the preparation group contained only eight people. Also while the stages of change model is supposedly applicable to all groups the young age of students, their different lifestyle and the fact that 80% the group were female, meant the sample was far from ideal for generalizing the results to wider more diverse groups. Both exploratory studies however, were of value in that they indicated improvements necessary in the design of the questionnaires for the main study.

Group Selection
To obtain a more representative sample of individuals actively engaged with dietary change, clients with type two diabetes at a West London hospital were selected. As part of their treatment clients with type two diabetics are recommended to stay on a low fat diet. It was felt therefore that the majority of people in this sample will have attempted at some time to improve their diet, or at the very least it would have been recommended to them to do so and that they will be motivated to adopt to a low fat diet. Clients in this group will also be knowledgeable regarding the requirements of a low fat diet, as all have received dietary advice from a nutritionist during the course of their treatment. This partly answers the criticism of Brug et al (1994) regarding objective and subjective assessment of fat intake in that they believed many participants under estimate the level of fat in their diet.

Improvements to Questionnaire
As discussed in the previous chapters several improvements were necessary to the questionnaires in order to gain a more accurate insight into the processes used and assessment of dietary change. The demographic details however were similar to the first questionnaire, participants gave details of their age, sex, and level of education. The participant was asked if they were responsible for buying and preparing their own food, indicating the degree of control over their dietary intake.
Dietary Behaviour Scale

Assessing dietary intake accurately is a formidable problem. It is an issue, which any dietary investigation needs to address thoroughly. Therefore there now follows a detailed discussion of the background information on this topic and justification for the method used for assessment in this study which is a dietary behaviour questionnaire consisting of 14 items.

Unfortunately the measurement of dietary intake has proved to be a difficult task. Indeed in comparison to the measurement of other health behaviours such as smoking or alcohol consumption the measurement of nutrition intake is enormously complicated. Improvement in an addictive behaviour is straightforward, the end goal is for the addictive habit to be eliminated or reduced significantly. Dietary improvement, however, involves a series of changes and very often it is undesirable to entirely eliminate a class of food. For example a totally fat free diet is not desirable, though a diet containing less than 30% fat is. The most favoured techniques to date for measuring dietary intake are food frequency questionnaires, daily recall and four, five-day or seven day recall (Glasgow, Perry, Toobert and Hollis 1996). However, significant disadvantages exist with the administration of these methods. They are all particularly unsuited to situations common to many research projects where assessment needs to be done quickly and inexpensively and are sometimes completed over the telephone.

Many food frequency questionnaires are particularly time consuming, of necessity they must contain lists of many foods and no matter how detailed inevitably many items are not included. A long and complex questionnaire is also unlikely to encourage the involvement of voluntary participants the majority of whom are usually required to give their time freely. An added disadvantage with health interventions is that it often needs to attract individuals uninterested in change, for example people in the pre action stages of Prochaska, DiClemente and Norcross (1992) transtheoretical model. Individuals such as these are perhaps even less likely to complete lengthy complex questionnaires. Similar problems exist with daily and four to five day recall in food diaries, these may also have the additional problem that trained dietitians are needed to code and possibly interview subjects to assess the validity of records. Van Assema, Brug, and Brants (1992) point out that for many studies it is not necessary to measure nutrient intake in such a precise manner. Often the ranking of a subject or the ability to predict an improvement in a
dietary behaviour for example fat intake is all that is required. In an attempt to overcome these problems researchers have adopted strategies such as targeting the foods central to the sample population. Van Assema et al (1992) and Kristal, Shattuck, Henry and Fowler (1990) used this method for assessing fat intake. Brief telephone assessments using a questionnaire based on core foods produced significant correlations with a more detailed questionnaire in the Kristal et al (1990) study and 7 day food diaries in the Van Assema et al (1992) study. The finished questionnaires had the significant advantage of taking approximately 5 minutes to administer. This form of assessment however still initially involves a detailed analysis of the standard diet of the target group. With the Kristal et al (1990) study data were obtained from the Women’s Health trial and in the Van Assema et al (1992) study the questionnaire was based on data from a more detailed telephone survey conducted in 1988. Therefore while the latter questionnaire is an improvement in terms of administration on the initial assessment, considerable resources and commitment are still required and therefore the problems of participant compliance and interpretation still exist.

Another option which may give a broader and perhaps more accurate indication is the measurement of a dietary behaviour associated with a given area, for example fat intake or fruit and vegetable intake. Kristal, Shattuck, Henry and Fowler (1990) summarised the process of a low fat diet as consisting of 4 core dimensions or processes. These are (A) avoiding high fat foods (B) modifying commonly available foods to make them lower in fat (C) substituting high fat foods with a lower fat version of the same food (D) using different preparation techniques. In their study an initial pool of 86 items was reduced to 28 by an expert panel of nutritionists and psychologists. The questionnaire was then distributed to a sample of 400 women who also completed two four-day diet records; any item, which correlated less than 0.5 with the diet records, was eliminated. This final dietary behaviour questionnaire consisted of 18 items. Kristal et al (1990) have since evaluated the questionnaire in a variety of clinical and research conditions with satisfactory results. Beerman and Dittus (1994) further validated the questionnaire in a study with a group consisting of men and women, again finding a high correlation with fat intake. However while they found the questionnaire could identify participants with a high fat intake, they questioned its ability to distinguish between participants with medium or low fat intakes. In a more extensive test of the questionnaire with 1,006 employees in a worksite intervention Glasgow, Perry, Toobert and Hollis (1996) found the food behaviour questionnaire to correlate well with more expensive and time consuming methods of dietary assessment.
Interestingly Kristal, Andrilla, Koepsell, Diehr and Cheadle (1998) found no significant effect of intervention bias with a food behaviour questionnaire, while social desirability effects were found with two high fat food frequency questionnaires. However the questionnaires used in this study were quite short. Kristal et al suggested that qualitative reports of dietary habits such as those used in a dietary behaviour questionnaire might be less subject to intervention bias than quantitative recall. Overall limited research suggests that a brief behavioural assessment may have value where assessment needs to be completed quickly and when it is necessary only to measure an improvement in a participant’s dietary behaviour rather than a detailed assessment of all their dietary habits, for example in community settings. However if more detailed assessment is needed a dietary behaviour questionnaire can still be combined with food diaries or a more detailed questionnaire. This will give insight into areas in which participants need to bring about an improvement, for instance do they need to improve at modifying or substituting their dietary intake.

The questionnaire in the following study attempts to address these issues by including a wide range of behaviours, which will give a broad indication as to the dietary behaviour of the participants. The questionnaire regarding fat intake consists of 14 items from 2 sources, Bowen et al (1994) and Hargreaves et al (1999). Items 1-7, were taken from Bowen et al (1994). Bowen et al (1994) tested the validity of the stages of change model with 720 members of an outdoor folk music festival audience. Dietary behaviours were assessed under the term nutritional strategies. The original questionnaire consisted of 12 items. However 5 of these items could be rephrased under counterconditioning as identified in the transtheoretical model. The nutritional strategy scale used by Bowen et al showed an increase in low fat behaviours throughout the stages. With those in the post action stages using strategies most and participants in precontemplation using them the least. The items loaded as a single factor with an eigen value of 4.12. While only used in one study the items were generated following a series of focus groups and interviews some with individuals who had spent up to one year on a fat reduction programme.

Items 8-14 in the present questionnaire were taken from the eating styles questionnaire developed by Hargreaves et al (1999). This is a 16-item questionnaire, which focuses on the behaviours related to low fat intake and high fruit and vegetable intake. The 7 items chosen specifically related to fat intake. Items on this questionnaire were generated following cluster
analysis of 53 items in an exploratory questionnaire administered to 174 participants. In follow up analysis greater use of the low fat behaviours was associated with progression through the stages of change. The combination of these groups of items associated with progression through the stages in previous studies implies that they may be accurate measures of movement through the stages in the present study. The questionnaire also focuses on the 4 aspects associated with dietary behaviour, items 1, 3, 4 and 6 focused on substitution, sample item “I substitute low fat dairy foods for high fat dairy foods”. Items 2, 5 and 12 examined preparation sample item “I grill or bake instead of frying foods”. Items 7, 8, 9, 10 and 13 focused on avoidance items sample item “I avoid eating hamburgers and other high fat foods at fast food restaurants”. Items 11 and 14 focused on modification sample item “When I eat meats I choose low fat cuts or trim off the fat”. Also the length of the questionnaire, 14 items, adds to ease of administration particularly as the dietary questionnaire is followed by a lengthy processes of change, self efficacy and decisional balance questionnaires. Overall it is felt that this broadly based dietary behaviour questionnaire will give an accurate and rapid assessment as to whether or not the individual is maintaining or attempting to maintain a low fat diet. Responses are assessed on a 1-7 likert scale ranging from never to always.

Staging Algorithm

To date the debate regarding the classification of the stages of change for dietary habits has followed a similar pattern to the debate regarding dietary behaviour however with stage classification no conclusive answer has yet been reached. As with the measurement of an addictive behaviour such as smoking, stage classification for an addictive behaviour is straightforward as a participant will know if they are smoking or not. Or if they intend to give up smoking or not. Following on from this classification into the different stages is a clear-cut matter. Obviously other addictive habits such as alcohol and substance abuse follow a similar pattern. However low fat dietary behaviour as previously discussed is not as explicit particularly if a statutory cut off point such as 30-35% of dietary energy is used. Only a small percentage of participants will be able to say with confidence when they have reached such a target.

As the transtheoretical model has been applied to behaviours many of which do not have explicit cut off points it is of interest to look at the methods used for stage classification. One behaviour which is similar to dietary behaviour is exercise acquisition. Reed, Velicer, Prochaska, Rossi and
Marcus (1997) in a comparison of 3 staging algorithms for exercise acquisition concluded that it critical to accurately stage individuals for each target behaviour. Reed et al in classifying participants with exercise recommended giving a clear definition of the target behaviour with a 5 choice reply format. For example a target behaviour may be “exercise includes activities such as brisk walking, jogging or swimming ....... being undertaken at least 3 times a week”. Participants rated their present behaviour or their intended behaviour on a 1-5 scale (strongly disagree-strongly agree).

To date unlike with exercise there has been no detailed assessment of the most accurate staging algorithm for dietary behaviour. Many researchers simply use the participant’s perceptions, (Prochaska and Diclemente http://www.uri.edu/research/cprc/ 2000), Lamb and Sissons 1996, Glanz et al 1994). Brug et al (1994) however queried this approach pointing out the dangers of participants wrongly classifying themselves as maintaining a low fat diet. Of the 1,507 participants interviewed in their 1994 study a majority (55%) proved to be unrealistic about their dietary fat intake with the vast majority (76%) underestimating their fat intake. Greene et al (1994, 1998) introduced a 5 item behavioural criterion to be classified in a post action stage participants were required to respond positively to at least 4 items.

Kristal, Hedderson, Patterson and Neuhauser (2001 p764) focused on stage of change and dietary behaviour from a different viewpoint, emphasising a person’s subjective belief of their engagement with dietary change. For example should an individual who has reduced fat intake from 50% to 38% and has maintained this change for more than 6 months be classified as a precontemplater simply because they have not reached the criterion of less than 35% fat intake. This again pinpoints the problems with applying the model too rigidly to dietary behaviour, which is on a continuum, unlike explicit addictive behaviours. Kristal et al argued for a different interpretation of the model citing studies showing that individuals already engaged with the dietary process can and are more likely to adopt additional healthful habits. Kristal et al (2001 p764) therefore argued in favour of a simple 5 item staging algorithm as this measures a participant’s engagement with the dietary process and not a cut off point. Clearly this is an issue, which requires further investigation, and it is hoped the research in this study will contribute to answering some of the questions.

The exploratory study, staging algorithm contained five yes no response items and a 7 item
dietary behaviour scale. Participants who classified themselves in the post action stages (action and maintenance) on the basis of the staging algorithm did not score highly on dietary fat behaviours. However the majority scored medium low fat behaviours indicating that while some attempt was being made to reduce fat intake in many areas participants may need to reduce fat intake further. Also many participants who classified themselves in the pre action stages (precontemplation, contemplation and preparation) on the basis of the staging algorithm also classified themselves on a medium fat behaviours. Therefore individuals classifying themselves in post or pre action may in fact be on approximately the same fat intake. This indicates that many participants who classify themselves as being in post action may still be above the recommended level of fat intake. Also participants on similar levels of fat intake perceive their dietary status differently. However in support of such a simple algorithm only 1 participant in the precontemplation stage classified themselves as being on low fat behaviours overall and no participants in the action or maintenance stages classified themselves as being on high fat behaviours. Therefore with the extremes of the stages this very basic algorithm appears to have some validity. However methodological problems exist in that insights of the group used (psychology students may not be accurate). Also the dietary behaviour scale consisting of 7 items may not contain the sensitivity to detect the difference between high and medium fat intake in a large percentage of cases.

In the light of the research and experience in the pilot study several adjustments were made to both the staging algorithm and as previously discussed the low fat behaviour measure. The principle change to the staging algorithm being the addition of 2 extra items. These items allowed participants in action and maintenance to indicate their intention regarding future fat intake. In this instance whether they intended to reduce their fat intake further. Individuals therefore who have started to reduce their fat intake, but may not have reached the recommended level could indicate if they intended to take steps to reduce their fat intake further. This is in line with the Kristal et al argument that clinically important change needs to be recognised, and individuals at this point should not be classified for example as precontemplaters or contemplaters purely because they have not reached a behavioural cut off point. The participants in this study, type two diabetics have all received advice from a qualified nutritionist on how to maintain a low fat diet meaning they should have a clearer understanding than the students in the pilot study of the low fat dietary behaviours expected. The researcher believes that overall the sensitivity of these two scales (dietary behaviour and staging algorithm) will have increased
significantly from those used in the exploratory study.

**Perceived Risk**

Kristal, Hedderson, Patterson and Neuhauser (2001 p762) commented that many community interventions to promote dietary change have at best had modest effects. An explanation put forward is the concept of unrealistic optimism (Weinstein 1982). Weinstein found in surveys with students and the general public that many people believed they were less susceptible to health problems compared with a sample of other adults of their own age and sex. Clearly if people feel they are not at risk then perhaps they are less likely to adopt the behaviours which prevent the problem arising. A strong association exists between diabetes - obesity and in turn heart disease. The perception of people with diabetes of their risk of heart disease and its relationship to stage is of interest. For example will precontemplators or maintainers perceive themselves as being most or least at risk. A single item was included asking participants to rate on a 1-10 scale the extent to which they perceived themselves at risk of developing heart disease due to their intake of fatty foods.

**Dietary Knowledge Questionnaire**

The relationship between dietary knowledge and actual behaviour change is unclear. Levy, Fein and Stephenson (1993 p33) in an analysis of data gathered between 1983 and 1988, found that general public knowledge was low regarding dietary fats and cholesterol. The groups most likely to have appropriate knowledge were those on a self prescribed lower cholesterol diet and well educated middleclass whites. Individuals on a physician recommended cholesterol lowering diet did not show good levels of nutrition knowledge. Stafleu, Staveren, Graaf and Hautvast (1996) in a sample of 2052 Dutch women across 3 generations did not find any significant correlation between nutrition knowledge and percentage of energy derived from fat. McDonell, Roberts and Lee (1998) however found in a sample of 1,081 university employees that dietary knowledge increased with stage progression. The sample of participants with type two diabetes in this study at the west London hospital are expected as part of their treatment to maintain a low fat diet. It will be of interest to establish the level of dietary knowledge regarding fat intake participants will have and its relationship to stage of change. Will for example as in the McDonell et al (1998) study participants show increased knowledge as they progress through the
stages? One item concerning the recommended level of energy to be derived from fat in the diet was included. The Health of the Nation document and numerous researchers estimate this at 35%. The scales used by McDonell et al (1998), Levy et al (1993) and Stafleu et al (1996) consisted of at least 11 items. Pressure of space made inclusion of a detailed questionnaire impossible in this instance. However knowledge of a general question regarding level of fat intake may give an insight into participant’s overall level of dietary knowledge.

Processes of change

Greene, Rossi,Rossi,Velicer, Fava and Prochaska (1999 p675) in a summary of the processes in relation to dietary change listed 11 processes in total. These were divided them into experiential and behavioural categories, 9 of which are summarised in the following diagram.

**Diagram: Processes of change**

<table>
<thead>
<tr>
<th>Experiential</th>
<th>Behavioural</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consciousness Raising</td>
<td>Increasing awareness of unhealthy Dietary behaviour</td>
</tr>
<tr>
<td>Dramatic Relief</td>
<td>Using feeling to help motivation</td>
</tr>
<tr>
<td>Self Reevaluation</td>
<td>Reassessing thoughts, feelings and knowledge about oneself</td>
</tr>
<tr>
<td>Self Liberation</td>
<td>Recognising choices and using will power, making commitments</td>
</tr>
<tr>
<td>Environmental Reevaluation</td>
<td>Assessing impact on family and friends</td>
</tr>
</tbody>
</table>

Greene et al (1999) included an additional experiential process of Social Liberation (becoming aware of the changes in the environment that influence dietary behaviour plans) and an additional behavioural process of interpersonal systems control (avoiding other people who encourage consumption of high fat foods or act as a barrier to low fat behaviour patterns).

This questionnaire focused on the five experiential and four behavioural processes identified in
the original model (Prochaska and DiClemente 1992), these processes were emphasised as the processes central to change by Prochaska again in 1999. A thorough examination of these will give a detailed insight into the use of experiential and behavioural processes whereas a less thorough examination of additional processes which may not play as crucial a role will not give a worthwhile insight.

The exploratory study processes scale consisted of 42 items measured on a 1-5 likert scale. Items were selected from Bowen et al (1994) and the University of Rhode Island web site (www.uri.edu/research/cprc). Scores were exceptionally low on several subscales with participants overall rarely scoring more than occasional use with any process. The highest score for example with self reevaluation in the maintenance stage of 15.2 indicates at best occasional use. There are two possible interpretations of this either these processes are not used very often or that the scale lacked the sensitivity to detect their use. These problems were addressed in two ways firstly by including additional items, seven items per process increasing the scale in total to 63 items. Secondly participants were given more options on the scale by increasing it to 1-7 from 1-5. Items were selected from Bowen et al (1994) and the University of Rhode Island website with an additional 20 items from participant’s comments in the qualitative interviews. Copy in appendix three.

Processes of change questionnaire structure

Firstly each process was measured by 7 items, giving a range of scores from 7 to 49. Details of the source of the items and a sample item for each process follows (complete questionnaire in appendix three).

Consciousness Raising: Items 1-5 were taken from Bowen et al (1994) and items 6 and 7 were adapted from information in the qualitative interviews. Sample item “I talk to people about the systems or tricks they use to stay on low fat diets”.

Social Support: Items 8, 9, 10 and 12 were taken from Bowen et al (1994) and item 11 from the University of Rhode Island web site. Items 13 and 14 were taken from information in the qualitative interviews. Sample item “The encouragement of others is a major factor in the lowering of fat in my diet”.
Dramatic Relief: Items 15 and 16 were taken from Bowen et al (1994). Items 17, 18 and 19 were adapted from the University of Rhode Island website. Items 20 and 21 were taken from information in qualitative interviews. Sample item “News reports and official figures about the dangers of high fat diets upset me”.

Environmental Reevaluation: Items 22, 23, 24, 25 and 26 were taken from Bowen et al (1994). Items 27 and 28 were taken from the qualitative interviews. Sample item “I believe I can do more for family and friends if I stayed on a low fat diet”.

Self Reevaluation: Items 29, 30, 31 and 33 were taken from Bowen et al (1994). Item 32 was adapted from the University of Rhode Island website. Items 34 and 35 were taken from information in the qualitative interviews. Sample item “I believe that by eating a low fat diet I will become a healthier and happier person”.

Reinforcement Management: Items 36 and 38 were taken from the University of Rhode Island website. Items 37, 39 and 40 were taken from Bowen et al (1994). Item 41 and item 42 were adapted from the qualitative interviews. Sample item “Eating high fat foods is not a problem provided it does not happen too often”.

Self Liberation: Items 43, 44, 45 and 46 were taken from the University of Rhode Island website. Items 47 and 48 were adapted from the qualitative interviews. Sample item “I tell myself I can make the necessary changes to maintain a low fat diet”.

Counterconditioning: Items 50, 51, 52 and 53 were taken from the University of Rhode Island website. Item 54, 55 and 56 were adapted from information in the qualitative interviews. Sample item “I find keeping myself busy is a good way to avoid eating high fat foods”.

Stimulus Control: Items 57, 58, 59 and 60 were adapted from the University of Rhode Island website. Item 61 was taken from Bowen et al (1994). Item 62 was adapted from information provided in the qualitative interviews. Sample item “When I shop I avoid areas where there are a lot of high fat foods”.
Decisional balance

Janis and Mann (1977 cited in Prochaska and Velicer 1994 p 40) conceptualized decision making as a conflict model, consisting of a careful examination of the comparative gains and losses. Prochaska and Velicer (1994 p41) theorised that decisional balance followed a fixed pattern in relation to the stages of change. In precontemplation the pros of the problem behaviour will outweigh the cons and in action and maintenance the cons will outweigh the pros. The crossover between pros and cons takes place in either contemplation or preparation.

Different researchers have used varying measures with decisional balance in relation to dietary change. Prochaska et al (1994) used a 24 item measure (12 items pro and 12 items con), while Simmons and Mesui (1999) used 8 cons and 6 pro items. Steptoe, Wijetunge, Doherty and Wardle (1996) in a postal survey of South London residents used a 12 item questionnaire. The pilot study questionnaire consisted of 20 items, ten focused on cons and ten on pros. However shortage of space and the increase in the amount of items in the low fat behaviour scale and the processes of change scale meant the amount of items in the decisional balance scale needed to be decreased. In order to make the new scale practical and having increased the number of items in the processes of change scale it was decided to decrease the number of items in the decisional balance scale to 10 items overall. The new scale consisted therefore of 5 pro items and 5 con items. Again these were measured on a 1-7 likert scale with 1 meaning no importance at all and 7 meaning extremely important. While not matching the detail of the Prochaska et al (1994) study it is comparable with the measures used by Simmons and Mesui (1999) and Steptoe et al (1996) and will be a valid measure of decisional balance. Items were selected from University of Rhode Island website (www.uri.edu/research/cpre) . Sample item for decisional balance pros “My self respect would be higher on a low fat diet”. Sample item for decisional balance cons “A low fat diet takes the pleasure out of meals”.

Self efficacy

Bandura (1977) expected that individuals with high efficacy expectations, will cope with difficult or high risk situations related to their changed behaviour. For example a smoker that
believes they can give up smoking has an improved chance of success. In relation to dietary behaviour Bernier and Avard (1986) found that pre treatment self efficacy scores were significantly related to weight loss during treatment and post treatment efficacy predicted maintenance of weight loss at a 6 week follow up. The questionnaire in the exploratory study consisted of 20 items and focused on self efficacy with regard to negative emotions, availability, social pressure, physical discomfort and positive activities. Pressure of space in this questionnaire necessitated the number of items be reduced to 10. The new scale consisted of the 2 items from each subscale with the heaviest loading in the factor analysis of the pilot study data. Subscales covered negative emotions (items 1,4), availability (items 2,7), social pressure (items 5,8), physical discomfort (items 6,9), positive activities (items 3,10). As in the exploratory study the source of items was Clark and Abrams (1991) “Self Efficacy in weight management scale”. Sample item “I can resist eating high fat foods when others are pressuring me to eat them”. Items were measured on a 1-7 likert scale with 1 meaning not confident and 7 meaning very confident.

Overall the use of additional items in the low fat behaviour and processes of change scales, the inclusion of the additional concepts of perceived risk and dietary knowledge alongside the most relevant items for decisional balance and self efficacy makes this set of questionnaires a greatly improved tool than that used in the exploratory study.

Intervention pamphlets

Central to the transtheoretical model is the belief that interventions matched to the stages of change are more effective than general interventions. A central aim of this thesis is to research this area and test stage matched interventions against a general intervention and against no intervention. Five interventions matched to stage and one general intervention were designed. The information contained in each intervention and its source are now explained.

Precontemplation pamphlet

In the transtheoretical model three processes consciousness raising, dramatic relief and environmental reevaluation are linked with initiating progress from precontemplation (Prochaska
1992, 1999). Consciousness raising in theory consists of observations, confrontations, interpretations, feedback and education. While in an interview or clinical situation techniques such as these are possible, Prochaska (1999 p 241) did acknowledge that a problem with strategies such as confrontation is their high risk for retention. Therefore realistically in a pamphlet which participants read for approximately 10 minutes, the best option is to encourage participants to think and read further. Consciousness raising in the pamphlet consists of making participants aware that while some fat is necessary the majority of the British population still consumes too much fat in their diet and it is this excess fat which causes many problems. It is also pointed out that a strong link exists between many serious health complaints and high fat intake. Consciousness raising is covered in the first page of the booklet.

The second strategy linked with movement from precontemplation is environmental re-evaluation. This involves assessing how a person’s behaviour is affecting their social environment and how changing their dietary behaviour will improve this. Prochaska (1999 p242) in relation to smoking uses a dramatic example of how ill health has an adverse impact on other family members. The message in the pamphlet is similar making the person aware that it is not just their health which is involved but also an improved quality of life for those close to them.

The third and final strategy at this point is dramatic relief, Prochaska (1999) defines this as “Emotional arousal regarding one’s current behaviour and the relief that can come from changing”. Strategies such as role playing, personal testimonies and grieving are recommended, but again many of these are suited to interviews and one to one counselling. In the pamphlet this is covered by encouraging the person to think of someone they know who has lost weight and imagine the feeling of satisfaction and relief that goes with improved health. The intervention is kept brief as precontemplaters are not intending to change and are therefore unlikely to spend time reading detailed booklets. It is hoped a brief dramatic booklet will encourage them to at least think about changing. The goal at this point is to move them forward to contemplation (copy of pamphlet in appendix four).

**Contemplation pamphlet**

At this point in the change process participants are firstly congratulated for taking the first steps
to an improved diet, that is thinking about change. Prochaska (1999 p 240) pointed out that with contemplaters an increase in the pros and a decrease in the cons is necessary before participants will move from contemplation to later stages. Evaluating the pros and cons is a simple exercise in which the participant is asked to list the advantages of a low fat diet in one box and disadvantages of high fat diets in another one. The participant is instructed at the end to focus on the advantages of a lower fat content in the diet. The process emphasised at this point is self reevaluation. With this the participant needs to evaluate how they will feel once they have started a low fat diet. This is addressed in a simple exercise, requesting participants to list how they will feel if they change on to a low fat diet and how they will feel if they remain on a high fat diet. Overall it is hoped that an improvement in decisional balance and in greater use of self reevaluation will move the participant forward from contemplation (Copy in appendix four).

**Preparation pamphlet**

Again firstly the participant is congratulated for making a definite commitment to change. The process emphasised to move participants onward from the preparation stage is self liberation. This consists of recognising choices, using will power and making commitments to change. Self efficacy is also acknowledged as an important factor as a strong belief in the ability to change is associated with increased incidence of success. In the pamphlet firstly self efficacy is addressed by asking the person to think of problem situations associated with maintaining low fat behaviours a list of coping strategies used by others is also provided. Participants are then asked to list situations in which they might find it difficult to adhere to low fat foods and following this to list methods helpful to coping. The strategy is for the participant to be prepared for problems and to develop a belief in their ability to cope with them. The participant should also see they have a choice in that alternative behaviours are available to eating high fat foods. The next step is to make a definite commitment to change, this means deciding on a firm starting date and listing some of the steps which they intend to take. The participant is also encouraged to think ahead to the action stages and to have the back up of at least one helping relationship (Copy in appendix four).

**Action pamphlet**

At this point the participant is actively involved in improving their diet, but they have maintained
the behaviour for less than six months and so considerable process use is encouraged to maintain and improve dietary behaviours. The processes targeted at this point are reinforcement management, helping relationships, counterconditioning and stimulus control. Reinforcement management implies the person reward themselves or at least acknowledges that they have made a step forward. They are encouraged to do this by firstly reading through a list of the rewards other people have given themselves and to then make a list of rewards they would like and a timetable for receiving them. Overall they are encouraged to enjoy their improved diet. With regard to helping relationships, participants are encouraged to make a list of people who will be supportive of them and to list ways in which their support can be utilised. With counterconditioning participants are encouraged to substitute harmful behaviours or interests with beneficial ones. Participants are provided with a sample list of substitute behaviours and interests others have used for example in circumstances where it is difficult to maintain low fat diets people may instead eat some fruit or take up alternative behaviours like exercise. Participants are then encouraged to make a list of alternative behaviours or interests they can partake which will help them maintain a low fat diet and to list when they intend to start them. With stimulus control, that is avoiding situations which trigger unhealthful behaviours, participants are advised to surround themselves with stimuli which encourage them to maintain a low fat diet such as putting a list of the benefits of low fat foods where they can be clearly seen. They are also encouraged to choose a starting date for putting the new stimuli in place (Copy in appendix four).

**Maintenance pamphlets**

The strategies emphasised in maintenance are identical to those in action, that is reinforcement management, helping relationships, counterconditioning, and stimulus control. Again participants are congratulated for maintaining their low fat diet for some time. While the strategies used at this point are similar to those used in action, participants are encouraged to continue to reward themselves, for example, to have helpful supportive people whom they can contact, to have a list of alternative behaviours and interests available to them, and to have stimuli around them which will encourage them to maintain their low fat behaviours. However, while people in action are expected to be enthusiastic it is accepted that those in maintenance will be more comfortable with their behaviour and may occasionally break their diet.
Additional sections are introduced in the pamphlet. The first covers slips in their dietary programme pointing out that infrequent brief slips in their diet need not be a cause for concern. They only become a problem when they are maintained for some time. The final section reminds them to think of the benefits they have gained by maintaining their low fat diet and to list them down. The emphasis at this point is more on consolidation of behaviour and appreciation of the benefits gained. The cover sheets differed slightly acknowledging if a participant indicated they intended to reduce their fat intake further still (Copy in appendix four).

General pamphlet

While this pamphlet was not designed to be specific to any one stage information was included which covered all stages in that it consisted of a cognitive processes (consciousness raising and self reevaluation) a behavioural component (counterconditioning) and a decisional balance section. With this combination of processes and concepts participants received information matched and mismatched to their relevant stage. The section on consciousness raising was identical to that given to precontemplaters. The section on decisional balance matched that given to those in contemplation, the section on counterconditioning matched that in the brochures for action and maintenance. The content of a half page section focusing on the benefits of low fat behaviours contained similar strategies to that given to participants in preparation or contemplation (Copy in appendix four).

Sources of pamphlet content

The content of the pamphlets was adapted from Mija nutrition website (2000 www.cse.unl.edu/~mjia/nutrition) Hesonline nutrition (http://www.hesonline.com/brochures.html). Diet and Nutrition and the Prevention of Chronic Diseases, The Health of the Nation Document Health and lifestyles, The commonsense guide to weight loss for people with diabetes (Hansen 2000). Several quotes were also introduced from the qualitative interviews conducted at the University of Surrey. Pamphlets were matched as closely as possible for style and size. However of necessity the pamphlets for the behaviour orientated stages, action and maintenance were slightly larger. The precontemplation pamphlet contained five pages, contemplation pamphlet four, preparation five, action pamphlet six pages and maintenance pamphlet seven pages. The generalised intervention contained six pages. (Copies of all brochures in appendix four).
Hypotheses

The hypotheses to be tested were similar to those previously examined in the exploratory study. In total 8 hypotheses were included, the first five related to the transtheoretical model examining the processes and concepts of change. The last three focused on the processes and concepts in this instance in relation to low fat behaviour. Hypotheses are summarised below.

1 Low fat dietary behaviour will be significantly higher in the post action stages (action and maintenance) than the pre action stages (precontemplation, contemplation and preparation).

2 Processes of change will match those outlined by the model. Specifically cognitive processes will be emphasised in the pre action stages and behavioural in the post action stages.

3 Significant differences will be found with decisional balance pros and the decisional balance cons between the stages. It is expected that the pros will score higher than the cons in the post action stages and the cons higher than the pros in the early pre action stages with crossover taking place in contemplation.

4 Self efficacy will be significantly different between the stages. Specifically post action stage groups will score higher than pre action groups.

5 With perceived risk participants in precontemplation will see themselves less at risk of developing health problems from their intake of fatty foods than participants in other stages.

6 Process use will be significantly different between the low fat behaviour groups. Specifically those scoring higher on low fat behaviours will have higher scores on process use.

7 Scores on decisional balance pros and decisional balance cons will be significantly different between the low fat behaviour groups. Specifically pros will be higher and cons lower for those in the higher scoring groups.

8 Scores on self efficacy will be significantly different between groups. Specifically a higher
score on low fat behaviours will relate to a higher score on self efficacy.

Method

Questionnaires were distributed in 2 outpatients clinics for diabetics at South London hospitals, between December 2000 and July 2001. Patients were approached in the waiting rooms and asked if they would be willing to complete a questionnaire focusing on attitudes to dietary change. They were informed it was part of a six-month study with a follow up questionnaire in 6 months time. Participants received an information sheet detailing the purpose of the study and a consent form, which they signed to indicate their willingness to take part (copy of ethics form in appendix two). They were not advised however as to which type of intervention they would receive.

On completion of the questionnaire participants were given either a matched brochure based on the transtheoretical model, or general information brochure; participants in the control group received no intervention. Pre-paid envelopes were distributed to participants, who could not complete the questionnaire immediately, to allow completion and return of the questionnaire at a later date. Three months following the start date participants were posted a copy of the brochure they received at baseline. A second questionnaire with a pre-paid return envelope was mailed to their home address six months after the start date. In summary an independent group design was used with participants divided into 3 groups, a summary of the study is included in table 4.1.

Table 4.1: Summary of Study Outline

<table>
<thead>
<tr>
<th>Baseline</th>
<th>Mid Point 3 Months</th>
<th>Follow Up 6 Months</th>
</tr>
</thead>
<tbody>
<tr>
<td>Questionnaires and intervention pamphlets distributed. Total N = 955</td>
<td>Repeated interventions distributed</td>
<td>Final questionnaires distributed and returned</td>
</tr>
<tr>
<td>Stage matched pamphlet N = 327</td>
<td>Stage matched N = 327</td>
<td>Stage matched N = 60</td>
</tr>
<tr>
<td>General pamphlet N = 309</td>
<td>General N = 309</td>
<td>General N = 60</td>
</tr>
<tr>
<td>Control group N = 319</td>
<td>Control N = 319</td>
<td>Control N = 108</td>
</tr>
</tbody>
</table>
Baseline results

Of the 1273 questionnaires distributed, 858 were completed at the clinics, 97 were returned by post, 15 were completed incorrectly in a manner which made them unusable, 308 taken by participants were not returned. In total 955 questionnaires were returned making a return rate of 75%. The general intervention was distributed to 309 participants, stage matched interventions to 327. The control group receiving no intervention consisted of 319.

Demographics

The final sample consisted of 955 participants. However, not all participants answered all of the questions and therefore the total number on particular variables may be lower than this. Sample consisted of 510 males, 443 females, 2 participants did not answer, ages ranged from 18 – 90 with a mean of 57. 584 participants were responsible for preparing and purchasing their own food and 314 were not, 57 participants did not answer this item. With regard to education 381 did not hold any of the listed qualifications, 188 held O levels, 73 A levels, 52 HND’s or HNC’s, 132 held first degrees and 75 Higher degrees (Masters or PhD), 54 did not answer this item.

Chi square analysis of intervention type yielded a value of .572 p>.05, therefore the important issue of equal distribution of the intervention type has been achieved. Chi square regarding sex was also significant yielding a value of 4.9 p<.05. The sample therefore has a significantly larger group of males than females.

Stage Distribution

The first analysis will use the traditional classification of the transtheoretical model using the traditional algorithm containing five stages. Therefore those in action who indicated they intended to reduce their fat intake further were combined with those who indicated they had been on a low fat diet for less than 6 months. Those in maintenance who indicated that while on a low fat diet they intended to reduce their fat intake further were combined with those who simply indicated they had either been on a low fat diet for more than six months. Stages distributed as follows, precontemplaters 159, contemplaters 57, preparation 57, action 107 and maintenance 575. Data summarised in figure 4.1.
954 participants completed this scale: Range 14-101, mean score 64.49, standard deviation 16.7. Scores were divided into 3 groups, low, medium and high fat behaviour. High fat behaviour - 14-42, medium fat behaviour - 43-71, low fat behaviour scores - 72-98. 3 scores were above 98, this indicated the participants had scored 8 on items 3, 10, and 11 meaning they did not take dairy products or eat meat. These participants were all in the low fat behaviour group. 93 participants fell into high fat behaviour scores, 497 medium fat behaviour and 364 low fat behaviour.
Stage distribution and low fat behaviours:

Table 4.2 shows the numbers of participants classified into each of the 5 stages and into each of the 3 levels of fat behaviours (high, medium and low). It can be seen that there is an association between these two classifications, with the majority of the participants in pre action stages being classified as high or medium fat behaviours, while the majority of those in post action stages are in medium or low fat behaviours. Data summarised in table 4.2.

Table 4.2: Fat behaviours and Stage

<table>
<thead>
<tr>
<th>Stage</th>
<th>High</th>
<th>Medium</th>
<th>Low</th>
</tr>
</thead>
<tbody>
<tr>
<td>Precontemplaters</td>
<td>44</td>
<td>102</td>
<td>13</td>
</tr>
<tr>
<td>Contemplaters</td>
<td>10</td>
<td>44</td>
<td>3</td>
</tr>
<tr>
<td>Preparation</td>
<td>12</td>
<td>38</td>
<td>7</td>
</tr>
<tr>
<td>Action</td>
<td>8</td>
<td>66</td>
<td>33</td>
</tr>
<tr>
<td>Maintenance</td>
<td>19</td>
<td>267</td>
<td>287</td>
</tr>
</tbody>
</table>

Analysis of fat behaviour scores showed a skew of -.30, and kurtosis of -.27 indicating the data is distributed close to normality and suitable for analysis using parametric tests. A one way analysis of variance showed $F(4) = 76.79$ p > .001. Scheffe post hoc tests were conducted. Significant differences between precontemplation versus action (p < .01) and maintenance (p < .01), contemplation versus action (p < .01) and maintenance (p < .01), preparation versus action (p < .05) and maintenance (p < .01), and action versus maintenance (p < .01). Mean scores precontemplaters = 51.20, contemplation = 51.17, preparation = 55.35, action = 63.03 and maintenance = 70.67. Meaning all pre action stages as expected differed from Action and Maintenance, but there were no significant differences between the pre action stages. There was however unexpectedly a significant difference between action and maintenance. Mean scores summarised in figure 4.2.
Perceived Risk

899 participants responded to this item. Analysis of data showed a skew of -.192 and kurtosis of -1.25, indicating the data are not normally distributed. A log transformation while reversing the kurtosis (.363) gave a negative skew (-1.109). A distribution of this nature may be inevitable in a sample with a chronic condition which may feel it has a higher than average risk of developing significant health problems. Two tests of significance were run. A one way analysis of variance $F(4) = 5.716 \ p<.001$. Scheffe post hoc tests found significant differences between precontemplators and action ($p<.05$) and maintenance ($p<.01$) with differences with contemplation and preparation being close to significance ($p<.10$). Kruskal Wallis a non parametric test suitable for unusually skewed data yielded chi square (4) 22.02; $p<.001$. Precontemplators were ranked lowest, meaning they perceived themselves at least risk of developing a significant health problem, despite their low fat behaviours being lower which implies they are at greater risk. The mean scores are shown figure 4.3.
Dietary Knowledge

594 participants responded, 361 did not, 243 scored item 1, 178 item 2, 104 item3, 31 item 4, 35 item 5, 2 item 6 and 1 item 7. Therefore less than 20% answered correctly (item 2 correct answer), 38% failing to answer the item at all. Within the stages correct answers were precontemplation 31(19%), contemplation 15(26%), preparation 13(22%), action 19(17%), maintenance 100(17%). Data summarised in figure 4.4.
Data reduction and scale reliability

The validity and reliability of questionnaires were assessed using a principal component analysis of the processes, self efficacy and decisional balance scales and an alpha reliability analysis of the subscales. With the processes questionnaire a principal components analysis using direct oblimim rotation converged in 27 iterations. Nine factors with eigen values greater than one accounting for 66% of the variance emerged (copy in appendix one). Factors loaded broadly in line with that outlined in the structure of the questionnaire and the reliability estimates for each subscale were acceptable. Results as follows.

Processes Scale

Items 1-7 measuring consciousness raising loaded as a single factor all with loadings greater than .3. However item 2 also loaded on factor 7 (environmental reevaluation). Alpha reliability equaled .86 and would not have been increased with the deletion of any item. Items 8-14 measuring social support again loaded broadly as a single factor, however items 8 and 12 also loaded on other factors. The alpha reliability was acceptable at .87, and this would not have been improved by deleting any items. Items 15-21 measuring dramatic relief loaded as a single factor, alpha reliability was acceptable at .94. Items 22-28 measuring environmental reevaluation loaded mainly as a single factor but three items also loaded on other factors. Alpha reliability was
acceptable at .89 and this would not have been improved by removing any items. Items 29-35 measuring self reevaluation loaded as a single factor with the exception of one item which did not load on any factor. Alpha reliability was acceptable at .92, which again would not have been improved by deleting any item. With items 36-42 measuring reinforcement management the results were unclear: overall items did not load on any single factor but alpha reliability was acceptable at .83; this would have improved slightly to .85 with the deletion of item 42. Items 43-49 measuring self liberation loaded as a single factor with the exception of item 49 which only loaded at .24. Alpha reliability was acceptable at .87. Items 50-56 measuring counter conditioning loaded as a single factor with the exception of item 56. Alpha reliability was acceptable at .88, which would not have been improved by deleting any item. Items 57-63 measuring stimulus control loaded as a single factor with the exception of item 62 which did not load on any factor. Alpha reliability was acceptable at .89 and this would have improved slightly to .90 with the deletion of item 62. Overall the factor loadings and reliability scores are acceptable matching broadly the processes outlined in the transtheoretical model. Therefore no items were deleted or adjustments made to the process scale structure.

Transtheoretical concepts

With decisional balance a principal components analysis with direct oblimin rotation converged in 6 iterations. Two factors emerged with eigen values greater than one explaining 60% of variance (copy in appendix one). All the decisional balance pro items loaded on one factor, alpha reliability was acceptable at .86. All decisional balance con items loaded as single factor, alpha reliability was acceptable at .86. Self efficacy was measured as a single concept it’s alpha reliability was acceptable at .92.

Again with the concepts the structure broadly matched that outlined with the transtheoretical concepts and the reliability levels were acceptable, analysis was therefore conducted on the basis of the original structure of the questionnaire.

Use of transtheoretical processes and concepts at different stages

Scale items were combined to give a total score for each process or concept. In order for a participant’s score to be included at least 80% of the subscale items had to have been completed.
Each process of change consisted of 7 items (maximum 49, minimum 7), self efficacy 10 items, (maximum 70, minimum 7), pros of change 5 items (maximum 35, minimum 5) cons of change (maximum 35, minimum 5). Individual scores and probability levels follow with overall results summarised in table 4.3 and figure 4.5.

**Processes of change**

Analysis of skew and kurtosis for all processes with the exception of self reevaluation gave values less than one showing results to be suitable for analysis with parametric tests. Accordingly scores for self reevaluation were log transformed, making the results for skew and kurtosis less than one meaning scores on the transformed variable were suitable for analysis using a parametric test. One way analysis of variance were calculated for each of the processes of change with one factor of stage. Significant differences were found with the use of all processes between stages.

Results are summarised in table 4.3 and figure 4.5.

Scheffe post hoc tests were conducted. With self reevaluation, environmental reevaluation and self liberation significant differences were found between precontemplation and all other stages. With consciousness raising differences were significant between precontemplation versus preparation (p<.01), action (p<.01) and maintenance (p<.01) and contemplation versus action (p<.05) and maintenance (p<.01). With social support differences were significant between precontemplation versus action(p<.01) and maintenance(p<.01), contemplation versus action (p<.01) and maintenance (p<.01) with differences between preparation precontemplation and contemplation approaching significance p=.08. With dramatic relief significant differences were found between precontemplation versus preparation (p<.01) action (p<.01) and maintenance (p<.01). Differences between precontemplation and contemplation approached significance p =.07. With reinforcement management significant differences were found between precontemplators versus preparation (p<.05), and maintenance (p<.01). With counter conditioning differences were significant between precontemplation versus action (p<.01) and maintenance (p<.01), and contemplation versus maintenance (p<.01). Differences between contemplation and action and preparation and maintenance were close to significance p=.06 for both. With stimulus control differences were significant between precontemplation versus action (p<.01) and maintenance (p<.01), contemplation versus action (p<.05) and maintenance (p<.01). Differences between preparation and maintenance were close to significance p=.06.
Table 4.3: Mean scores transtheoretical processes and stage of change

<table>
<thead>
<tr>
<th>Process</th>
<th>Number</th>
<th>Precontemplation</th>
<th>Contemplation</th>
<th>Preparation</th>
<th>Action</th>
<th>Maintenance</th>
<th>F Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consciousness raising</td>
<td>947</td>
<td>21.86(8.7)</td>
<td>25.04(6.6)</td>
<td>27.82(7.8)</td>
<td>30.04(8.75)</td>
<td>31.38(9.69)</td>
<td>34.96**</td>
</tr>
<tr>
<td>Dramatic relief</td>
<td>934</td>
<td>18.03 (11.14)</td>
<td>23.73(11.5)</td>
<td>25.65(12.23)</td>
<td>25.17(11.94)</td>
<td>24.63(12.91)</td>
<td>9.50**</td>
</tr>
<tr>
<td>Environmental reevaluation</td>
<td>935</td>
<td>21.31(10.63)</td>
<td>27.01(9.5)</td>
<td>28.38(9.56)</td>
<td>30.15(10.94)</td>
<td>30.36(10.98)</td>
<td>22.03**</td>
</tr>
<tr>
<td>Self reevaluation</td>
<td>923</td>
<td>20.17(12.27)</td>
<td>28.12(10.74)</td>
<td>32.09(9.34)</td>
<td>32.05(11.16)</td>
<td>31.33(12.02)</td>
<td>29.60**</td>
</tr>
<tr>
<td>Self Liberation</td>
<td>941</td>
<td>18.87(9.8)</td>
<td>26.03(9.17)</td>
<td>26.73(8.79)</td>
<td>29.58(10.02)</td>
<td>29.58(10.93)</td>
<td>33.03**</td>
</tr>
<tr>
<td>Reinforcement management</td>
<td>925</td>
<td>19.44(9.3)</td>
<td>22.02(8.19)</td>
<td>24.47(10.02)</td>
<td>22.85(9.20)</td>
<td>24.24(10.70)</td>
<td>7.48**</td>
</tr>
<tr>
<td>Social support</td>
<td>947</td>
<td>19.10(10.46)</td>
<td>21.96(9.5)</td>
<td>23.93(11.02)</td>
<td>28.57(10.00)</td>
<td>27.61(11.15)</td>
<td>22.55**</td>
</tr>
<tr>
<td>Counter conditioning</td>
<td>920</td>
<td>14.30(8.82)</td>
<td>22.01(8.19)</td>
<td>21.31(8.18)</td>
<td>25.38(9.79)</td>
<td>25.64(10.90)</td>
<td>24.42**</td>
</tr>
<tr>
<td>Stimulus control</td>
<td>905</td>
<td>14.30(8.82)</td>
<td>17.41(9.7)</td>
<td>18.89(9.61)</td>
<td>22.96(9.99)</td>
<td>23.44(11.34)</td>
<td>24.90**</td>
</tr>
</tbody>
</table>

Std in brackets P<.05 * P<.001* Means with the same superscript do not differ at p<.05.
Figure 4.5: Mean scores transtheoretical processes and stage of change


Precon = Precontemplation, Contem = Contemplation, Prepare = Preparation, Action = Action, Mainten = Maintenance
Results Transtheoretical concepts

Scale items were combined to give a total score for each section. In order for a participant's score to be included at least 80% of the subscale items had to have been completed. Self-efficacy consisted of 10 items, (maximum 70, minimum 10), decisional balance pros of change consisted of 5 items (maximum 35, minimum 5), decisional balance cons of change also consisted of 5 items (maximum 35, minimum 5). Results are summarised in table 4.5 and figure 4.6.

Analysis of skew and kurtosis gave values of less than one for decisional balance cons and self-efficacy. For decisional balance pros however the value for kurtosis was greater than one, and therefore data were log transformed to reduce kurtosis to less than one and analysis conducted on the transformed variable. Scheffe post hoc tests conducted and significant differences were found between stages for all concepts using one way analysis of variance. With decisional balance pros and cons differences were significant between precontemplators and all other stages (p < .01). With self-efficacy differences were significant between maintainers and all other groups (p < .01).

Table 4.5: Mean Scores transtheoretical concepts and stage of change

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Precon</th>
<th>Con</th>
<th>Prepare</th>
<th>Action</th>
<th>Mainten</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pros</td>
<td>875</td>
<td>14.10(8.03)a</td>
<td>19.25 (7.2)b</td>
<td>20.79 (8.20)b</td>
<td>20.90 (8.35)b</td>
<td>20.18 (8.62)b</td>
<td>19.44**</td>
</tr>
<tr>
<td>Cons</td>
<td>878</td>
<td>15.90(7.25)a</td>
<td>20.60 (5.8)b</td>
<td>21.48 (5.79)b</td>
<td>19.13 (6.60)b</td>
<td>18.28 (7.49)b</td>
<td>8.23**</td>
</tr>
<tr>
<td>S. E.</td>
<td>856</td>
<td>48.08(17.25)a</td>
<td>45.08(13.04)a</td>
<td>46.63(13.04)a</td>
<td>46.98(15.61)a</td>
<td>55.32(12.50)a</td>
<td>18.87**</td>
</tr>
</tbody>
</table>

** p < .01 Precon = Precontemplation, Con = Contemplation, Prepare = Preparation, Action = Action, Mainten = Maintenance,
Pro = Decisional balance pros, cons = Decisional balance cons, S.E = Self-efficacy. Means with same superscript do not differ at p < .05.
Precon = Precontemplation  Con = Contemplation  Prepare = Preparation  Action = Action  Mainten = Maintenance
Pros = Decisional balance pros  Cons = Decisional balance cons  S.E = Self efficacy
Analysis based on split post action stages

The staging algorithm used in this study differed from traditional staging algorithms in that it offered participants in action and maintenance the option of stating if they intended to reduce their fat intake further. With dietary behaviour not being an explicit cut off behaviour it is possible that participants who classify themselves in action or maintenance may intend further behaviour change. It is of interest if differences emerge between these groups on low fat behaviours or any of the transtheoretical concepts or processes. Of interest firstly is the number of participants who classify themselves in these additional stages when given the opportunity. Of the 107 participants in action 77 or 71% classified themselves as intending to reduce their fat intake further. Of the 575 participants in maintenance 256 or 44.5% classified themselves also as intending to further reduce their fat intake. Analysis was conducted on the scores in these four groups. Results are now summarised firstly with low fat behaviours and perceived risk.

With low fat behaviours significant differences were found between stages. Scheffe post hoc tests were conducted. These found there were no differences between the two action or two maintenance stages but between both action and both maintenance stages (p<.05). Participants in maintenance showed more low fat behaviours than those in action which is in agreement with the classification in the traditional stage of changes where significant differences were found between action and maintenance overall.

Results with perceived risk also found significant differences between stages $F(3) = 3.81$, p<.01. Scheffe post hoc tests conducted significant differences found between those in maintenance indicating further change and those not indicating further change (p<.05). Those in maintenance wishing to increase their low fat behaviours saw themselves as more at risk than those indicating no further change.

Transtheoretical processes

One way analyses of variance were conducted and surprisingly significant differences were found between stages for all processes (p<.01) with the exception of social support. Scheffe post hoc tests conducted these found with consciousness raising, dramatic relief, environmental reevaluation, self reevaluation, counterconditioning and stimulus control differences were
significant between action and action further change, between maintenance and maintenance further change and between maintenance further change and action. With environmental reevaluation differences also significant between action and maintenance. With self liberation and reinforcement management differences were significant between action and action further and action and maintenance further change and with reinforcement management differences between maintenance further change and maintenance were close to significance. Overall those indicating further change tended to score higher on process usage whether they were in action or maintenance. Results are summarised in table 4.6 and figure 4.7.

Transtheoretical concepts of change

With decisional balance pros and cons one way analysis of variance found significant differences for the cons between action and action further change (p=.01) and maintenance and maintenance further change (p=.05), while differences between action and maintenance further change were close to significant (p = .06). With decisional balance pros significant differences were found between action further change and maintenance (p<.05) and maintenance further change and maintenance (p<.01). Participants thinking of further change scored higher on both pros and cons. Interestingly these differences were not found in the initial analysis when significant differences only emerged between precontemplaters and other stages. With self efficacy significant differences were found between both action stages and both maintenance stages, in line with the results in the analysis based on the initial stage classification where participants in maintenance scored higher overall. Results are summarised in table 4.7 and figure 4.8.
Table 4.6: Mean scores trantheoretical processes for post action split stages

<table>
<thead>
<tr>
<th>Process</th>
<th>Action further</th>
<th>Action</th>
<th>Maintenance further</th>
<th>Maintenance</th>
<th>F value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consciousness raising</td>
<td>31.72 (8.24)a</td>
<td>25.79 (8.68)b</td>
<td>32.48 (9.13)c</td>
<td>30.17 (9.63) abd</td>
<td>5.97**</td>
</tr>
<tr>
<td>Dramatic relief</td>
<td>27.84 (11.83)a</td>
<td>18.48 (9.47)b</td>
<td>27.12 (12.52)ac</td>
<td>22.52 (12.63)d</td>
<td>10.53**</td>
</tr>
<tr>
<td>Environmental reevaluation</td>
<td>33.00 (10.59)a</td>
<td>23.13 (8.42)b</td>
<td>31.98 (10.68)ac</td>
<td>28.90 (11.02)d</td>
<td>9.83**</td>
</tr>
<tr>
<td>Self reevaluation</td>
<td>34.88 (10.83)a</td>
<td>25.06 (9.99)b</td>
<td>33.98 (11.24)ac</td>
<td>29.19 (12.04)bd</td>
<td>13.31**</td>
</tr>
<tr>
<td>Self liberation</td>
<td>32.10 (9.00)a</td>
<td>23.33 (9.85)b</td>
<td>30.78 (9.95)a</td>
<td>28.77 (11.54)</td>
<td>6.32**</td>
</tr>
<tr>
<td>Reinforcement management</td>
<td>26.83 (8.76)a</td>
<td>20.23 (7.93)b</td>
<td>25.79 (9.88)</td>
<td>23.50 (10.94)</td>
<td>5.26**</td>
</tr>
<tr>
<td>Social support</td>
<td>28.74 (9.85)</td>
<td>28.15 (10.52)</td>
<td>27.72 (10.78)</td>
<td>27.40 (11.60)</td>
<td>0.31</td>
</tr>
<tr>
<td>Counter conditioning</td>
<td>27.49 (9.03)a</td>
<td>20.20 (9.79)b</td>
<td>27.13 (10.10)ac</td>
<td>24.53 (11.37)bd</td>
<td>6.15**</td>
</tr>
<tr>
<td>Stimulus control</td>
<td>25.24 (9.53)a</td>
<td>17.33 (8.91)b</td>
<td>25.48 (11.42)ac</td>
<td>21.88 (11.16)bd</td>
<td>8.52**</td>
</tr>
</tbody>
</table>

** p<.01 Means with the same superscript do not differ at p<.05.

Table 4.7: Mean scores trantheoretical concepts for post action split stages

<table>
<thead>
<tr>
<th>Concept</th>
<th>Action further</th>
<th>Action</th>
<th>Maintenance further</th>
<th>Maintenance</th>
<th>F value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decisional balance pros</td>
<td>22.16 (8.35)a</td>
<td>17.75 (7.62)</td>
<td>21.67 (8.30) c</td>
<td>18.96 (8.70)c</td>
<td>6.52**</td>
</tr>
<tr>
<td>Decisional balance cons</td>
<td>20.64 (6.42)a</td>
<td>15.37 (5.54)b</td>
<td>19.25 (7.18)</td>
<td>17.50 (7.66)bd</td>
<td>6.53**</td>
</tr>
<tr>
<td>Self efficacy</td>
<td>47.21 (14.51)a</td>
<td>46.42 (18.30)b</td>
<td>54.03 (12.89)b</td>
<td>56.36 (12.10)b</td>
<td>12.82**</td>
</tr>
<tr>
<td>Low fat behaviours</td>
<td>63.87 (14.63)a</td>
<td>60.89 (14.30)b</td>
<td>69.58 (14.59)b</td>
<td>71.53 (14.92)b</td>
<td>9.81**</td>
</tr>
</tbody>
</table>

** p < .01 Means with same superscripts do not differ at p<.05
Figure 4.7: Mean scores transtheoretical processes for post action split stages


Action + = Action further change  Action = Action  Mainten+ = Maintenance further change  Mainten = Maintenance
Figure 4.8: Mean scores transtheoretical concepts for post action split stages

Pros = Decisional balance pros  Cons = Decisional balance cons  Efficacy = Self efficacy
Action+ = Action further change  Action = Action  Mainten+ = Maintenance further change  Mainten = Maintenance
Discussion

The unequal distribution of participants across the stages is a problem common to the majority of stage of change research studies. As referred to earlier Graaf, Gaag, Kafatos Lennernas and Kearney (1997) found in a sample of 14331 subjects across the European Union that 52% were in precontemplation and 31% in maintenance, leaving 16% distributed across the remaining stages. Greene et al (1999) estimated at any one time only one quarter of the population is ready to take meaningful action to change health behaviour. Therefore the distribution of participants in this sample with 23% about to or having recently taken action matches the distribution in previous studies. However 44% of the maintenance and 77% of the action group indicated that they still intended to reduce their fat intake further. The analysis concerning these groups will be discussed following discussion of the results based on the traditional stage classification.

The results were as expected with low fat behaviours showing significant differences existed between the pre action and post action stages. In pre action the behaviour did not significantly change at different stages, participants at these points are still thinking about change while maintaining the old dietary behaviours. Unexpectedly a significant difference existed between those in action and maintenance. Perhaps maintainers continue to reduce their fat intake to a level lower than those who only recently adopted a lower fat diet. This again emphasises the danger Prochaska and DiClemente (1992) pointed out of equating action with maintenance. Further interventions may still be necessary in action firstly to maintain change and secondly to accelerate it. The first hypothesis was therefore supported as significant differences were found between the pre and post action stages. Also overall the results show the revised 14 item dietary behaviour scale to be a more sensitive measure than the seven item scale used in the exploratory study which failed to locate change after precontemplation.

With perceived risk the low score in precontemplation is of interest in that these participants scored low on low fat behaviours meaning they are at higher risk of health complications. However their perception of this happening to them is quite low. Maintainers see themselves as being most at risk. The result with maintainers is slightly confusing, it may have been expected that as they are on a low fat intake their perceived risk would have been less than for example participants in contemplation and preparation and certainly less than those in precontemplation. However another factor may be that their health has deteriorated significantly already and they
are in reality at greater risk. Therefore further examination as to how much at risk either group actually is would be necessary before commenting further on the accuracy of these results while noting that participants pursuing high risk behaviours see themselves as less at risk. The hypothesis regarding perceived risk was therefore supported to the extent that precontemplators scored significantly lowest. However more detailed research may be necessary with this concept.

The most interesting factor regarding the dietary knowledge scale is the number of participants who simply did not answer it a total of 361 participants that is approximately 39%. This high abstention rate makes proper interpretation of the scores difficult. The main conclusion perhaps is that the question used is not a suitable question for this type of study. Many participants as seen in their dietary behaviour scores are aware of the proper low fat behaviours yet they may not have interpreted these into a percentage of their energy derived from fat. Perhaps dietary knowledge needs to be explored in a more direct fashion, for example asking participants which foods contain the highest fat levels. Mcdonnell et al (1998) examined this area with 11 items asking for example if participants knew the difference between saturated and unsaturated fats and what products these were found in. A more direct approach like this might prove more productive.

With the transtheoretical processes of change, as expected precontemplators scored lowest with all processes. Significant differences also existed between precontemplators and other stages with each process. Again this differs from the pilot study which found no significant differences between stages in the use of social support, dramatic relief and environmental reevaluation, with differences only emerging between precontemplation and the post action stages with consciousness raising, self reevaluation, reinforcement management, self liberation, counterconditioning and stimulus control. The most likely explanations for this difference is the greater numbers in all stages and the increased sensitivity of the present questionnaire, which contained more items and used a 1-7 likert scale. However again overall the pattern expected of process use in the transtheoretical model did not emerge with for example cognitive processes such as consciousness raising not decreasing in the post action stages. However results for stimulus control a behavioural process were closest to the model with differences in all the pre action stages being significant or close to significance with post action stages. Overall however the second hypothesis was not fully supported.
With decisional balance significant differences were found between precontemplators and all other groups with pros and cons. The difference with pros was as expected with precontemplators scoring lowest, but with the cons the precontemplators also scored lowest, where it might be expected they should score highest on these items. Precontemplators scored highest with cons in the exploratory study. However in comparing the scores on the pros and cons the expected pattern emerged in that scores on the cons were higher than the pros for those in precontemplation, contemplation and preparation, with this pattern changing in action and maintenance. Therefore while the score for cons was higher in maintenance at 18.28, than it was in precontemplation at 15.90, the score with the pros has also increased significantly in maintenance reaching 20.18 as opposed to 14.10 in precontemplation. This indicates that to initiate dietary change the crucial factor is that the pros outweigh the cons rather than simply reducing the cons and increasing the pros. Also the measure used in this analysis was not as detailed as the measure used in the exploratory study which may have emphasised the change over in pros and cons more thoroughly. However it was comparable with the measures used in previous research. Previous research shows a decisive shift to be necessary in decisional balance before change is achieved (Prochaska et al 1992, McDonnell et al 1998). In the stages where the participant is considering change contemplation and preparation, the score for cons increased considerably, which is not in line with the transtheoretical model. This suggests a decrease in the cons at these points but even at these points the pros were also increasing, though they had not overtaken the cons. The third hypothesis therefore was not fully supported.

Regarding self efficacy maintainers scored significantly higher than all other groups, the dramatic drop in preparation shown in the pilot study was not repeated. The scores indicate that precontemplators have approximately the same belief as those in contemplation, preparation and action in their ability to maintain a low fat diet. Only in maintenance when an individual has maintained low fat dietary behaviours for some time does their belief in their ability to maintain a low fat diet increase substantially. Therefore the fourth hypothesis that self efficacy would increase with stage progression was supported with one post action stage.

The scores show a different picture emerging in this study than the exploratory study, in particular regarding low fat behaviours and the processes of change. The results regarding the pros and cons and self efficacy indicate that differences only emerge at the extreme ends of the stages, that is between either precontemplators or maintainers compared to the other stages. This
raises questions regarding the value of classifying participants in the other stages with regard to these concepts. For example if a participant in preparation has the same level of self efficacy as a participant in precontemplation should interventions be tailored differently regarding this concept?

The next question, which arises, is whether or not the results fit the pattern outlined in the transtheoretical model. To fit the model it is expected firstly that the cognitive processes such as consciousness raising, dramatic relief, environmental reevaluation and self reevaluation will be used significantly more at the pre action stages from precontemplation to preparation, with the more behaviourally orientated processes coming into use in the post action stages. Firstly with consciousness raising this does not fit the pattern outlined in the model, in that scores are lowest in precontemplation and increase linearly until maintenance. To fit in with the model scores should be highest at contemplation or preparation and decrease in the post action stages where the need to be aware should already be well established. A similar pattern is seen with environmental reevaluation with again the highest scores being found in the post action stages. However with dramatic relief that is using feelings to motivate dietary fat reduction and self reevaluation that is reassessing thoughts feelings and knowledge about unhealthy dietary behaviour (Greene et al 1999 p675) the highest scores were in preparation. The pattern with these processes follows the classic “Mount Change” Greene et al (1999 p676) in that processes are used as the person initiates action and then tail off once the action is established. This supports the model which suggests making people aware of these feelings will motivate them to change, implying that interventions aimed at these processes will be more effective in promoting or supporting change than general interventions.

Regarding the behavioural processes these loosely follow the pattern outlined in the model, with the highest scores being found in the post action stages. With social support differences were significant between the post action stages and precontemplation and contemplation, counterconditioning was also approaching significance up until contemplation, with stimulus control differences were close to significance between all post action and pre action stages, a similar pattern emerged with reinforcement management. With self liberation however this was not the case though the scores were highest in action which is as expected in the transtheoretical model. Therefore some support emerges for the model in that the behavioural processes in particular appear to be suited to the post action stages and some cognitive processes may be
particularly suited to the earlier stages. This again indicates value in interventions at these stages focusing on these processes and in particular avoiding putting emphasis on the behavioural processes in the pre action stages perhaps with the exception of preparation. To a lesser degree these results were supported in the exploratory study, in that consciousness raising and environmental reevaluation increased throughout the stages. However so also did dramatic relief and self reevaluation, though self reevaluation did show a dramatic increase in contemplation. In the exploratory study however self efficacy did show a dramatic fall in preparation which was not repeated in this study.

Overall a number of questions need to be answered. Firstly does classifying participants on the basis of a simple staging algorithm limited to five stages supply useful information, that cannot be obtained with other classifications? It would be expected that precontemplaters would score lowest on all processes and concepts with the exception of decisional balance cons. However, to allocate participants to precontemplation it would simply be necessary to ascertain if participants were on a low fat diet and if not if they intended changing in the future. Of value are the low scores in perceived risk in precontemplation indicating that participants at this point may need to be made more aware of the risks associated with high fat intake. The value of cognitive interventions as opposed to behavioural ones for the pre action stages cannot be fully explored in a cross sectional study such as this. However this study shows that cognitive processes such as consciousness raising are still used in the post action stages and may therefore be a crucial factor in maintaining and improving behaviour throughout the stages. This supports the conclusion made in the qualitative exploratory study that cognitive processes still play a part in dietary change at all stages. Therefore classifying participants on the basis of stage may not mean interventions can be tailored solely on the basis of cognitive and behavioural processes, particularly for the post action stages, although it may be of value to emphasise the cognitive processes in the pre action stages.

The additional classification of participants in the action and maintenance stages into participants intending and not intending further dietary fat reduction provided interesting insights. With all processes and concepts with the exception of self efficacy participants intending further change scored highest. With self efficacy participants in maintenance not intending further change scored highest. Interestingly although these were all post action stages the increase was not solely with behavioural processes as might be excepted as in the transtheoretical model
behavioural processes are emphasised at this point, but all cognitive and behavioural processes showed an increase. Also consciousness raising a cognitive process remained one of the highest scoring processes. For those in action intending further change it was in the cognitive processes scored highest and for those in maintenance intending further change they also scored highly. These results demonstrate again that action and maintenance may not be fixed stages with dietary behaviour but stages subject to further behavioural change. For example even in maintenance where low fat behaviours have been maintained for more than 6 months people may decide to initiate further change. These are factors which future researchers will need to take into account in designing future staging algorithms for behaviours without clear cut off points and more importantly in designing interventions.

To fully evaluate the transtheoretical model however further analysis is necessary examining results for the transtheoretical processes and concepts across levels of fat intake. This will help in deciding if the stage concept can pinpoint differences in a manner which traditional methods of classification may not. Analysis in the exploratory study showed that process use simply increased linearly with reduced fat behaviours. It will be of interest to examine whether or not this pattern repeats itself in this larger study.
Analysis based on low fat behaviour scores

Participants were divided into low medium and high fat intake groups on the basis of their low fat behaviour scores. The scores possible on the low fat behaviour questionnaire ranged from 7-98. Those scoring highest showed the greatest number of low fat behaviours. However the actual results ranged from 14 – 98. Accordingly participants were divided into low, medium and high fat behaviours groups as in the exploratory study. Participants scoring 14-42 showed the least low fat behaviours and were included in the high fat behaviour group. Participants scoring 43-71 showed medium low fat behaviours and were included in the medium fat behaviour group. Participants scoring 72 – 98 showed the highest low fat behaviours and were included in the low fat behaviour group. The majority of participants (54%) were in the medium category, 36% into low and 10% into high. Therefore 90% of participants are taking some steps toward reducing their fat intake including a large number of precontemplaters. This is as expected in a group with type two diabetes as low fat dieting is a central strategy and most participants will have taken some steps to reduce their fat intake even slightly. A wide range of scores however is contained within the low, medium and high categories, meaning they may not totally match the detail contained in the stages of change concept. This classification however will give an indication as to whether or not process use increases with adoption of low fat behaviours.

Processes of change
Analyses of variance were conducted firstly with the transtheoretical processes on the basis of low fat behaviour groups. Analysis of variance results were highly significant for all processes with the exception of reinforcement management. Scheffe post hoc tests found significant differences for the use of all processes between all three groups. Results are summarised in table 4.8 and figure 4.9.
Table 4.8: Mean scores transtheoretical processes at level of low fat behaviour

<table>
<thead>
<tr>
<th>Process</th>
<th>Number</th>
<th>High</th>
<th>Medium</th>
<th>Low</th>
<th>F value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consciousness raising</td>
<td>946</td>
<td>20.1(8.2)a</td>
<td>26.92(8.7)b</td>
<td>34.41(8.9)c</td>
<td>127.06**</td>
</tr>
<tr>
<td>Dramatic relief</td>
<td>933</td>
<td>18.67(11.4)a</td>
<td>22.74(12.01)b</td>
<td>26.14(13.01)c</td>
<td>15.54**</td>
</tr>
<tr>
<td>Environmental reevaluation</td>
<td>934</td>
<td>21.45(11.21)a</td>
<td>27.12(10.51)b</td>
<td>32.34(10.88)c</td>
<td>45.46**</td>
</tr>
<tr>
<td>Self reevaluation</td>
<td>922</td>
<td>21.68(12.52)a</td>
<td>28.24(12.06)b</td>
<td>33.33(11.53)c</td>
<td>39.29**</td>
</tr>
<tr>
<td>Self liberation</td>
<td>913</td>
<td>19.71(10.66)a</td>
<td>25.98(10.36)b</td>
<td>31.82(10.65)c</td>
<td>57.06**</td>
</tr>
<tr>
<td>Reinforcement management</td>
<td>924</td>
<td>22.8(9.37)</td>
<td>22.89(10.33)</td>
<td>23.95(10.32)</td>
<td>1.49</td>
</tr>
<tr>
<td>Social support</td>
<td>946</td>
<td>19.27(10.43)a</td>
<td>24.05(10.51)b</td>
<td>29.79(11.50)c</td>
<td>43.87**</td>
</tr>
<tr>
<td>Counter conditioning</td>
<td>919</td>
<td>16.67(10.21)a</td>
<td>22.20(9.6)b</td>
<td>27.65(11.31)c</td>
<td>49.72**</td>
</tr>
<tr>
<td>Stimulus control</td>
<td>904</td>
<td>14.33(10.07)a</td>
<td>19.60(10.19)b</td>
<td>25.55(11.37)c</td>
<td>51.10**</td>
</tr>
</tbody>
</table>

Std in brackets P<.05* P<.01** Means with same superscript do not differ at p<.05
Figure 4.9: Mean scores transtheoretical processes at level of low fat behaviour


High = High fat behaviours, Medium = Medium fat behaviours, Low = Low fat behaviours
Concepts of change

Analysis of variance were conducted on the transtheoretical concepts and significant differences were found with self efficacy and decisional balance pros. Scheffe post hoc tests found significant differences between all groups (p<.01). With perceived risk analysis of variance was again significant. Scheffe post hoc tests found significant differences between high fat behaviours with medium and low (p≤.01), there were no significant differences between medium and low fat behaviours. Also analysis of variance was not significant for decisional balance cons. Results are summarised in table 4.9 and figure 4.10.

Table 4.9 : Mean scores transtheoretical concepts at level of low fat behaviour

<table>
<thead>
<tr>
<th>Concept</th>
<th>High</th>
<th>Medium</th>
<th>Low</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pros</td>
<td>15.59 (8.7)&lt;sup&gt;a&lt;/sup&gt;</td>
<td>18.60 (8.2)&lt;sup&gt;b&lt;/sup&gt;</td>
<td>21.20 (8.9)&lt;sup&gt;c&lt;/sup&gt;</td>
<td>17.14**</td>
</tr>
<tr>
<td>Cons</td>
<td>17.94 (7.90)</td>
<td>18.34 (6.7)</td>
<td>18.40 (7.8)</td>
<td>.13</td>
</tr>
<tr>
<td>Efficacy</td>
<td>42.27 (16.89)&lt;sup&gt;a&lt;/sup&gt;</td>
<td>50.07 (14.19)&lt;sup&gt;b&lt;/sup&gt;</td>
<td>57.42 (11.8)&lt;sup&gt;c&lt;/sup&gt;</td>
<td>49.31**</td>
</tr>
<tr>
<td>Perceived Risk</td>
<td>5.13 (2.6)&lt;sup&gt;a&lt;/sup&gt;</td>
<td>6.17 (2.8)&lt;sup&gt;b&lt;/sup&gt;</td>
<td>6.44 (3.3)&lt;sup&gt;b&lt;/sup&gt;</td>
<td>6.68**</td>
</tr>
</tbody>
</table>

* p<.05, ** p<.01. Means with same superscript do not differ at p<.05
Pros = Decisional balance pros  Cons = Decisional balance cons  Efficacy = Self efficacy  Perceived Risk = Perceived risk
Figure 4.10: Mean scores transtheoretical concepts at level of fat behaviour

Pros = Decisional balance pros, Cons = Decisional balance cons  Efficacy = Self efficacy
High = High fat behaviours  Medium = Medium fat behaviours  Low = Low fat behaviours
Discussion

All of the transtheoretical constructs with the exception of the cons in decisional balance and reinforcement management in the processes showed significant differences across levels of low fat behaviours. Perceived risk showed a significant difference between those on high fat behaviours and those on medium and low fat behaviours. Implying that once the individual perceives themselves at risk action starts however those on medium fat behaviours may need to reduce their fat intake further as it is unlikely to be below 35% of dietary intake. This again emphasises the dangers pointed out by Brug et al (1994) in a participant’s perceptions of their diet being unrealistic. Self efficacy showed a linear increase, with participants maintaining low fat behaviours showing the highest level of belief. With the transtheoretical model those in the last stage maintenance had the highest level of self efficacy. However no significant differences existed across the other stages including surprisingly precontemplation and action. This implied that participants in action and precontemplation have a similar level of belief but the results with low fat behaviours contradict this showing that as the person’s level of engagement with the dietary change increases so too does their belief in their ability to maintain their behaviour.

With the transtheoretical processes and low fat behaviours consciousness raising showed a linear increase, indeed this is similar to the results in the stages which showed increased use of consciousness raising as a participant progressed through them. Dramatic relief also showed a linear increase, however progression in stages showed a slightly different pattern, increasing up until preparation and then showing a slight fall off. This is in line with the model in that dramatic relief should be more effective in the pre action stages. Stage of change algorithms may show more sensitivity with this concept perhaps pinpointing where it is most effective. Environmental reevaluation also showed a linear increase, which is similar to the pattern shown across the stages. Self reevaluation also showed linear increase, again not quite in line with the stage analysis which showed increase up until preparation, tailing off in action and maintenance, the difference at that point however was not significant. With reinforcement management no significant differences were found across levels of low fat behaviours, however with the stages classification significant differences were found between precontemplators and other groups, this may be another area where the stages classification is more sensitive. As a process reinforcement management is supposed to be emphasised in the post action stages therefore it is somewhat surprising that it is not emphasised in for example low fat behaviours. With self liberation again the increase was linear; this is similar to the pattern on the stage classification though with this
significant differences only emerged between precontemplation and the other stages. Counterconditioning again showed a linear increase, a similar pattern to that shown with the stages. The same pattern emerged with stimulus control showing a linear increase across the fat behaviour groups and across the stages.

The results for decisional balance with low fat behaviours showed a linear increase with the pros, and significant differences between all groups. This is as expected as a person becomes increasingly engaged with low fat behaviour that the advantages will become increasingly apparent to them. The results with the cons were not as expected however showing these remained virtually the same at all three levels of low fat behaviours. Participants on medium fat behaviours scored virtually identically on the pros and cons. However the standard pattern in comparing pros and cons was maintained in that participants with high fat behaviours rated the cons higher than the pros, at medium they are virtually the same and when the individual moves into low fat behaviours the pros score higher than the cons. Overall the results with pros are similar to those found using stage classification, precontemplaters scoring lowest and those in later stages scoring higher. With the cons the stages of change classification also showed a difference between precontemplaters and all other stages, indicating that a stage of change classification may be more sensitive with this construct than a simple level of engagement with the dietary process.

The results with perceived risk were similar with fat behaviours and stages of change classification. Participants with high fat behaviours perceived themselves as least at risk and those in precontemplation also perceived themselves as least at risk. However once the participant started to think about change or initiated some change as in the medium fat behaviours group their perception of risk increased significantly. This demonstrates perhaps that it is only when the perception of risk is higher that engagement with the dietary process increases. This implies that an intervention may need to make a participant acutely aware of the dangers of high fat intake. This becomes clearer with the fat behaviours classification than the stages classification. With the stages classification it appeared only to be necessary for the person to be intending to change that is be in contemplation for awareness of the risks involved with high fat behaviours to increase.

The next question that arises as to the advantages of classifying individuals by stage and
designing interventions based on this concept as opposed to simply classifying individuals on the basis of fat behaviours and giving interventions based on all the processes. Brug et al (1994) found that a majority of participants underestimated their fat intake. Lechner and Brug (1998) found with an initial classification based on stages of change placed 14% of participants in precontemplation, however when classification was based on a strict dietary estimate this increased to 55% many of whom were unaware that they needed to make further changes. However the pattern emerging in this study is the transtheoretical model actually showing a sensitivity which may be lost with a simple classification based on level of dietary intake. With for example cognitive processes such as self reevaluation and dramatic relief peaking more in preparation. The more sensitive measures in this study, show a pattern in the stages of change which is closer to fat behaviours than that shown in the exploratory study which only showed differences emerging between precontemplaters and others groups with a few processes. More sensitive measures again containing more items may match closer the outline suggested in the transtheoretical model.

However in a comparison with the processes between low fat behaviour and stage groups, consciousness raising for example which showed a linear increase across the stages still had a slightly higher mean score in the low fat behaviour group than in the equivalent group in the stages classification that is maintainers. This is as expected as the maintainers group (stage classification) also contained a small group of people with high fat behaviours. This raises the question as to whether classifying participants purely on the basis of dietary intake as in the fat behaviour group is a good decision. Classification purely on the basis of low fat behaviours may mask clinically important change as suggested by Kristal et Al (1999). With the transtheoretical model, which focuses on the individuals cognitive engagement with their dietary behaviour and is not simply a matter of measuring dietary intake this aspect of clinically important change is included. For example an individual in maintenance who still has high fat behaviours may have in fact reduced their dietary fat intake considerably from where they were one year ago.

Classification on the basis of stages of change may give that extra insight. For example participants in action scored highest in social support, before tailing off slightly in maintenance. A factor like this may go unnoticed in a simple high medium low fat behaviours classification, which shows a linear increase. A similar pattern emerged with dramatic relief and self reevaluation, peaking in preparation. Stages classification also gave insights into reinforcement
management, and decisional balance cons where significant differences were found between precontemplaters and other stages while differences were not found with the low fat behaviours classification. Overall classification based on stages appears to give valuable insights into the use of processes rather than a simple classification based on the assumption that for example all individuals on less than 35% fat are at the same point and therefore require the same intervention. In fact the stage classification shows that many such individuals in the post action stages wished to reduce their fat intake further.

Perhaps a combination of both classifications is advisable, with the designing of interventions based on the results from both. For example an individual in the pre action stages using a stages classification may benefit from interventions emphasising the use of cognitive processes and an individual in the post action stages may benefit from an intervention emphasising the use of behavioural processes. However if it became apparent that significant dietary change was still required after using a dietary classification, interventions may need to be adjusted accordingly. For example to initiate significant dietary change to reduce an individual’s fat intake from 50% to 40% cognitive processes such as consciousness raising may be appropriate. Indeed such an individual may be classified as being in either the maintenance or action stages where behavioural processes become more appropriate. However a dietary behaviour measure would show that further fat reduction may be necessary, in which case interventions using a mix a cognitive to initiate further and behavioural to maintain previous change may be necessary. A simple classification based on either dietary measures or stages could not encompass all these areas.

**Conclusion**

To summarise the results suggest that in the pre action stages (precontemplation, contemplation and preparation) the theory of the cognitive processes being of most value appears to hold, however there is no evidence of these being disregarded in favour of behavioural processes in the post action stages in fact cognitive processes appear to be playing a major if not the major role at this point. Therefore from the evidence in this study cognitive processes are of value throughout the process of dietary improvement and therefore need to be emphasised at all stages, perhaps in conjunction with behavioural processes in the post action stages. However in the pre action stages the emphasis from this study suggests that cognitive processes may be the primary
catalysts for change. However as previously stated in this thesis and emphasised by researchers such as Weinstein (1998) the true test of a stage model can only be established with longitudinal studies. Therefore this brings us to the next point of this study the 6 month follow up analysis of returned questionnaires which will be discussed in the following chapter.
Chapter 5: Longitudinal analysis of the application of the transtheoretical model to the low fat behaviours of participants with type two diabetics.

Introduction

Despite its application in a wide range of health areas the transtheoretical model has been criticised by numerous researchers. One of its most prominent critics Sutton (1996) describes it as an ideal model of how people should change which may not be applicable outside of clinical settings. As previously stated a key component of the model is that the use of processes follows a specific pattern, implying that interventions matched to that pattern will be more effective than general interventions. However, the evidence for this is somewhat contradictory. Prochaska et al (1993) found for example that self help materials matched to stage were more than twice as successful as standard action orientated interventions. However, research by Dijkstra, De Vries, Roijackers and Van Brueklen (1998) and Quinlan and McCaul (1999 cited in Sutton 2001 p 183) again with smokers was not as conclusive. This therefore is a key area in which further research is essential to establish the validity of the model.

Sutton (1996) also argues that serious concerns exist with sequential movement through the stages, another key area of the model. Sequential movement implies that for example individuals in precontemplation will most likely progress to contemplation, before preparation and from there to the post action stages. However, Sutton doubts if this is the case and cites the Prochaska (1991) study with 960 self changing smokers in which less than 16% showed stable progression over two years, with apparently no participants progressing sequentially through 3 or more stages. Horwath (1999 p307) in a review of the model in relation to eating behaviour, points out that many of the longitudinal intervention studies examining the transtheoretical model are not in fact matched to the stages of change, but have merely included an assessment of stage as an indicator of change. Horwath also emphasises the need for more research into the use of processes rather than single constructs such as stage.
Therefore the longitudinal study of the present research will provide a valuable insight into these crucial areas, following participants over time to discover if movement is sequential and if process use matches that outlined by the transtheoretical model. Several hypotheses are tested.

**Hypotheses**

(A) Stage progression will follow the predicted pattern across six months.

(B) The use of processes will follow that outlined in the model, specifically cognitive processes will decrease and behavioural processes will increase with progress from pre to post action stages.

(C) The decisional balance pros will increase and cons decrease with progress through the stages.

(D) Self efficacy will affect stage movement.

(E) Interventions based on the transtheoretical model will be more effective then general interventions or no intervention at all.

**Method**

The method was outlined in detail in the previous chapter (p116), to revise briefly, stage matched and general interventions were distributed at baseline and three months, with questionnaires being completed at baseline and six months with participants in the intervention groups receiving an additional questionnaire on the effectiveness of the interventions they received at six months (Copy questionnaire in appendix 3).
Results

The first analysis concerns the rate of return of questionnaires. The expected result in line with the transtheoretical model is that participants who received matched interventions will respond in greater numbers than participants who received the general intervention and that intervention group participants will respond better than no intervention. However, the results did not confirm this. In fact in the control group 108 participants returned completed questionnaires at follow up, in the matched intervention 60 returned completed questionnaires at follow up, and in the general intervention 60 returned questionnaires at follow up, giving an overall return rate of 24%. Intervention type had no effect but the control group responded in higher numbers than the intervention groups. This difference was significant (chi 27.23 (2) p<.01).

Comparisons were also conducted with the response rate of different demographic groups. With gender of the 512 males at baseline, 124 responded at follow up, with the 443 females at baseline 104 responded difference not significant (chi 0.04 (1),p>.05). With stage of the 159 precontemplaters 40 responded, of the 57 contemplaters 14 responded, of the 57 preparers 7 responded, of the 107 in action 27 responded and of the 575 in maintenance 140 responded. Differences were not significant (chi 3.06 (4) p>.05). With age participants were divided into those over and under 60. With the 470 participants over 60 129 responded, of the 484 participants under 60, 99 responded this difference was close to significant (chi 3.93(1) p = .06).

The most interesting data to emerge from a longitudinal study with regard to the TTM is the sequence of movement across stages. Will this be in line with the movement predicted in the model? The first step is to look at the group in total, that is the 228 who replied at time 2. Table 5.1 shows clearly that over a six-month time frame there are no dramatic changes in the number of participants at each stage; chi square tests showed no significant differences.
Table 5.1: Number of participants at each stage at the baseline and follow up

<table>
<thead>
<tr>
<th>Stage A</th>
<th>Number baseline</th>
<th>Stage follow up</th>
<th>Number Follow Up</th>
</tr>
</thead>
<tbody>
<tr>
<td>Precontemplater</td>
<td>40</td>
<td>Precontemplater</td>
<td>35</td>
</tr>
<tr>
<td>Contemplater</td>
<td>14</td>
<td>Contemplater</td>
<td>13</td>
</tr>
<tr>
<td>Preparation</td>
<td>7</td>
<td>Preparation</td>
<td>8</td>
</tr>
<tr>
<td>Action +*</td>
<td>21</td>
<td>Action +</td>
<td>12</td>
</tr>
<tr>
<td>Action</td>
<td>6</td>
<td>Action</td>
<td>10</td>
</tr>
<tr>
<td>Maintenance +*</td>
<td>49</td>
<td>Maintenance +</td>
<td>57</td>
</tr>
<tr>
<td>Maintenance</td>
<td>91</td>
<td>Maintenance</td>
<td>93</td>
</tr>
</tbody>
</table>

* Participants in action and maintenance indicating further dietary change

The next issue to be addressed is the movement of individuals at different points in the stage model. Will for example someone in contemplation move to preparation or even action in line with the model? The present data shown in table 5.2 does not fully support this. Of the 40 participants in precontemplation at baseline 25 were still in precontemplation at follow up, 1 moved to preparation, 3 were in action and 11 were in maintenance. Forward movement had taken place, but no precontemplaters moved to contemplation. It is, however, possible those showing forward movements had previously passed through contemplation, though none remained there for 6 months as suggested in the transtheoretical model. With the 14 participants in contemplation at baseline, at follow up 8 were in contemplation, 2 in action and 4 in maintenance. Again forward movement had taken place but no participants were in preparation, though it is again possible those showing forward movement had already passed through this stage. Of the 7 in preparation at baseline, 3 remained in preparation at follow up, 2 moved into action, 2 into maintenance. With the 27 people in the action stages at baseline at follow up 5 were still in action, one moved back to preparation, 5 to precontemplation and 15 moved forward to maintenance. Movement is expected at this point and the majority move in the direction predicted, that is forward to maintenance. With the 141 participants in maintenance at baseline, the majority 118 remained in the maintenance stage at follow up, ten were in action, three in preparation, five in contemplation and five in precontemplation. Overall the majority of participants 164 remained in the same stage over the six months with 69 showing movement, 40 forward and 29 backward. The results are summarised in the table 5.2.
Table 5.2: Stage Movement for main stages between baseline and follow up

<table>
<thead>
<tr>
<th>Baseline Stage</th>
<th>N</th>
<th>Pc</th>
<th>C</th>
<th>Pr</th>
<th>Ac</th>
<th>M</th>
<th>Forward</th>
<th>Back</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pc</td>
<td>40</td>
<td>25</td>
<td>1</td>
<td>3</td>
<td>11</td>
<td>15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>14</td>
<td>8</td>
<td></td>
<td>2</td>
<td>4</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pr</td>
<td>7</td>
<td></td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ac</td>
<td>27</td>
<td>5</td>
<td>1</td>
<td>1</td>
<td>5</td>
<td>15</td>
<td>15</td>
<td>7</td>
</tr>
<tr>
<td>M</td>
<td>141</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>10</td>
<td>158</td>
<td>40</td>
<td>29</td>
</tr>
<tr>
<td>Total</td>
<td>228</td>
<td>35</td>
<td>13</td>
<td>8</td>
<td>22</td>
<td>150</td>
<td>40</td>
<td>29</td>
</tr>
</tbody>
</table>

Pc-precontemplation, C-contemplation, Pr - preparation, Ac - action, M - maintenance

Analysis of entire group at follow up

The next step is the examination of behaviour and process use longitudinally. The first factor to be examined is the low fat behaviour scale. 225 participants completed this at baseline and follow up. The mean score at baseline was 66.09 and at follow up was 67.95. Across the group as a whole this difference was close to significance t (224) = -1.82  p = .069, indicating there was an increase in low fat behaviours overall.

Analysis of the data within the follow up group showed significant differences across stages. A one way anova conducted across stages yielded the following results F (4) = 20.42 p<.01. Significant differences were found between precontemplaters versus action and maintenance, and between contemplaters versus action and maintenance. This indicates again that the scale is valid in discriminating between those on high fat diets and those on low fat. The small number in preparation at time two may have effected the results possibly being the reason why no significant difference was found between preparation and the post action stages.
Paired t tests were conducted for each stage between baseline and follow up. Participants were grouped according to stage classification at time 2. A significant difference was found with the maintenance group only t(147)= -2.21 p<.05. Results are summarised table 5.3.

**Table 5.3: Low fat behaviour scores with stages at baseline and follow up**

<table>
<thead>
<tr>
<th>Stages at follow up</th>
<th>N</th>
<th>Baseline</th>
<th>Follow up</th>
<th>t value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Precontemplation</td>
<td>35</td>
<td>53.38</td>
<td>50.62</td>
<td>.954</td>
</tr>
<tr>
<td>Contemplation</td>
<td>13</td>
<td>56.17</td>
<td>57.75</td>
<td>-.43</td>
</tr>
<tr>
<td>Preparation</td>
<td>7</td>
<td>64.35</td>
<td>59.12</td>
<td>1.06</td>
</tr>
<tr>
<td>Action</td>
<td>22</td>
<td>67.22</td>
<td>72.92</td>
<td>-1.91</td>
</tr>
<tr>
<td>Maintenance</td>
<td>148</td>
<td>69.87</td>
<td>72.62</td>
<td>-2.21*</td>
</tr>
</tbody>
</table>

* p<.05

With the processes of change across the entire follow up group differences were significant from baseline to follow up in the use of social support t(222)= 2.14, p<.05, self liberation t(218) = 2.23 p<.05 and counter conditioning t(219) =2.50 p<.05. Results are summarised in table 5.4.

**Table 5.4 : Mean scores for processes baseline and follow up**

<table>
<thead>
<tr>
<th>Process</th>
<th>No</th>
<th>Baseline</th>
<th>Follow Up</th>
<th>t value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conscious Raising</td>
<td>218</td>
<td>29.12 (9.7)</td>
<td>28.2 (9.57)</td>
<td>1.44</td>
</tr>
<tr>
<td>Social Support</td>
<td>223</td>
<td>24.72 (10.96)</td>
<td>23.46 (11.31)</td>
<td>2.14*</td>
</tr>
<tr>
<td>Dramatic Relief</td>
<td>220</td>
<td>22.14 (11.57)</td>
<td>21.81 (12.58)</td>
<td>0.48</td>
</tr>
<tr>
<td>Environmental</td>
<td>223</td>
<td>28.17 (10.68)</td>
<td>27.49 (11.23)</td>
<td>1.16</td>
</tr>
<tr>
<td>Self Reevaluation</td>
<td>220</td>
<td>28.77 (12.02)</td>
<td>28.05 (12.38)</td>
<td>1.16</td>
</tr>
<tr>
<td>Reinforcement</td>
<td>223</td>
<td>22.59 (9.75)</td>
<td>22.07(9.57)</td>
<td>1.01</td>
</tr>
<tr>
<td>Self Liberation</td>
<td>219</td>
<td>27.58 (11.02)</td>
<td>26.12 (11.23)</td>
<td>2.23*</td>
</tr>
<tr>
<td>Counter Condition</td>
<td>220</td>
<td>24.17 (10.61)</td>
<td>22.64 (11.42)</td>
<td>2.50*</td>
</tr>
<tr>
<td>Stimulus Control</td>
<td>215</td>
<td>20.56 (10.05)</td>
<td>20.83 (11.41)</td>
<td>0.45</td>
</tr>
</tbody>
</table>

*p<.05
With the remaining concepts in the transtheoretical model are decisional balance (pros and cons of behaviour) and self efficacy. No significant differences were found with these concepts between baseline and follow up among the group as a whole. The scores for perceived risk while not specific transtheoretical concept are also included differences were not significant. Results are summarised in table 5.5.

Table 5.5: Mean scores of transtheoretical concepts at baseline and follow up

<table>
<thead>
<tr>
<th>Concept</th>
<th>No</th>
<th>Mean Baseline</th>
<th>Mean Follow Up</th>
<th>t Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cons</td>
<td>211</td>
<td>17.49 (7.40)</td>
<td>17.78 (7.17)</td>
<td>-.53</td>
</tr>
<tr>
<td>Pros</td>
<td>209</td>
<td>18.16 (8.16)</td>
<td>18.51 (8.69)</td>
<td>-.69</td>
</tr>
<tr>
<td>Efficacy</td>
<td>202</td>
<td>52.89 (13.75)</td>
<td>53.55 (13.83)</td>
<td>-.64</td>
</tr>
<tr>
<td>Perceived risk</td>
<td>203</td>
<td>6.31 (2.95)</td>
<td>6.13 (3.03)</td>
<td>.69</td>
</tr>
</tbody>
</table>

Cons = Decisional balance cons, Pros = Decisional balance pros, Efficacy = Self efficacy Perceived risk = Perceived risk

However, of greater importance is the use of processes in each individual stage longitudionally. Therefore an analysis of process use in each stage was conducted. The first analysis focused on precontemplaters.

Analysis of results of processes and concepts for stable precontemplaters and forward movers at baseline and follow up.

Participants who were in precontemplation at baseline were split into two groups, those who remained in precontemplation at follow up (stable precontemplaters) and those who moved forward (forward movers). Two way mixed factor anovas were conducted for each process between forward and stable precontemplaters at baseline and follow up. The F ratios from these analyses are shown in table 5.6 and the means at baseline and follow up are shown in table 5.7. Consciousness raising for the factor movement was close to significance F(1) = 3.49 p = .07. For the interaction between time and direction F(1) = 5.07, p<.05. Further analysis with independent t tests showed a significant difference at follow up between stable and forward movers, t(36) = -2.44 p<.05 with forward movers using consciousness raising more. The factor
movement, for self liberation was close to significance $F(1) = 3.46, p=.07$. Independent t tests found differences between stable and forward movers were close to significance at follow up $t(37) = -1.82, p=.07$ with again forward movers using the process more. Results for social support, dramatic relief, environmental reevaluation, self reevaluation and reinforcement management were not significant.

Decisional balance cons differences were not significant but for decisional balance pros the factor movement was significant $F(1) = 4.57 p<.05$, independent t test found pros were greater for forward movers than stable precontemplaters at follow up but not baseline, $t(34) = -2.47 p<.05$.

A central concept with the transtheoretical model is that the scores of decisional balance pros will outweigh the scores on decisional balance cons with progress from precontemplation to later stages. To examine the difference within groups paired sample t tests were conducted with stable and forward movers. Significant differences were found between the pros and cons of decisional balance for stable precontemplaters $t(22)=3.24, p<.01$, with this being repeated again at follow up $t(22) =2.50, p<.05$. The cons were rated significantly higher than the pros at each point. With forward movers however, no significant differences were found for decisional balance pros and cons at baseline or follow up. However the pros were rated higher than the cons at each point.

Self efficacy was greater for stable precontemplaters than for forward movers $F(1) = 7.07 p<.05$. Interestingly this was not in the expected direction, this is similar to the results in the pilot study which found those about to make change scored low on self efficacy. With fat behaviours movement anova there were significant effects for movement, $F(1) = 4.78 p<.05$ and the interaction between time and movement was also significant $F(1) = 4.96, p<.05$. Independent t test found forward movers scored higher than stable precontemplaters at follow up $t(37) = 2.74 p<.01$. A significant differences was also found with forward movers between baseline and follow up $t(13) = 3.50 p<.01$. There were however no significant differences for stable precontemplaters between baseline and follow up. With perceived risk anova was close to significance for movement $F(1) =3.15, p =.08$ and the interaction time and movement $F(1) = 3.15$
p = .08. Independent t test found differences between stable and forward movers close to significance at follow up t(31) = -1.82 p = .08. Analyses are summarised in table 5.6 and 5.7.

**Table 5.6: F values from two way anovas for stable and forward movement precontemplators at baseline and follow up with transtheoretical processes and concepts.**

Factors are time and movement.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Time</th>
<th>Movement</th>
<th>Interaction Time and Movement</th>
</tr>
</thead>
<tbody>
<tr>
<td>C.R</td>
<td>1.41</td>
<td>3.50*</td>
<td>5.07*</td>
</tr>
<tr>
<td>S. S.</td>
<td>0.54</td>
<td>1.15</td>
<td>0.60</td>
</tr>
<tr>
<td>D. R.</td>
<td>0.13</td>
<td>0.85</td>
<td>0.24</td>
</tr>
<tr>
<td>E.R</td>
<td>0.38</td>
<td>1.03</td>
<td>0.83</td>
</tr>
<tr>
<td>S.R</td>
<td>0.72</td>
<td>2.63</td>
<td>0.18</td>
</tr>
<tr>
<td>R.M</td>
<td>0.28</td>
<td>0.12</td>
<td>1.55</td>
</tr>
<tr>
<td>S.L</td>
<td>0.1</td>
<td>3.46</td>
<td>0.74</td>
</tr>
<tr>
<td>C.C</td>
<td>0.62</td>
<td>2.79</td>
<td>0.01</td>
</tr>
<tr>
<td>S.C</td>
<td>1.23</td>
<td>2.71</td>
<td>1.61</td>
</tr>
<tr>
<td>Cons</td>
<td>2.18</td>
<td>0.14</td>
<td>0.72</td>
</tr>
<tr>
<td>Pros</td>
<td>5.79*</td>
<td>4.57*</td>
<td>2.00</td>
</tr>
<tr>
<td>Efficacy</td>
<td>1.34</td>
<td>7.07*</td>
<td>2.39</td>
</tr>
<tr>
<td>Low Fat</td>
<td>3.43</td>
<td>4.78*</td>
<td>4.96*</td>
</tr>
<tr>
<td>Perceived risk</td>
<td>1.41</td>
<td>3.15*</td>
<td>3.15*</td>
</tr>
</tbody>
</table>

*p<.05, *p<.10.

Table 5.7: Mean scores for processes and concepts for stable and forward movement precontemplaters at baseline and follow up.

<table>
<thead>
<tr>
<th>Process</th>
<th>Stable N</th>
<th>Base</th>
<th>Follow</th>
<th>T Value</th>
<th>Forward N</th>
<th>Base</th>
<th>Follow</th>
<th>t Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>C.R.</td>
<td>24</td>
<td>20.67</td>
<td>19.21</td>
<td>0.91</td>
<td>14</td>
<td>23.42</td>
<td>27.89</td>
<td>-2.11*</td>
</tr>
<tr>
<td>S.S</td>
<td>25</td>
<td>19.12</td>
<td>17.69</td>
<td>0.95</td>
<td>14</td>
<td>21.61</td>
<td>22.39</td>
<td>0.77</td>
</tr>
<tr>
<td>D.R</td>
<td>25</td>
<td>17.00</td>
<td>16.12</td>
<td>0.64</td>
<td>14</td>
<td>20.14</td>
<td>19.78</td>
<td>0.09</td>
</tr>
<tr>
<td>E.R</td>
<td>25</td>
<td>21.52</td>
<td>21.08</td>
<td>0.27</td>
<td>14</td>
<td>23.71</td>
<td>26.00</td>
<td>0.09</td>
</tr>
<tr>
<td>S.R</td>
<td>25</td>
<td>19.32</td>
<td>17.48</td>
<td>1.7</td>
<td>14</td>
<td>25.15</td>
<td>24.77</td>
<td>0.17</td>
</tr>
<tr>
<td>R.M</td>
<td>25</td>
<td>18.56</td>
<td>17.60</td>
<td>0.60</td>
<td>14</td>
<td>17.80</td>
<td>20.23</td>
<td>-1.08</td>
</tr>
<tr>
<td>S.L</td>
<td>25</td>
<td>17.48</td>
<td>16.55</td>
<td>0.61</td>
<td>14</td>
<td>21.07</td>
<td>23.07</td>
<td>-0.54</td>
</tr>
<tr>
<td>C.C</td>
<td>25</td>
<td>15.88</td>
<td>14.80</td>
<td>0.84</td>
<td>14</td>
<td>20.80</td>
<td>19.50</td>
<td>0.38</td>
</tr>
<tr>
<td>S.C.</td>
<td>22</td>
<td>13.54</td>
<td>13.32</td>
<td>0.18</td>
<td>14</td>
<td>16.50</td>
<td>19.85</td>
<td>-1.08</td>
</tr>
<tr>
<td>Cons</td>
<td>24</td>
<td>17.09</td>
<td>18.00</td>
<td>0.89</td>
<td>14</td>
<td>14.49</td>
<td>18.30</td>
<td>-1.51</td>
</tr>
<tr>
<td>Pros</td>
<td>23</td>
<td>13.26</td>
<td>14.60</td>
<td>0.96</td>
<td>12</td>
<td>16.80</td>
<td>22.00</td>
<td>-1.95</td>
</tr>
<tr>
<td>Efficacy</td>
<td>22</td>
<td>55.60</td>
<td>55.45</td>
<td>0.31</td>
<td>12</td>
<td>39.99</td>
<td>48.00</td>
<td>-1.87</td>
</tr>
<tr>
<td>Low Fat</td>
<td>25</td>
<td>49.14</td>
<td>48.16</td>
<td>0.28</td>
<td>14</td>
<td>53.47</td>
<td>64.09</td>
<td>-3.50**</td>
</tr>
<tr>
<td>Risk</td>
<td>22</td>
<td>4.91</td>
<td>4.91</td>
<td>0</td>
<td>11</td>
<td>4.55</td>
<td>6.82</td>
<td>-1.59</td>
</tr>
</tbody>
</table>

* p<.05, ** P<.01

Analysis of results for contemplaters and preparers at baseline who remained stable and contemplaters and preparers who showed forward movement.

Unfortunately the numbers in the contemplation and preparation stages initially at baseline and who again completed follow up questionnaires were exceptionally small (stable contemplaters n=8, stable preparation n=3, forward contemplation n=6, forward preparation n=4). Therefore in order to gain insight into the changes in process use it was necessary to combine the scores of both stages for stable and forward groups. The reasoning was that both groups consist of participants who had indicated a willingness to change.

Two way mixed factor anovas were conducted for each process between stable and forward movers combined contemplaters and preparers. The results are summarised in table 5.8 and 5.9.

The difference with time was close to significance for consciousness raising F(1) = 3.63, p=.07, with greater use of consciousness raising at follow up. With dramatic relief the difference in movement that is between stable and forward movers was significant F(1) = 6.83, p<.05. Independent t tests were conducted and significant differences found at baseline t(18) = -2.33, p<.05 and follow up t(18) =2.22 p<.05, with forward movers scoring higher at baseline and follow up. With self reevaluation the difference with movement was significant F(1) =4.47, p<.05. An independent t test found differences in follow up scores between stable and forward movers to be close to significance t(18) = -1.90, p = .07 with the forward movers scoring higher. With reinforcement management a significant differences was found with movement F(1) = 5.62, p<.05. An independent t test found significant differences at follow up t(18) = -2.53, p<.05 again forward movers scored significantly higher. With self liberation a significant differences was found with movement F(1) = 4.32, p = 0.05. The difference in follow up scores between stable and forward movers was close to significance t(18) = -1.80, p = .08. again forward movers scored higher. With counterconditioning, environmental reevaluation and stimulus control no significant differences were found.

With the transtheoretical concepts no significant differences were found with decisional balance cons, decisional balance pros, self efficacy and perceived risk. With low fat behaviours the
interaction between time and direction was significant F(1) = 4.15, p = .05, and differences were close to significance for time F(1) = 3.44, p = .08. There was an increase from baseline to follow up but only for the forward movers, as would be predicted.

Table 5.8. Two way Anovas. F values for stable and forward movement contemplaters and preparers at baseline and follow up with transtheoretical processes and concepts. Factors time and movement.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Time</th>
<th>Movement</th>
<th>Interaction Time and Movement</th>
</tr>
</thead>
<tbody>
<tr>
<td>C.R</td>
<td>3.63a</td>
<td>0.13</td>
<td>0.05</td>
</tr>
<tr>
<td>S.S</td>
<td>0.03</td>
<td>0.45</td>
<td>0.01</td>
</tr>
<tr>
<td>D.R</td>
<td>2.32</td>
<td>6.83*</td>
<td>0.09</td>
</tr>
<tr>
<td>E.R</td>
<td>0.38</td>
<td>1.74</td>
<td>0.11</td>
</tr>
<tr>
<td>S.R</td>
<td>1.29</td>
<td>4.47*</td>
<td>0.71</td>
</tr>
<tr>
<td>R.M</td>
<td>0.66</td>
<td>5.62</td>
<td>0.50</td>
</tr>
<tr>
<td>S.L</td>
<td>2.92</td>
<td>4.35*</td>
<td>0.00</td>
</tr>
<tr>
<td>C.C</td>
<td>0.45</td>
<td>0.50</td>
<td>0.17</td>
</tr>
<tr>
<td>S.C</td>
<td>0.33</td>
<td>0.98</td>
<td>1.37</td>
</tr>
<tr>
<td>Cons</td>
<td>0.41</td>
<td>0.14</td>
<td>1.55</td>
</tr>
<tr>
<td>Pros</td>
<td>1.92</td>
<td>1.39</td>
<td>0.09</td>
</tr>
<tr>
<td>Efficacy</td>
<td>1.01</td>
<td>0.21</td>
<td>0.28</td>
</tr>
<tr>
<td>Low Fat</td>
<td>3.44</td>
<td>0.96</td>
<td>4.15*</td>
</tr>
<tr>
<td>Perceived risk</td>
<td>0.17</td>
<td>1.20</td>
<td>0.02</td>
</tr>
</tbody>
</table>

a p <.10, * p < .05

Table 5.9: Mean scores of transtheoretical processes and concepts for stable and forward movement contemplators and preparers

<table>
<thead>
<tr>
<th>Process</th>
<th>Stable N</th>
<th>Base</th>
<th>Follow</th>
<th>T Value</th>
<th>Forward N</th>
<th>Base</th>
<th>Follow</th>
<th>t Value</th>
</tr>
</thead>
<tbody>
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<td>10</td>
<td>24.80</td>
<td>28.13</td>
<td>-1.88a</td>
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<tr>
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<td>18.80</td>
<td>17.80</td>
<td>0.58</td>
<td>10</td>
<td>17.10</td>
<td>18.80</td>
<td>0.47</td>
</tr>
<tr>
<td>D.R</td>
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<td>17.30</td>
<td>20.00</td>
<td>0.76</td>
<td>10</td>
<td>26.72</td>
<td>30.80</td>
<td>-1.48</td>
</tr>
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<td>24.70</td>
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<td>10</td>
<td>28.50</td>
<td>30.20</td>
<td>-1.14</td>
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<td>33.50</td>
<td>0.21</td>
</tr>
<tr>
<td>R.M</td>
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<td>18.78</td>
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<td>10</td>
<td>24.86</td>
<td>24.70</td>
<td>0.06</td>
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<td>S.L</td>
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<td>19.63</td>
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<td>10</td>
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</tr>
<tr>
<td>C.C</td>
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<td>21.40</td>
<td>19.00</td>
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<td>22.66</td>
<td>22.11</td>
<td>0.18</td>
</tr>
<tr>
<td>S.C.</td>
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<td>16.90</td>
<td>15.95</td>
<td>0.47</td>
<td>9</td>
<td>17.77</td>
<td>20.66</td>
<td>-1.06</td>
</tr>
<tr>
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<td>18.44</td>
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<td>Pros</td>
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<td>-1.02</td>
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<td>16.55</td>
<td>19.33</td>
<td>-0.99</td>
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<td>43.66</td>
<td>45.50</td>
<td>-0.27</td>
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<tr>
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<td>56.64</td>
<td>55.86</td>
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<td>10</td>
<td>51.43</td>
<td>58.23</td>
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<tr>
<td>Risk</td>
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<td>6.64</td>
<td>6.82</td>
<td>-0.16</td>
<td>10</td>
<td>7.40</td>
<td>7.80</td>
<td>-0.48</td>
</tr>
</tbody>
</table>

*a p < .10


Combined forward movers for all pre action stages

In order to research further the role of process use in general those in the three pre action stages who moved forward were combined to form a forward movement group and a comparison was made with those who remained stable. The results are summarised in table 5.10 and 5.11 and figures 5.1 and 5.2. Overall there was a general effect across processes such that participants who
moved forward were likely to use processes more than participants who did not move forward. This was significant for consciousness raising, dramatic relief, self reevaluation, self liberation, counterconditioning and was marginally significant for environmental reevaluation. For consciousness raising this effect was tempered by a significant interaction and a marginally significant effect for baseline versus follow up, such that forward movers increased the use of consciousness raising from baseline to follow up but stable participants did not.

With the transtheoretical concepts no significant differences were found for the decisional balance cons. However decisional balance pros increased significantly over time F(1) = 7.54, p<.01. A paired sample t test found a significant difference over time with forward movers t(21) = 2.19, p<.05. For self efficacy a significant difference was found with movement F(1) = 5.09, p<.05. This however was not in the expected direction with forward movers scoring lowest. With low fat behaviours there were significant main effects for time and movement and a significant interaction between the two. With forward movers there was a significant increase between baseline and follow up t(23) = 3.60, p<.01. While for those remaining in their original stage there was no significant change t(34) = .34,p>.05. With perceived risk differences for movement were close to significant F(1) = 3.23, p = .08, independent t test found significant differences between stable and forward movers at follow up t(52) = -2.26, p<.05. With forward movers perceiving themselves as being at greater risk.
Table 5.10: Two way mixed factor anovas for stable and forward movers pre action stages at baseline and follow up for transtheoretical processes and concepts. Factors time and movement.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Time</th>
<th>Movement</th>
<th>Interaction Time and Movement</th>
</tr>
</thead>
<tbody>
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<td>4.43*</td>
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<tr>
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<td>0.004</td>
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<td>1.20</td>
</tr>
<tr>
<td>D.R</td>
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<td>5.36*</td>
<td>0.25</td>
</tr>
<tr>
<td>E.R</td>
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<td>3.02a</td>
<td>0.97</td>
</tr>
<tr>
<td>S.R</td>
<td>1.79</td>
<td>7.03**</td>
<td>0.66</td>
</tr>
<tr>
<td>R.M</td>
<td>0.01</td>
<td>2.84</td>
<td>1.76</td>
</tr>
<tr>
<td>S.L</td>
<td>0.39</td>
<td>8.23**</td>
<td>0.62</td>
</tr>
<tr>
<td>C.C</td>
<td>0.32</td>
<td>3.87*</td>
<td>0.85</td>
</tr>
<tr>
<td>S.C</td>
<td>1.64</td>
<td>4.04*</td>
<td>2.86</td>
</tr>
<tr>
<td>Cons</td>
<td>2.74</td>
<td>0.06</td>
<td>1.44</td>
</tr>
<tr>
<td>Pros</td>
<td>7.54**</td>
<td>2.46</td>
<td>1.75</td>
</tr>
<tr>
<td>Efficacy</td>
<td>1.83</td>
<td>5.09*</td>
<td>0.80</td>
</tr>
<tr>
<td>Low Fat</td>
<td>7.67**</td>
<td>6.55*</td>
<td>10.16**</td>
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<tr>
<td>Perceived risk</td>
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<td>3.23a</td>
<td>1.99</td>
</tr>
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</table>

*p<.10  *p<.05  **p<.01

Table 5.11: Mean scores for processes and concepts stable and forward movers in preaction Stages

<table>
<thead>
<tr>
<th>Process</th>
<th>Stable</th>
<th>N</th>
<th>Base</th>
<th>Follow</th>
<th>T Value</th>
<th>Forward Movement</th>
<th>N</th>
<th>Base</th>
<th>Follow</th>
<th>t Value</th>
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<td>17.72</td>
<td>1.12</td>
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<td>19.73</td>
<td>20.89</td>
<td>0.54</td>
<td></td>
<td></td>
</tr>
<tr>
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<td>-0.10</td>
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<td>22.88</td>
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<td>27.50</td>
<td>-1.20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S.R</td>
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<td>21.64</td>
<td>19.02</td>
<td>2.13*</td>
<td>24</td>
<td>28.50</td>
<td>27.86</td>
<td>0.27</td>
<td></td>
<td></td>
</tr>
<tr>
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<td>0.19</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C.C</td>
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<td>0.26</td>
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<td>21.53</td>
<td>20.52</td>
<td>0.43</td>
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<tr>
<td>S.C</td>
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<td>14.09</td>
<td>0.43</td>
<td>23</td>
<td>17.00</td>
<td>20.17</td>
<td>-1.49</td>
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<td>16.37</td>
<td>19.28</td>
<td>-1.89</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pros</td>
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<td>16.16</td>
<td>-1.33</td>
<td>22</td>
<td>16.70</td>
<td>20.90</td>
<td>-2.19*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Efficacy</td>
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<td>52.40</td>
<td>-0.37</td>
<td>22</td>
<td>41.66</td>
<td>46.86</td>
<td>-1.37</td>
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<td></td>
</tr>
<tr>
<td>Low Fat</td>
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<td>51.28</td>
<td>50.36</td>
<td>0.34</td>
<td>24</td>
<td>52.12</td>
<td>65.82</td>
<td>-3.60**</td>
<td></td>
<td></td>
</tr>
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<td>-0.18</td>
<td>21</td>
<td>5.90</td>
<td>7.29</td>
<td>-1.62</td>
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<td></td>
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</table>

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

C.R = Consciousness raising, S.S = Social support, D.R = Dramatic relief, E.R = Environmental reevaluation, S.R = Self reevaluation, R.M = Reinforcement management, S.L = Self liberation, C.C = Counterconditioning, S.C = Stimulus control
Figure 5.2: Mean score decisional balance pre action forward movers

Cons = Decisional balance cons, Pros = Decisional balance pros
Post action stages

The next step is to examine the use of processes and concepts in the post action stages. As expected at the action stage movement forward and backward in stages took place. However, only 27 (25%) participants in action at baseline replied at follow up. Of these, 7 moved backwards, and 15 forward while 5 remained in action. The small numbers moving backward to the pre action stages or remaining in the action stage made data analysis of these individual groups impossible. Therefore those in action at baseline who either moved backward in stages or remained stable were combined into one group consisting of 12 participants making some data analysis possible.

Between subject anovas were conducted to examine interactions at baseline and follow up between forward movers and a combined group of stable and retrograde movers with the transtheoretical processes and concepts. Results are summarised in tables 5.12 and 5.13. Use of counterconditioning significantly decreased over time F(1) = 4.43, p<.05. There was a similar decline with consciousness raising over time which was close to significance F(1) = 3.49, p =.07. The interactions between time and direction with decisional balance cons and low fat behaviours were significant. For decisional balance cons F(1) = 4.21,p=.05, with forward movers showing a decline, while the stable retrograde group showed a slight increase. Differences between baseline and follow up for forward movers were close to significance t(14) = 1.79, p=.09. Interaction for time and direction for low fat behaviours was also significant F(1) = 4.46, p<.05. Differences at follow up between stable and retrograde group and forward movers was close to significance t(25) = 1.87, p =.07 with forward movers scoring higher on low fat behaviours as would be expected. With the 15 participants who moved forward to maintenance no significant differences were found in either the use of processes or concepts between baseline and follow up, the decrease in decisional balance cons did approach significance at t(14) =1.79,p=.09.
Table 5.12: Two way mixed factor anovas for forward movers and stable retrograde group in the action stage. F values at baseline and follow up for transtheoretical processes and concepts. Factors time and movement.

<table>
<thead>
<tr>
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<th>Time</th>
<th>Movement</th>
<th>Interaction time and movement</th>
</tr>
</thead>
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<td>0.92</td>
</tr>
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<td>0.62</td>
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<td>0.51</td>
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<td>0.54</td>
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<td>0.05</td>
</tr>
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<td>Efficacy</td>
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<td>0.79</td>
<td>0.55</td>
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<tr>
<td>Low Fat</td>
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<td>0.93</td>
<td>4.46*</td>
</tr>
<tr>
<td>Perceived risk</td>
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<td>0.01</td>
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</table>

*p<.10  *p<.05

Table 5.13: Mean scores transtheoretical processes and concepts forward movers and stable and retrograde movement action stage.

<table>
<thead>
<tr>
<th>Process</th>
<th>N</th>
<th>Base</th>
<th>Follow</th>
<th>T Value</th>
<th>N</th>
<th>Base</th>
<th>Follow</th>
<th>t value</th>
</tr>
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<td>28.77</td>
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<td>15</td>
<td>29.13</td>
<td>26.55</td>
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<td>29.16</td>
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<td>30.33</td>
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<td>21.10</td>
<td>20.80</td>
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</tr>
<tr>
<td>Cons</td>
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<td>19.50</td>
<td>22.08</td>
<td>-1.14</td>
<td>15</td>
<td>19.90</td>
<td>16.00</td>
<td>1.79a</td>
</tr>
<tr>
<td>Pros</td>
<td>12</td>
<td>21.16</td>
<td>21.83</td>
<td>-0.32</td>
<td>15</td>
<td>20.31</td>
<td>17.36</td>
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<td>50.72</td>
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<td>15</td>
<td>49.20</td>
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<td>1.67</td>
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</table>

*p < .10


Maintenance group

The next step is analysis of the maintenance group. The first step is analysis of the scores for stable maintainers across time. With stable maintainers no significant differences were found between baseline and follow up for processes or concepts although consciousness raising was close to significance t(112) = 1.70, p = .09. Again the most interesting observation was the slight decrease in most scores suggesting that as individuals remain in maintenance process use starts
to decrease. Low fat behaviour scores, however, showed a slight increase. The results are summarised in table 5.14.

**Table 5.14: Mean scores of processes for stable maintainers**

<table>
<thead>
<tr>
<th>Process</th>
<th>No</th>
<th>Mean base</th>
<th>Mean follow up</th>
<th>t value</th>
</tr>
</thead>
<tbody>
<tr>
<td>C.R</td>
<td>113</td>
<td>32.15 (9.07)</td>
<td>30.62 (8.78)</td>
<td>1.70a</td>
</tr>
<tr>
<td>S.S</td>
<td>116</td>
<td>25.78 (10.63)</td>
<td>24.49 (11.00)</td>
<td>1.49</td>
</tr>
<tr>
<td>D.R</td>
<td>113</td>
<td>22.28 (11.57)</td>
<td>22.03 (12.25)</td>
<td>0.25</td>
</tr>
<tr>
<td>E.R</td>
<td>116</td>
<td>29.65 (10.19)</td>
<td>29.85 (11.11)</td>
<td>0.83</td>
</tr>
<tr>
<td>S.R</td>
<td>114</td>
<td>29.85 (11.46)</td>
<td>30.66 (11.56)</td>
<td>-1.03</td>
</tr>
<tr>
<td>R.M</td>
<td>116</td>
<td>22.97 (9.49)</td>
<td>22.64 (9.34)</td>
<td>0.43</td>
</tr>
<tr>
<td>S.L</td>
<td>115</td>
<td>29.49 (10.63)</td>
<td>28.43 (10.94)</td>
<td>1.19</td>
</tr>
<tr>
<td>C.C</td>
<td>114</td>
<td>26.03 (10.46)</td>
<td>25.28 (11.99)</td>
<td>0.87</td>
</tr>
<tr>
<td>S.C</td>
<td>113</td>
<td>22.88 (10.69)</td>
<td>23.14 (11.41)</td>
<td>-0.30</td>
</tr>
<tr>
<td>Cons</td>
<td>109</td>
<td>17.42 (7.33)</td>
<td>16.93 (7.17)</td>
<td>0.70</td>
</tr>
<tr>
<td>Pros</td>
<td>108</td>
<td>18.82 (8.06)</td>
<td>18.43 (8.57)</td>
<td>0.58</td>
</tr>
<tr>
<td>Efficacy</td>
<td>101</td>
<td>57.07 (10.79)</td>
<td>57.03 (12.31)</td>
<td>0.03</td>
</tr>
<tr>
<td>Low Fat</td>
<td>117</td>
<td>72.45 (14.39)</td>
<td>73.21 (13.50)</td>
<td>-0.59</td>
</tr>
<tr>
<td>Perceived risk</td>
<td>105</td>
<td>6.31 (3.13)</td>
<td>5.87 (3.18)</td>
<td>1.15</td>
</tr>
</tbody>
</table>

\(^a p < .10\)


**Stable and retrograde movement post action stages.**

On reaching maintenance the only possible movement is retrograde or remaining in maintenance. As the same processes are emphasised in both action and maintenance it is feasible to combine the scores in these groups and compare the scores between those remaining in post action (i.e. action and maintenance) and those regressing to pre action (i.e. precontemplation, contemplation...
Two way mixed factor anovas were conducted between stable and retrograde movers from post action to pre action stages. The results for these analyses are shown in table 5.15 and 5.16 and the changes in process use are shown in figure 5.3. Use of consciousness raising was significantly higher for the stable post action $F(1) = 14.09$, $p<.01$. With social support there was a significant decrease in use over time $F(1) = 6.57$, $p<.01$. Paired sample $t$ tests found significant differences between baseline and follow up with retrograde movement group $t(17) = 2.75$, $p<.05$. With reinforcement management significant differences were found over time $F(1) = 4.24$, $p<.05$, and the interaction between time and movement was close to significance $F(1) = 3.33$, $p = .07$. Paired sample $t$ tests did not find significant differences between baseline and follow up for stable or retrograde movers. However there was a decrease in use for the retrograde group which approached statistical significance $t(17) = 1.73$, $p=.10$. With self liberation, use decreased significantly over time $F(1) = 4.88$, $p<.05$ the biggest decrease over time being in the retrograde movement group, however paired $t$ test did not find a significant difference $t(17) = 1.64$, $p=.11$. With counterconditioning significant differences were found with time $F(1) =12.11$, $p<.01$, with movement $F(1) = 5.14$, $p<.05$ and the interaction between time and movement $F(1) = 6.78$, $p<.01$. Paired sample $t$ tests found significant decrease between baseline and follow up with retrograde movement group, $t(17) =3.30$, $p<.01$ and independent sample $t$ test found the retrograde group to show lower use at follow up $t(160) = 3.02$, $p<.01$. With low fat behaviours significant differences were found with movement $F(1) = 12.54$, $p<.01$ and the interaction between time and movement $F(1) = 3.65$, $p<.05$. Stable maintainers showed higher scores for low fat behaviours and the difference between the stable and retrograde groups was greater at follow up than baseline.
Table 5.15: Two way mixed factor anovas for stable and retrograde group in the post action stages. F values at baseline and follow up for transtheoretical processes and concepts. Factors time and movement.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Time</th>
<th>Movement</th>
<th>Interaction time and movement</th>
</tr>
</thead>
<tbody>
<tr>
<td>C.R</td>
<td>2.10</td>
<td>14.09**</td>
<td>0.00</td>
</tr>
<tr>
<td>S.S</td>
<td>6.57**</td>
<td>0.69</td>
<td>2.04</td>
</tr>
<tr>
<td>D.R</td>
<td>0.95</td>
<td>0.12</td>
<td>0.36</td>
</tr>
<tr>
<td>E.R</td>
<td>0.99</td>
<td>2.03</td>
<td>0.01</td>
</tr>
<tr>
<td>S.R</td>
<td>2.81</td>
<td>2.63</td>
<td>3.09</td>
</tr>
<tr>
<td>R.M</td>
<td>4.24*</td>
<td>0.01</td>
<td>3.33a</td>
</tr>
<tr>
<td>S.L</td>
<td>4.88*</td>
<td>0.89</td>
<td>1.44</td>
</tr>
<tr>
<td>C.C</td>
<td>12.11**</td>
<td>5.14*</td>
<td>6.78**</td>
</tr>
<tr>
<td>S.C</td>
<td>1.14</td>
<td>3.14</td>
<td>2.33</td>
</tr>
<tr>
<td>Cons</td>
<td>0.66</td>
<td>0.90</td>
<td>1.47</td>
</tr>
<tr>
<td>Pros</td>
<td>0.23</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Efficacy</td>
<td>0.80</td>
<td>3.49</td>
<td>1.54</td>
</tr>
<tr>
<td>Low Fat</td>
<td>0.99</td>
<td>12.54**</td>
<td>3.65*</td>
</tr>
<tr>
<td>Perceived risk</td>
<td>2.19</td>
<td>0.29</td>
<td>0.45</td>
</tr>
</tbody>
</table>

** p<.01 * p<.05. a p<.10

Table 5.16: Mean scores transtheoretical processes and concepts stable and retrograde movement post action stages.

<table>
<thead>
<tr>
<th>Process</th>
<th>N</th>
<th>Base</th>
<th>Follow</th>
<th>t value</th>
<th>N</th>
<th>Base</th>
<th>Follow</th>
<th>t value</th>
</tr>
</thead>
<tbody>
<tr>
<td>C.R</td>
<td>143</td>
<td>32.23</td>
<td>30.51</td>
<td>2.17*</td>
<td>17</td>
<td>25.00</td>
<td>22.29</td>
<td>1.01</td>
</tr>
<tr>
<td>S.S</td>
<td>146</td>
<td>26.72</td>
<td>25.47</td>
<td>1.67</td>
<td>18</td>
<td>26.22</td>
<td>21.79</td>
<td>2.75*</td>
</tr>
<tr>
<td>D.R</td>
<td>143</td>
<td>23.16</td>
<td>22.61</td>
<td>0.61</td>
<td>18</td>
<td>22.94</td>
<td>20.90</td>
<td>0.96</td>
</tr>
<tr>
<td>E.R</td>
<td>146</td>
<td>30.18</td>
<td>28.97</td>
<td>1.61</td>
<td>18</td>
<td>26.61</td>
<td>25.62</td>
<td>0.64</td>
</tr>
<tr>
<td>S.R</td>
<td>144</td>
<td>30.58</td>
<td>30.67</td>
<td>-0.23</td>
<td>18</td>
<td>28.16</td>
<td>24.38</td>
<td>1.56</td>
</tr>
<tr>
<td>R.M</td>
<td>146</td>
<td>23.50</td>
<td>23.24</td>
<td>0.36</td>
<td>18</td>
<td>25.72</td>
<td>21.53</td>
<td>1.73</td>
</tr>
<tr>
<td>S.L</td>
<td>144</td>
<td>29.92</td>
<td>28.72</td>
<td>1.53</td>
<td>18</td>
<td>29.05</td>
<td>25.00</td>
<td>1.64</td>
</tr>
<tr>
<td>C.C</td>
<td>144</td>
<td>26.30</td>
<td>25.32</td>
<td>1.30</td>
<td>18</td>
<td>23.48</td>
<td>16.82</td>
<td>3.30**</td>
</tr>
<tr>
<td>S.C</td>
<td>141</td>
<td>22.67</td>
<td>23.04</td>
<td>-0.50</td>
<td>17</td>
<td>19.94</td>
<td>16.82</td>
<td>1.46</td>
</tr>
<tr>
<td>Cons</td>
<td>138</td>
<td>17.50</td>
<td>17.10</td>
<td>0.60</td>
<td>18</td>
<td>17.77</td>
<td>19.77</td>
<td>0.92</td>
</tr>
<tr>
<td>Pros</td>
<td>137</td>
<td>19.02</td>
<td>18.60</td>
<td>0.70</td>
<td>18</td>
<td>18.94</td>
<td>18.50</td>
<td>0.24</td>
</tr>
<tr>
<td>Efficacy</td>
<td>131</td>
<td>55.75</td>
<td>55.14</td>
<td>0.54</td>
<td>17</td>
<td>48.32</td>
<td>52.05</td>
<td>0.80</td>
</tr>
<tr>
<td>Low Fat</td>
<td>147</td>
<td>71.95</td>
<td>73.51</td>
<td>-1.37</td>
<td>19</td>
<td>64.99</td>
<td>60.03</td>
<td>1.38</td>
</tr>
<tr>
<td>Risk</td>
<td>131</td>
<td>6.47</td>
<td>6.09</td>
<td>1.14</td>
<td>18</td>
<td>7.11</td>
<td>6.11</td>
<td>1.31</td>
</tr>
</tbody>
</table>

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

Logistic regression stage movement

To gain further insight into the processes and concepts used logistic regressions were conducted to identify the processes and concepts associated with forward and backward movement between stages. Participants were classified on the basis of whether they moved from pre to post or post to pre action stages. The dichotomous value with forward or backward movement meant logistic regression was the suitable method of analysis. Results are summarised in table 5.17. Analysis yielded a chi square value of 17.01, p<.05, indicating the model as a significant fit. Analysis showed overall the likelihood of forward movement was stronger for those scoring highly in social support. Overall comparison of scores indicates that it is mainly influential in predicting backward movement, from the post action stages (action and maintenance) to the pre action stages (precontemplation, contemplation and preparation).

Table 5.17. Logistic regression stage movement

<table>
<thead>
<tr>
<th>Number</th>
<th>Process / Concept</th>
<th>Wald Value</th>
<th>Odds Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>41</td>
<td>Consciousness raising</td>
<td>0.57</td>
<td>1.05</td>
</tr>
<tr>
<td>41</td>
<td>Social support</td>
<td>4.52*</td>
<td>0.87</td>
</tr>
<tr>
<td>41</td>
<td>Dramatic relief</td>
<td>1.38</td>
<td>1.09</td>
</tr>
<tr>
<td>41</td>
<td>Environmental reevaluation</td>
<td>1.21</td>
<td>1.09</td>
</tr>
<tr>
<td>41</td>
<td>Self reevaluation</td>
<td>0.53</td>
<td>1.06</td>
</tr>
<tr>
<td>41</td>
<td>Reinforcement management</td>
<td>2.10</td>
<td>0.88</td>
</tr>
<tr>
<td>41</td>
<td>Self Liberation</td>
<td>1.51</td>
<td>0.88</td>
</tr>
<tr>
<td>41</td>
<td>Counter conditioning</td>
<td>0.73</td>
<td>1.08</td>
</tr>
<tr>
<td>41</td>
<td>Stimulus control</td>
<td>1.09</td>
<td>0.93</td>
</tr>
<tr>
<td>41</td>
<td>Decisional balance Cons</td>
<td>0.02</td>
<td>0.98</td>
</tr>
<tr>
<td>41</td>
<td>Decisional balance pros</td>
<td>0.21</td>
<td>0.97</td>
</tr>
<tr>
<td>41</td>
<td>Self Efficacy</td>
<td>0.73</td>
<td>0.98</td>
</tr>
</tbody>
</table>

*p<.05*
Figure 5.3: Mean scores processes post to pre action stages

C.R = Consciousness raising, S. S = Social support D.R = Dramatic relief  E.R = Environmental reevaluation S.R. = Self reevaluation  
R.M = Reinforcement management, S.L = Self liberation  C.C = Counterconditioning, S.C. = Stimulus control
Low fat behaviour scores

In line with the analysis conducted at baseline the scores of those on low, medium and high fat behaviour scores were also examined. Participants scoring 14-42 were included in high fat behaviour group, participants scoring 43-71 were included in medium fat behaviour group, participants scoring 72-98 were included in low fat behaviour group. Of the 19 participants in high fat behaviours at baseline, 14 showed forward movement. Of the 115 in medium fat intake 29 showed forward movement and 5 backward. Of the 91 in low fat behaviours 21 showed backward movement. Overall therefore 43 participants showed forward movement and 26 backward movement. Movement across low fat behaviour groups is summarised in table 5.18.

**Table 5.18: Movement across fat behaviour groups**

<table>
<thead>
<tr>
<th>Behaviour Base</th>
<th>N</th>
<th>High</th>
<th>Medium</th>
<th>Low</th>
<th>Forward</th>
<th>Back</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>19</td>
<td>5</td>
<td>11</td>
<td>3</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>Medium</td>
<td>115</td>
<td>5</td>
<td>81</td>
<td>29</td>
<td>29</td>
<td>5</td>
</tr>
<tr>
<td>Low</td>
<td>91</td>
<td>3</td>
<td>18</td>
<td>70</td>
<td>21</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>225</td>
<td>13</td>
<td>110</td>
<td>102</td>
<td>43</td>
<td>26</td>
</tr>
</tbody>
</table>

**Movement low fat behaviours**

Analysis showed that 43 participants overall showed forward movement from high or medium fat behaviours with the majority 32 moving to low fat behaviours and 26 showed backward movement, the majority 18 going from low to medium fat behaviours. Two way mixed factor anovas conducted between forward and backward movers, revealed the following results. The results are summarised in tables 5.19 and 5.20 and figure 5.4. There were significant interactions between time and movement for all of the processes except for self liberation and self reevaluation. These interactions were all of the same form. With consciousness raising, social support, dramatic relief, environmental reevaluation, counter conditioning, reinforcement management and stimulus control those participants showing backward movement showed a decrease in process use, while those showing forward movement showed an increase. In
addition there were main effects for time with social support and reinforcement management with an overall decrease from baseline to follow up but t tests showed this effect was only significant for the retrograde group (table 5.20). Use of self reevaluation was also found to be significantly higher for those moving forward than those moving backward but it did not change with time.

With the transtheoretical concepts there were no significant effects for decisional balance cons. With decisional balance pros however movement and the interaction were close to significance. Independent t tests found differences at follow up were significant t(66) = -2.18, p<.05 with retrograde movers scoring less than forward movers. With self efficacy significant differences were found with movement but this was not in the expected direction with those showing retrograde movement scoring higher than those showing forward movement.
Table 5.19: Two way mixed factor anovas for forward and retrograde groups with low fat behaviours. F values for transtheoretical processes and concepts. Factors time and movement.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Time</th>
<th>Movement</th>
<th>Interaction time and movement</th>
</tr>
</thead>
<tbody>
<tr>
<td>C.R</td>
<td>1.75</td>
<td>0.27</td>
<td>19.41**</td>
</tr>
<tr>
<td>S.S</td>
<td>4.22*</td>
<td>0.46</td>
<td>8.45**</td>
</tr>
<tr>
<td>D.R</td>
<td>0.85</td>
<td>3.73*</td>
<td>5.06*</td>
</tr>
<tr>
<td>E.R</td>
<td>0.78</td>
<td>3.01</td>
<td>6.96**</td>
</tr>
<tr>
<td>S.R</td>
<td>0.42</td>
<td>3.76*</td>
<td>0.57</td>
</tr>
<tr>
<td>R.M</td>
<td>4.41*</td>
<td>2.07</td>
<td>6.82**</td>
</tr>
<tr>
<td>S.L</td>
<td>0.57</td>
<td>1.94</td>
<td>2.96</td>
</tr>
<tr>
<td>C.C</td>
<td>3.29</td>
<td>3.29</td>
<td>4.53*</td>
</tr>
<tr>
<td>S.C</td>
<td>0.00</td>
<td>1.41</td>
<td>5.15*</td>
</tr>
<tr>
<td>Cons</td>
<td>0.29</td>
<td>1.93</td>
<td>0.79</td>
</tr>
<tr>
<td>Pros</td>
<td>0.85</td>
<td>3.38a</td>
<td>3.18a</td>
</tr>
<tr>
<td>Efficacy</td>
<td>0.19</td>
<td>6.34**</td>
<td>0.05</td>
</tr>
<tr>
<td>Perceived risk</td>
<td>0.26</td>
<td>1.58</td>
<td>0.58</td>
</tr>
</tbody>
</table>

*p<.05, **p<.01, *p<.10  
Table 5.20: Mean scores transtheoretical processes and concepts forward and retrograde movement groups low fat behaviours.

<table>
<thead>
<tr>
<th>Process</th>
<th>Forward</th>
<th>N</th>
<th>Base</th>
<th>Follow</th>
<th>T Value</th>
<th>N</th>
<th>Base</th>
<th>Follow</th>
<th>t value</th>
</tr>
</thead>
<tbody>
<tr>
<td>C.R</td>
<td>43</td>
<td>27.27</td>
<td>30.53</td>
<td>-2.60*</td>
<td>25</td>
<td>30.76</td>
<td>24.68</td>
<td>3.45**</td>
<td></td>
</tr>
<tr>
<td>S.S</td>
<td>43</td>
<td>24.98</td>
<td>25.82</td>
<td>-0.63</td>
<td>26</td>
<td>25.88</td>
<td>20.99</td>
<td>3.82**</td>
<td></td>
</tr>
<tr>
<td>D.R</td>
<td>41</td>
<td>24.31</td>
<td>26.21</td>
<td>-1.03</td>
<td>26</td>
<td>22.07</td>
<td>17.53</td>
<td>2.17*</td>
<td></td>
</tr>
<tr>
<td>E.R</td>
<td>43</td>
<td>28.4</td>
<td>31.06</td>
<td>-1.94</td>
<td>26</td>
<td>26.78</td>
<td>23.57</td>
<td>1.80</td>
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</tr>
<tr>
<td>S.R</td>
<td>42</td>
<td>30.65</td>
<td>30.78</td>
<td>-0.07</td>
<td>26</td>
<td>25.69</td>
<td>23.96</td>
<td>1.10</td>
<td></td>
</tr>
<tr>
<td>R.M</td>
<td>43</td>
<td>23.50</td>
<td>24.04</td>
<td>-0.42</td>
<td>26</td>
<td>22.96</td>
<td>18.00</td>
<td>2.92**</td>
<td></td>
</tr>
<tr>
<td>S.L</td>
<td>42</td>
<td>26.96</td>
<td>28.17</td>
<td>-0.73</td>
<td>26</td>
<td>25.57</td>
<td>22.43</td>
<td>1.76</td>
<td></td>
</tr>
<tr>
<td>C.C</td>
<td>42</td>
<td>25.19</td>
<td>25.51</td>
<td>-0.24</td>
<td>26</td>
<td>22.65</td>
<td>18.57</td>
<td>2.69**</td>
<td></td>
</tr>
<tr>
<td>S.C</td>
<td>41</td>
<td>20.36</td>
<td>22.77</td>
<td>-1.84</td>
<td>25</td>
<td>19.68</td>
<td>17.30</td>
<td>1.45</td>
<td></td>
</tr>
<tr>
<td>Cons</td>
<td>41</td>
<td>19.16</td>
<td>18.86</td>
<td>0.26</td>
<td>26</td>
<td>15.82</td>
<td>17.05</td>
<td>-0.79</td>
<td></td>
</tr>
<tr>
<td>Pros</td>
<td>41</td>
<td>18.94</td>
<td>21.19</td>
<td>-2.02*</td>
<td>26</td>
<td>16.57</td>
<td>15.86</td>
<td>-0.62</td>
<td></td>
</tr>
<tr>
<td>Efficacy</td>
<td>37</td>
<td>49.82</td>
<td>50.02</td>
<td>-0.06</td>
<td>26</td>
<td>57.08</td>
<td>58.25</td>
<td>-0.92</td>
<td></td>
</tr>
<tr>
<td>Risk</td>
<td>40</td>
<td>6.37</td>
<td>6.07</td>
<td>-0.53</td>
<td>24</td>
<td>5.21</td>
<td>5.67</td>
<td>0.53</td>
<td></td>
</tr>
</tbody>
</table>

*p<.05  **p<.01

Figure 5.4: Mean scores process use forward movers low fat behaviours

C.R = Consciousness raising  S. S = Social support  D.R = Dramatic relief  E.R = Environmental reevaluation  S.R = Self reevaluation  
S.L = Self liberation  C.C = Counterconditioning  S.C = Stimulus Control
Logistic Regression of Fat Behaviours

Participants were classified on the basis of forward or backward movement in terms of fat behaviours, backward movement = high to medium or medium to low, forward movement = low to medium and medium to high. Results are summarised in table 5.21.

While 69 participants initially showed forward or backward movement according to level of fat behaviour, 8 were eliminated from the analysis because of missing data. Analysis yielded a chi square value for the model of 16.90, p>.05, indicating the model was not a good fit. Results indicate that an increase in consciousness raising at baseline indicates a likelihood of forward movement with a decrease indicating a likelihood of backward movement. Use of self reevaluation at baseline was also close to significance (p = .06) therefore this too might be influential again with greater use increasing the likelihood of forward movement and decrease increasing the likelihood of backward movement. Overall in this analysis cognitive processes are again emphasised. Interestingly social support is not emphasised here, while it was with stage movement.

Table 5.21 Logistic regression low fat behaviours

<table>
<thead>
<tr>
<th>Number</th>
<th>Process</th>
<th>Wald Value</th>
<th>Odds Ration</th>
</tr>
</thead>
<tbody>
<tr>
<td>61</td>
<td>Consciousness raising</td>
<td>3.73*</td>
<td>0.89</td>
</tr>
<tr>
<td>61</td>
<td>Social support</td>
<td>.00</td>
<td>0.99</td>
</tr>
<tr>
<td>61</td>
<td>Dramatic relief</td>
<td>.13</td>
<td>0.98</td>
</tr>
<tr>
<td>61</td>
<td>Environmental reevaluation</td>
<td>.53</td>
<td>1.05</td>
</tr>
<tr>
<td>61</td>
<td>Self reevaluation</td>
<td>3.40a</td>
<td>1.12</td>
</tr>
<tr>
<td>61</td>
<td>Reinforcement management</td>
<td>1.39</td>
<td>0.92</td>
</tr>
<tr>
<td>61</td>
<td>Self Liberation</td>
<td>.52</td>
<td>0.95</td>
</tr>
<tr>
<td>61</td>
<td>Counter conditioning</td>
<td>.75</td>
<td>1.05</td>
</tr>
<tr>
<td>61</td>
<td>Stimulus control</td>
<td>.17</td>
<td>1.02</td>
</tr>
<tr>
<td>61</td>
<td>Decisional balance Cons</td>
<td>.14</td>
<td>1.02</td>
</tr>
<tr>
<td>61</td>
<td>Decisional balance pros</td>
<td>1.45</td>
<td>0.91</td>
</tr>
<tr>
<td>61</td>
<td>Self Efficacy</td>
<td>1.92</td>
<td>0.96</td>
</tr>
</tbody>
</table>

Table 2. p<.05 a p<.10
Responses to interventions.

One of the hypotheses predicted that participants would respond more positively to interventions based on the transtheoretical model than to general interventions. Analysis of participant’s responses to the brochures they received showed that of the 120 participants who received brochure assessment questionnaires 110 returned completed the questionnaires. Of these 55 had received the general intervention and 55 received the matched intervention. Results are summarised in Table 5.21.

Overall the results were virtually identical between matched and general intervention, Essentially those receiving interventions matched to stage did not respond more positively than those receiving general interventions did.

### Table 5.22: Pamphlet items responses

<table>
<thead>
<tr>
<th></th>
<th>Matched yes</th>
<th>General yes</th>
<th>Matched no</th>
<th>General no</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read Brochure (Item 1)</td>
<td>50</td>
<td>46</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>Save Brochure (Item 2)</td>
<td>30</td>
<td>27</td>
<td>24</td>
<td>27</td>
</tr>
<tr>
<td>Brochure Help (Item 3)</td>
<td>37</td>
<td>37</td>
<td>17</td>
<td>15</td>
</tr>
<tr>
<td>Brochure Discuss (Item 4)</td>
<td>11</td>
<td>12</td>
<td>43</td>
<td>42</td>
</tr>
<tr>
<td>All Exercise (Item 5)</td>
<td>19</td>
<td>14</td>
<td>35</td>
<td>40</td>
</tr>
<tr>
<td>Some Exercise (Item 6)</td>
<td>31</td>
<td>30</td>
<td>23</td>
<td>24</td>
</tr>
</tbody>
</table>

Regarding response rates of the 328 brochures distributed to the matched group, 55 were returned completed, of the 309 distributed to the general group 55 were returned. Making a return rate of 16.7% for the matched group and 17.7% for the general group, therefore the return rate of the matched and general groups was virtually identical.
Intervention type and stage movement

Another key hypothesis is whether or not intervention type made a difference to stage movement. Unfortunately due to the mixed response rate it was not possible to conduct a thorough analysis of this hypothesis with each stage. With contemplation and preparation combined group and the action group the data sets were too small with one cell in each case containing only one participant. Chi square tests were possible with the precontemplation and maintenance groups. However the results were not significant for either group. With the precontemplators \( \chi^2(2) = 1.02, p > .05 \), with maintainers \( \chi^2(2) = 0.01, p > .05 \). In order to evaluate the scores contained in the combined contemplation and preparation group and action group to a degree the scores from both these groups were combined with the precontemplation group and chi square conducted across the stages as a whole. Again no significant differences were found \( \chi^2(2) = 1.03, p > .05 \). While the data sets are very small even when an acceptable number was present as for example in the maintenance group and combined stages group the type of intervention made no significant impact on movement. Results are summarised in table 5.21 and 5.22.

**Table 5.23: Movement stage and intervention type pre maintenance stages**

<table>
<thead>
<tr>
<th>Stage</th>
<th>Match Forward</th>
<th>Match Stable</th>
<th>General Forward</th>
<th>General Stable</th>
<th>Control Forward</th>
<th>Control Stable</th>
<th>Chi Square</th>
</tr>
</thead>
<tbody>
<tr>
<td>Precon</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>10</td>
<td>7</td>
<td>11</td>
<td>1.02</td>
</tr>
<tr>
<td>Con +Pre</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>Not poss</td>
</tr>
<tr>
<td>Action</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>1</td>
<td>5</td>
<td>6</td>
<td>Not poss</td>
</tr>
<tr>
<td>Totals</td>
<td>12</td>
<td>10</td>
<td>11</td>
<td>16</td>
<td>17</td>
<td>22</td>
<td>1.03</td>
</tr>
</tbody>
</table>
Table 5.24. Movement and intervention type maintenance stage

<table>
<thead>
<tr>
<th>Stage</th>
<th>Match Backward</th>
<th>Match Stable</th>
<th>General Backward</th>
<th>General Stable</th>
<th>Control Backward</th>
<th>Control Stable</th>
<th>Chi Square</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maint</td>
<td>6</td>
<td>32</td>
<td>5</td>
<td>28</td>
<td>11</td>
<td>58</td>
<td>.011</td>
</tr>
</tbody>
</table>

**Intervention type analysis**

Two way mixed factor anovas were conducted on the transtheoretical processes and concepts, with factors of brochure type and time. Results are summarised in tables 5.23 and 5.24. Significant F values were found over time with social support, counterconditioning and low fat behaviours with the value for self liberation being close to significance the interaction for self liberation was also close to significance. With social support all groups showed a slight decrease over time though none of the decreases were significant when analysed for the individual groups. With counterconditioning the decrease between baseline and follow up in the no intervention group was significant. With self liberation the decrease in the no intervention group was significant with the decrease in the general intervention group being close to significance, there was however a slight increase in the matched group but this was not significant. A one way anova found differences were significant between the three groups at follow up, F(2) = 3.16, p<.05 but not at baseline F(2) =.14, p>.05. Post hoc tests showed differences between matched and no intervention group close to significance at follow up (p=.06 ). With low fat behaviours both the general intervention and the matched intervention groups showed a significant increase between baseline and follow up, but there was no significant effect for the no intervention group. Although this effect could be as predicted with improved dietary behaviour for the two intervention groups but not the control group, this must be treated with caution given the non significant interaction in the anova.
Table 5.25. Two way mixed factor anovas for brochure type, F values at baseline and follow up for transtheoretical processes and concepts. Factors time and intervention type

<table>
<thead>
<tr>
<th>Variable</th>
<th>Time</th>
<th>Brochure</th>
<th>Interaction Time and Brochure</th>
</tr>
</thead>
<tbody>
<tr>
<td>C.R</td>
<td>1.28</td>
<td>0.47</td>
<td>0.49</td>
</tr>
<tr>
<td>S.S</td>
<td>5.86*</td>
<td>0.44</td>
<td>0.91</td>
</tr>
<tr>
<td>D.R</td>
<td>0.36</td>
<td>1.26</td>
<td>0.77</td>
</tr>
<tr>
<td>E.R</td>
<td>1.17</td>
<td>0.68</td>
<td>0.25</td>
</tr>
<tr>
<td>S.R</td>
<td>1.66</td>
<td>0.11</td>
<td>0.46</td>
</tr>
<tr>
<td>R.M</td>
<td>0.51</td>
<td>0.94</td>
<td>0.47</td>
</tr>
<tr>
<td>S.L</td>
<td>3.31a</td>
<td>0.23</td>
<td>2.59a</td>
</tr>
<tr>
<td>C.C</td>
<td>5.52*</td>
<td>0.46</td>
<td>0.02</td>
</tr>
<tr>
<td>S.C</td>
<td>0.14</td>
<td>0.95</td>
<td>0.16</td>
</tr>
<tr>
<td>Cons</td>
<td>0.49</td>
<td>0.14</td>
<td>2.21</td>
</tr>
<tr>
<td>Pros</td>
<td>0.45</td>
<td>0.20</td>
<td>2.28a</td>
</tr>
<tr>
<td>Efficacy</td>
<td>0.37</td>
<td>0.91</td>
<td>0.16</td>
</tr>
<tr>
<td>Low Fat</td>
<td>4.91*</td>
<td>1.46</td>
<td>1.44</td>
</tr>
<tr>
<td>Perceived risk</td>
<td>0.08</td>
<td>0.60</td>
<td>2.55a</td>
</tr>
</tbody>
</table>

*p<.05  a p<.10


Low Fat = Low Fat Behaviours, Perceived risk = Perceived risk
Table 5.26 Mean scores transtheoretical processes and concepts with no intervention, general intervention and stage matched intervention baseline and follow up

<table>
<thead>
<tr>
<th>Process</th>
<th>No Intervention</th>
<th>General Intervention</th>
<th>Matched Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>Base</td>
<td>Follow</td>
</tr>
<tr>
<td>C.R</td>
<td>101</td>
<td>28.87</td>
<td>27.37</td>
</tr>
<tr>
<td>S. S.</td>
<td>105</td>
<td>23.65</td>
<td>23.22</td>
</tr>
<tr>
<td>D.R</td>
<td>102</td>
<td>21.24</td>
<td>21.34</td>
</tr>
<tr>
<td>E.R</td>
<td>105</td>
<td>28.28</td>
<td>27.55</td>
</tr>
<tr>
<td>S.R</td>
<td>102</td>
<td>28.51</td>
<td>28.08</td>
</tr>
<tr>
<td>R.M</td>
<td>105</td>
<td>22.40</td>
<td>21.24</td>
</tr>
<tr>
<td>S.L</td>
<td>104</td>
<td>27.34</td>
<td>24.94</td>
</tr>
<tr>
<td>C.C</td>
<td>104</td>
<td>24.20</td>
<td>22.54</td>
</tr>
<tr>
<td>S.C</td>
<td>103</td>
<td>20.13</td>
<td>20.56</td>
</tr>
<tr>
<td>Cons</td>
<td>101</td>
<td>17.44</td>
<td>17.50</td>
</tr>
<tr>
<td>Pros</td>
<td>101</td>
<td>18.05</td>
<td>18.53</td>
</tr>
<tr>
<td>Efficacy</td>
<td>98</td>
<td>54.06</td>
<td>54.68</td>
</tr>
<tr>
<td>Low Fat</td>
<td>96</td>
<td>65.69</td>
<td>65.74</td>
</tr>
<tr>
<td>Risk</td>
<td>96</td>
<td>6.67</td>
<td>6.06</td>
</tr>
</tbody>
</table>

*p<.05 **p<.01 a p<.10

Discussion

None of the initial hypotheses were fully supported and stage progression did not follow exactly that outlined in the transtheoretical model. However, of the 61 participants in the pre action stages at baseline 25 showed forward movement at follow up. With the precontemplators who moved forward 11 were in maintenance, whereas logically the furthest stage movement possible is to action. A similar pattern emerged with those in contemplation. It could be that participants simply skipped some stages, meaning that precontemplators may have suddenly adopted low fat behaviours, similar to the smoker whom suddenly gives up cigarettes. It is unclear how dramatic behaviour changes such as this fit in with the transtheoretical model. Interestingly mean scores for fat behaviours in the pre to post action group showed significant differences, indicating that participants who say they have changed stage have matched this with actual behaviour. However, the picture for those who relapsed from post action to pre action stages is contradictory. Here no significant differences were found in fat behaviour scores, though the mean score at follow up was less showing some relapse into poorer dietary habits. It is possible that some participants in the post action stages as indicated by Brug, Van Assema, Kok, Lenderink and Glanz (1994) initially held an unrealistic view of their fat intake and in fact movement to pre action stages may indicate a positive intention to change and not a relapse to old dietary habits. The strongest support for stage movement as outlined in the transtheoretical model took place in the action stage, with 15 (55%) showing forward movement to maintenance. Individuals at this point having made significant changes are more likely it appears to maintain them. Response rates also did not differ significantly on the basis of stage or gender, however the difference in response rate between those over and under 60 was close to significance. It may be that participants over 60 are perhaps more conforming and therefore ready to respond to questionnaires.

Process use did not fully match that outlined in the transtheoretical model meaning that hypothesis two is also rejected. However, partial support did exist in that consciousness raising, a cognitive process showed a significant increase in participants who progressed from the pre action to post action stages. With the third hypothesis that concerned decisional balance, partial support for the model was demonstrated, participants who moved from pre action to post action
stages significantly increased their scores with the pros of change. But while scores on the cons were lower this difference was not significant. With self efficacy there were no significant changes in scores between those who moved forward or backward, rejecting fully the fourth hypothesis. Interventions based on the transtheoretical model were no more effective than general interventions rejecting the fifth hypothesis. A more detailed discussion of the results now follows.

The return rate from the matched and general interventions was disappointing, with virtually 50% of the total questionnaires coming from the control group. This may be due to the fact that those who received brochures were sent follow ups 3 months later and participants may have felt too much nuisance mail was coming their way and expecting more follow up questionnaires simply withdrew from the study. They may also, however, as Prochaska (1999) pointed out have found the strategies in the brochures confrontational, and simply decided to withdraw rather than take part in a study, which they perceived as too demanding. The results of this study show that once an intervention is introduced response rates decrease significantly. This may be of interest to future researchers who may wish to simply conduct longitudinal studies without interventions on the stages of change or indeed in any other area.

With movement across stages, 159 (70%) participants remained in the same stage, but of those that showed movement the majority 40 showed forward movement, with 29 moving backward in stages. With the dietary behaviour scales, participants in action and maintenance at follow up increased their low fat behaviours from baseline and while scores for those in action were close to significance, scores for maintainers were significant. However with stable maintainers the increase in low fat behaviours was not significant. This may indicate that these stages are not fixed with regard to low fat behaviour, as for example, behaviour is in the addictions where abstinence is simply adopted and maintained. With dietary behaviour change is still taking place and this may influence the other areas of the transtheoretical model for example process use. With cognitive processes, consciousness raising may not be completely abandoned with movement to the post action stages and the pros of decisional balance may need to increase further in post action to promote more change. For participants in the pre action stages dietary behaviour scores remained reasonably static. Scores in precontemplation and preparation did
show a slight decrease, which is broadly in line with expected results. Participants at these points had not adopted low fat behaviours initially and have obviously not changed their dietary behaviour significantly in the interim 6 months.

With process use overall it is of interest again that social support, dramatic relief, reinforcement management, counter conditioning and stimulus control are not used very frequently. This is in line with the results of the pilot study at the University of Surrey where again many participants indicated infrequent process use. The four processes that are indicated as being used usually at baseline and follow up are consciousness raising, environmental reevaluation, self reevaluation and self liberation. The remaining processes are at best used occasionally at both times, indicating that perhaps not all processes may play an equally significant role in dietary change. Also of interest is that the use of the processes across the group as a whole decrease at follow up with the exception of stimulus control, which shows a small insignificant increase. Decreases in the scores for social support, counterconditioning and self liberation were significant showing that some process use may vary considerably as situation and dietary behaviour changes. Possible explanations are that social support is less necessary once improved health behaviour is established, with counterconditioning substitute or alternative behaviours may already have been found and with self liberation there may be no need to make further commitments to change. However, the decreases may be due to a particular group of participants for example a relapse group showing an exceptional decrease.

Within the individual stages, precontemplators as predicted showed minimal use of processes. No significant differences were found longitudinally with stable precontemplaters but precontemplaters showing forward movement scored significantly higher in consciousness raising. In the transtheoretical model consciousness raising is associated with movement from precontemplation to later stages. Therefore support for the model is demonstrated in this study with at least one cognitive process. Significant differences were found between stable and forward movers in precontemplation at follow up in dramatic relief, self reevaluation, reinforcement management and self liberation, with the forward movement group scoring significantly higher with all four processes. This indicates that increased process use causes change and in a pre action stage mainly cognitive processes. Further support is found in
participants moving from pre action to post action stages. Highly significant differences were found in the use of consciousness raising, with the pros of change also showing a significant increase. Both these concepts are central to the transtheoretical model. The use of cognitive processes combined with an increase in the pros of change is predictive of forward movement from pre to post action stages. However other major differences emerge between the results and the predicted results based on the transtheoretical model. Significant increases could be expected with dramatic relief, environmental reevaluation and self reevaluation in forward moving precontemplaters, but these however were not found. There is also a large increase in the cons of change; these are expected to decrease as the participant adopts improved dietary behaviour. However, initially individuals may become more aware of the advantages and disadvantages, the crucial factor perhaps being that the increase in pros more than matched the increase in cons.

With participants moving from action to maintenance use of all processes decreases although none of the decreases was significant. This is partly in line with the transtheoretical model in that the use of processes in particular the cognitive processes should decrease as in maintenance the same emphasis will not be put on process use. Participants at this point may become secure with their behaviour and it is therefore not necessary to take steps to constantly reinforce it. The decrease in cons is also in line with the model, but the decrease in the pros is surprising as it is expected these will increase when low fat behaviours are maintained. However scores for the cons also decreased meaning at follow up pros still score higher than the cons.

With participants who moved from post action to pre action stages, that is showed backward movement, the highly significant decreases in social support and counterconditioning are in line with the transtheoretical model. These are behavioural processes, which are emphasised in the model as of importance in maintaining the post action stages. However, to fully support the model significant decreases need to take place also in reinforcement management and stimulus control. Overall backward movers scored lower on all processes at baseline than stable participants, with the exception of reinforcement management. At follow up, however all processes scored lower for backward movement, with the differences between groups for consciousness raising and counterconditioning being significantly lower. Again this shows that a mix of cognitive and behavioural processes continue to play a part. With the transtheoretical
concepts no significant differences were found. Interestingly, however, with self efficacy
backward movers showed a slight increase at follow up showing they believed more strongly in
their ability to maintain low fat behaviours despite relapse. Again this could be due to some
participants already maintaining a low fat diet partially deciding to make further alterations. The
results of the logistic regression showed social support as a crucial factor in stage movement.
Again with the transtheoretical model social support is seen as a crucial factor in the post action
stages and the results overall in this study are in agreement.

For participants showing forward movement in terms of fat behaviours that is from high or
medium fat behaviours to low fat behaviours, there were significant increases in scores for
consciousness raising and the scores for environmental reevaluation were close to significance.
These are again the processes emphasized for forward change in the transtheoretical model.
While fat behaviour scores are not directly related to stages outlined in the transtheoretical
model, a degree of additional support for the model is provided with these results. No significant
increases were found for behavioural processes, with scores for stimulus control being the closest
to significance. With dietary behaviour altering significantly at this point increases in for
example social support and counterconditioning may also have been expected to take place but
were not found. With the concepts the significant increase in decisional balance pros is as
expected, the decisional balance cons did not however show a significant decrease.

With participants showing backward movement in terms of fat behaviours that is moved from
low fat behaviours to medium or high fat behaviours, significant decreases were found with
reinforcement management, social support and counterconditioning and consciousness raising,
partially supporting the transtheoretical model. The first three are the behavioural processes
associated in the transtheoretical model with maintaining improved health behaviours. Therefore
interventions centered on them may help in preventing relapse. However, with consciousness
raising, a cognitive aspect, also showing a significant decrease a mix of behavioural and
cognitive interventions may be required to maintain improved low fat behaviours. The results
suggest that the same processes may not be involved in preventing relapse as promoting forward
movement, with cognitive processes being associated with forward movement and a combination
of behavioural and cognitive processes associated with preventing relapse. The finding of
significant differences between groups at follow up in three cognitive (dramatic relief, environmental reevaluation and self reevaluation) and one behavioural process (counterconditioning), demonstrates again that cognitive and behavioural strategies continue to play a crucial role.

One of the first questions that needs to be addressed, is why the stage matched intervention did not work? Weak support was found for the general concept of an intervention being more effective than no intervention, in that for both the general and stage matched groups low fat behaviour scores increased significantly between baseline and follow up while those in the no intervention group remained the same. The sole support for the matched intervention brochure was found with self liberation which showed a significant decrease in the no intervention group and a close to significant decrease in the general intervention group while showing a small but insignificant increase in the matched group. Overall however no strong endorsement of the use of stage matched interventions is found in this study though a case may be made for the introduction of self help pamphlets generally as the results show these may crucially promote low fat behaviours.

Possible reasons why the stage matched interventions were not effective are firstly that the interventions were too brief, consisting of only 5-6 pages and therefore not detailed enough to impact significantly on participants. Another factor may be that the majority of studies demonstrating the effectiveness of stage interventions have been conducted with smokers and substance addiction. However, Campbell et al (1994) with dietary behaviour found with tailored messages that while there was no increase in fruit and vegetable intake, there were reductions in fat intake. Another explanation may be that the sample, clients with type two diabetes having already received numerous interventions concerning dietary behaviours simply did not respond to another booklet. Also the interventions based on stage in the previous research showing improvement were computer tailored and therefore more highly personalised and more detailed. A central concept of the transtheoretical model is that interventions based on it will be more effective than general interventions but with this study this has not been the case. It is however, problematic to generalise from this study to interventions in general. However, if exceptional attempts are necessary to increase the effectiveness of stage based interventions for example by
making them highly personalised, this may become a significant drawback as the cost and expertise involved will invalidate the practical usefulness of the model. The interventions based on the transtheoretical model may simply prove too costly and time consuming to produce and be no more effective than simply dedicating more time and resources to individuals. The perceived riskistic forecast by Velicer and Prochaska (1999) that widespread distribution of simply produced stage matched manuals would greatly enhance participation and effectiveness of self-help manuals has not been supported in this study.

It is necessary to make a more detailed examination of the results as a whole. Firstly, process use across the group in total decreased with the decreases in social support, self liberation and counter conditioning being significant. This demonstrated that process use may vary significantly simply over the course of time. Analysis based on the stages of change however shows increases in process use at crucial points. For example, for a precontemplator to move forward to the post action stages increases in consciousness raising are a vital factor. Also an increase in the pros of decisional balance more than a decrease in the cons of decisional balance is required. Self reevaluation is also the most widely used process at this point. Also in cross group comparisons between stable and forward movement pre to post action the use of dramatic relief, self reevaluation, self liberation and counter conditioning differed significantly with forward movers showing greater use and at follow up significant differences existed in the use of all processes for forward movers with the exception of social support. However, the increase in consciousness raising and decisional balance pros appear to be the crucial factors.

Once in the action stage the highest scoring processes are consciousness raising, environmental reevaluation, self reevaluation and self liberation all of which are cognitive processes. However when the individual reaches maintenance in order to avoid relapse social support and counter conditioning need reinforcement. This outlook is supported in the results from the fat behavioural scores, in which those who moved backward from low fat intake to medium or high fat intake groups showed decreases in social support and counterconditioning. However in addition this group also showed a significant decrease in consciousness raising. Therefore interventions based on this may be more effective than interventions focusing solely on cognitive
processes in the pre action stages and solely on behavioural processes in the post action stages may be.

Overall the results suggest that a model based on the addictions may not be totally transferable to a dietary habit such as low fat behaviours. Even at the later points in dietary change it may not be possible to dismiss totally cognitive processes, rather it may be necessary to continually reinforce them along with behavioural processes to prevent relapse. The following diagram summarises the application of the model based on the data from the present study, using the stage and fat behaviours classifications. The diagram plots an ideal path starting at precontemplation and moving through the stages to maintenance.

**Diagram 5.1 Trantheoretical process and concept application to dietary change**

```
Precon —► Contem —► Prepare —► Action —► Maintenanc

C. R.  C. R.  C. R.  C. R.
Pros   Pros   S. S.   S. S.

Precon = Precontemplation, Contem = Contemplation, Prepare = Preparation, Action = Action, Maintenanc = Maintenance.
C.R. = Consciousness Raising, Pros = Decisional Balance Pros, S.S. = Social Support, C.C. = Counter Conditioning
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Overall a mix of cognitive and behavioural processes appears to be the most effective particularly in the post action stages rather than a reliance on solely cognitive or behavioural processes particularly in the post action stages, with cognitive processes being emphasised in the pre action stages. A model similar to this is supported to a degree in early research by Prochaska
and DiClemente (1985 p355) which found that people losing weight tend to read more and think about feedback more than those quitting addictive habits indicating the use of consciousness raising.

This may be best demonstrated further with the example of an imaginary person moving through the stages of dietary change. In the pre action stages cognitive processes in particular consciousness raising are emphasised that is increasing the persons’ awareness of the dangers of high fat foods. Simultaneously the individual could be made aware of the many benefits of maintaining low fat behaviours and the disadvantages of high fat behaviours. This is in contrast to the stages of change model, which emphasises separate interventions in the three pre action stages. Once in action the emphasis changes to preventing relapse, in line with the stages of change model behavioural processes are introduced. For example increasing social support may mean the joining of a self-help group. With counter conditioning, healthful thoughts and behaviours are introduced. However, in contrast to the transtheoretical model cognitive processes are not abandoned at this point. Crucially consciousness raising may still make a difference, the person may still need to seek out information and increase their knowledge of dietary fats. This is indicated by the fact that consciousness raising is the highest scoring process in the action to maintenance group at baseline and the second highest scoring process in the stable maintainers group. Consciousness raising also shows a significant increase in forward movers for fat behaviours and a significant decrease in backward movement for fat behaviours. The use of a cognitive component at all points with dietary behaviour may be because it is not a cut off behaviour with instant adverse effects with relapse as for example with the majority of addictive behaviours. These are the core concepts and processes emphasised on the basis of this research but additional behavioural and cognitive processes may also be helpful when used as support to the strategy outlined above.

A major methodological criticism of the present study must be the small numbers in the groups due to subject attrition, with 24 participants in the pre to post action groups, 35 in the stable pre action groups and 19 in the post to pre action groups. With low fat behaviours there were 43 forward movers and 26 backward movers. The question obviously arises as to how valid these
scores are in relation to the group in total as many participants simply did not reply to the second questionnaire.

The small number in some of the groups perhaps demonstrates how fixed certain categories of dietary behaviour may be. The results however do indicate a successful direction of process and concept use which participants have taken to initiate and maintain dietary change, or in the case of relapse the processes and concepts, which significantly decreased. The groups are also similar in size to initial studies by Prochaska and DiClemente (1985 p356) in which comparisons were made in process use between smokers and participants losing weight and with a group of smokers in the action stage compared with smokers and people coping with distress. Therefore the results and approach are likely to be of value to researchers wishing to conduct larger and lengthier longitudinal studies, perhaps building on the results of this study.

However a number of issues regarding the validity of this study and previous studies in this dissertation require examination. Therefore an in depth review of all the studies in this thesis and the insights and issues raised by them for future research with dietary behaviour and the transtheoretical model along with stage models in general will now be thoroughly discussed in the final chapter.
Chapter 6: Final Discussion

Overview

The first step in this final discussion is to give a brief overview of the results from all the studies in this thesis. To gain a broad insight into the transtheoretical model four studies were conducted, one a qualitative study consisting of interviews with 20 participants who had changed their dietary behaviour, two cross sectional studies focusing on the processes and concepts identified in the transtheoretical model and a longitudinal study following process use over time and comparing the effects of stage matched and general interventions. The conclusions gained from these studies will be briefly outlined before discussing their limitations and suggestions for improvement later in this chapter. The first study to be discussed is the qualitative study.

Qualitative study

This was conducted with 20 participants who had changed their dietary habits or were in the process of making dietary change. The catalyst that finally initiated dietary change with the majority of participants was a reaction to a specific event, though participants often had been aware of the need for improvement for sometime, this had not resulted in action. The exceptions to this were students of health psychology who were studying and receiving intensive health information on a weekly basis. Once dietary change was established the most successful strategy was social support, in situations where this was lacking relapse was more likely. With decisional balance more benefits were associated with dietary change than disadvantages. While the qualitative study yielded valuable insights into the process of dietary change an additional aim was to generate items for inclusion in later quantitative studies and several items were generated which were included in questionnaires for later studies.
Cross sectional studies

Two cross sectional studies were conducted, an exploratory study with a sample of 150 students and staff at the University of Surrey and the main study with a sample of 955 participants with type two diabetes at a London hospital. In the exploratory study there was a general effect across stages for greater use of processes and concepts but this was mainly between precontemplation and later stages, the exception to this was self efficacy which showed a significant decrease in preparation. Analysis based on low fat behavior groups showed significant increases with increased low fat behaviour again the exception being self efficacy where no differences were found.

In the main cross sectional study with 955 participants with type two diabetes, more detailed questionnaires were used and additional concepts of perceived risk and dietary knowledge were examined. There was a general effect across stages, but again this was mainly between the early pre action and post action. Decisional balance followed the pattern outlined in the transtheoretical model with the crossover between pros and cons taking place in preparation. Again use of processes increased linearly and did not follow the pattern expected of a stage model. Again when divided into low fat behaviour groups process use with one exception followed a linear pattern of increased use with increased low fat behaviours.

Longitudinal study

228 participants with type two diabetes took part in a six month follow up. In general those showing forward movement from pre to post action stages showed greater use of processes at baseline and follow up, with differences in consciousness raising and the pros of decisional balance being significant within the forward movement group. Participants who relapsed from post to pre action stages showed a decrease overall in process use with the decreases in social support and counterconditioning being significant. With the low fat behaviour groups forward movement was associated with an increase in consciousness raising and the pros of decisional balance while retrograde movement was associated with decreases in consciousness raising, social support, reinforcement management and counterconditioning.
Interventions

In general participants who received interventions were more likely to drop out of the study, the response rate of those receiving matched or general interventions was identical. There was also no effect for intervention type with processes or concepts. There was however weak evidence that those who received interventions staged matched or general increased their low fat behaviours whilst those who received no interventions did not.

Overall the studies gave an interesting insight into the strategies associated with dietary change. There were however limitations to the studies and these along with suggested improvements will now be discussed.

General limitations

A necessary step in assessing the validity of the results contained in this thesis is to look at the limitations of the present studies and from there to suggest improvements for future researchers. Perhaps firstly it is advisable to examine the degree to which these studies have attempted to answer the criticisms of previous researchers notably Sutton (1996, 2000 and 2001) in relation to the applicability of the transtheoretical model to health behaviours in general and Horwath (1999) in relation to dietary change in particular. Sutton in particular criticised previous research on the transtheoretical model as consisting almost entirely of cross sectional studies. The major exception to this being one study by Prochaska et al (1991) which looked at five snapshots of smokers over 2 years. While the exploratory study and baseline hospital study were both cross sectional and are both open to the criticisms of Sutton regarding this type of study, the follow up hospital study consisted of an intervention and six month follow up at least partially answering this criticism. However while this gives an interesting partial insight, two main problems arose, firstly there was large subject attrition of the initial 955 participants at baseline only 228 or 24% replied at follow up. This was in a relatively short time span and it can only be assumed that a longer time span would have resulted in greater participant attrition.
This raises two issues firstly is the sample in follow up a representative sample of those in the initial baseline and are the results a reflection of what is necessary for example for forward movement? With the sample that replied it was found that consciousness raising was a crucial factor in movement from pre to post action stages. However this obviously is based on the participants who replied and it is possible that many participants who dropped out also showed forward movement and could possibly have applied a different but equally effective strategy. Clearly this is a question that can only be fully answered with close to 100% follow up in the study which is unlikely to be achieved. However, in support of the conclusions found in the study it would be of considerable practical advantage to practitioners in the field to be aware that firstly brief interventions may lead to an increase in low fat behaviours with approximately 12% of their clients. Secondly an emphasis on consciousness raising has an increased chance of being effective with clients in the pre action stages of change attending their clinics, in that it may move them to either reduce their high fat behaviours or to maintain reductions in high fat behaviours initiated in the recent past.

A second major criticism may be the actual time elapsing in this study, that is 6 months. A central feature of the transtheoretial model is that particular time frames exist between stages. For instance with participants in contemplation, that is those vaguely considering change, a time frame of approximately 6 months is expected, for those in preparation one month may be required for the planning of changes, and once in action 6 months of the changed behaviour is necessary before maintenance. Therefore even excluding those in precontemplation who have no intention of changing a time scale of just over one year may be necessary in any longitudinal study to assess fully the differences in process use, transtheoretical concepts and stage movement. This is supported in previous research, with Prochaska et al (1991) for example using a two year time frame. Studies related to dietary behaviour have used varying time scales Beresford et al (1997) collected responses at 3 month intervals over 12 months. Greene and Rossi (1998) also conducted a 12 month follow up and Glanz et al (1998) reported on a three year follow up. Therefore while this study provided an interesting snapshot which undeniably gives an insight into longitudinal changes, ideally this needs to be extended beyond six months. However in defence of the present study any information which may establish even a short term
change in dietary behaviour will be of benefit in at least initiating dietary change which in turn may be built upon further with improved interventions.

Another major criticism of the research to date regarding the transtheoretical model is the lack of studies comparing stage and general interventions. Horwath (1999) in particular commented on the lack of proper stage matched interventions being tested longitudionally. To date only one study Campbell et al (1994) has specifically used stage matched interventions to encourage dietary change, specifically low fat intake and higher fruit and vegetable intake. The information provided was brief and the results found stage matched interventions to be more effective than standard messages or no messages in reducing fat intake. However the remaining concepts central to the transtheoretical model, that is stages processes and concepts were not measured. The present study attempted to address the issue raised by Horwath by introducing stage matched and general interventions and measuring all the concepts relevant to the transtheoretical model. Results showed increases in low fat behaviours were significantly higher in both intervention groups, suggesting that the stage matched interventions were no more effective than standard which does not support the findings of Campbell et al (1994).

Two possible conclusions can be made from this, that there are no advantages to stage matched interventions or that the interventions in this study were not sufficiently detailed or intensive to fully test the effectiveness of staged interventions. If the first conclusion is accepted that the stage matched interventions are indeed no more effective than general interventions, this questions fundamentally the validity or at least the practical usefulness of the transtheoretical model. However before accepting this very strong conclusion the limitations of the interventions in this study need to be pointed out. Firstly while the pamphlets in this study fulfilled several of the criteria in matching of interventions to stage with regard to processes and concepts, the design of the pamphlet was basic with only one page devoted to each process or concept. This may not have been sufficient to develop the full use of a process or concept. The non-tailored pamphlets were of similar length and also focused on the processes and concepts central to many of the stages of change. The Campbell et al (1994) study used computer tailored information, which may have contained more personally relevant information, which in turn may have motivated participants further. Also in this thesis the same intervention was distributed at both
points, participants may have simply responded to the pamphlet in the first instance and found a second copy of the same pamphlet uninteresting. A second pamphlet still based on stage or a general intervention but building on the feedback contained in the questionnaires may have produced a more productive result. Brug et al (1998) used this approach and found with 800 Dutch participants that iterative feedback (based on responses to questionnaires) was more effective than standard feedback with dietary behaviour when both were distributed twice over 3 months. While the interventions distributed by Brug et al were not tailored to stage of change, it still demonstrates the effectiveness of detailed personalised relevant information. Therefore before accepting that stage matched interventions are no more effective than general further investigation with more detailed interventions is necessary.

These issues of time scale, the sample of participants, the computer tailoring of information based on responses at different time points may all need to be considered in future studies wishing to provide a more robust test of interventions based on the transtheoretical model or indeed dietary interventions in general. The preceding paragraphs have addressed the general criticisms and suggested improvements for the methodology used the following section will focus on the structure and design of the questionnaires used.

**Questionnaire design**

A critical issue to be addressed is the validity of the questionnaires used throughout this thesis and in particular the questionnaires used in the Hammersmith baseline and follow up studies. Also of importance are any suggested improvements for future studies. Firstly two concepts perceived risk and dietary knowledge were measured briefly in this thesis, with one item being used for each concept. In future studies most certainly more detailed assessment will be required in particular with dietary knowledge. McDonell, Roberts and Lee (1998) measured dietary knowledge with 11 items and even then failed to find any significant differences across stages. Future questionnaires examining this concept will need to be revised and made more relevant to the information used by the average person. With perceived risk also while significant differences were found between precontemplation and all other groups at baseline it is advised
that the concept be explored in more detail, perhaps in a manner similar to self efficacy with perceived risk being assessed for different health aspects and situations.

A critical aspect in any study related to the transtheoretical model is the staging algorithm used. Two algorithms were used in this thesis. The initial one used in the exploratory study used 5 stages matching the five stages of change. The second in both the Hammersmith hospital studies contained 7 items with participants in action and maintenance being given an additional option to state if they intended to reduce their fat intake further. Overall the results showed that this may be a worthwhile option as a substantial percentage in both post action stages (71% in action and 44.5% in maintenance) indicated they wished to make further dietary changes. This indicates that many participants who have made dietary changes may wish to make further change in the future. Another option with low fat behaviour is to give a precise measure of the required level of low fat adherence. For example Reed, Velicer, Prochaska, Rossi and Marcus (1997) in looking at exercise behaviour included one option which defined exercise as brisk behaviour such as jogging or aerobic dancing at least 3 times a week. Participants were then given the option to respond to 5 items matched to the 5 stages of change. However defining low fat dietary behaviour is more difficult as it consists of a wide range of behaviours much more complex and varied than exercise behaviour. Therefore the option used in this study of giving an informed group, in this instance type two diabetics, the option to state their intentions and behaviour regarding low fat dieting and to then measure their behaviour on a dietary behaviour scale may be the most efficient and practical option. This is supported by the data in relation to the staging algorithm, which showed significant differences between stages at the level of low fat behaviour.

The next step is to examine the low fat behaviour questionnaires used. The initial scale in the exploratory study used 7 items, but this is obviously too few items to measure a behaviour as diverse as low fat dieting. This is possibly why the scale failed to differentiate between stages after precontemplation. However the scale used in the baseline and follow up studies contained 14 items and appears to have achieved the necessary sensitivity discriminating between pre and post action stages in the baseline study and between the early pre and post action stages in the follow up study. Previous researchers such as Kristal and Shattuck (1990) used 18 items and Hargreaves, Schlundt, Buchowski and Hardy (1999) used 16 items. Overall it appears a
minimum of 14 items are required and future researchers may wish to add to this number. Also in situations where dietary habits require investigation for example with cultural differences, a requirement may be the conducting of interviews or focus groups to gain detailed insights into the dietary changes necessary and incorporate these issues into questionnaires. In summary a short scale consisting of 14-20 well chosen items is the best option to answer the questions of accuracy and practicality.

Processes of change are a crucial component of the transtheoretical model and must be measured accurately. Bowen, Meischke and Tomoyasu (1994) concluded that 60 items from a total of 121 pilot study items measured the processes associated with dietary change. The current processes of change scale for weight loss of the Cancer Research Center (University of Rhode Island http://www.uri.edu/research/cprc/) consists of 48 items. Based on the results of this thesis the 42 item scale in the exploratory study did not appear to adequately measure processes of change as significant differences were not found with several processes and differences when found were mainly between precontemplation and post action stages. However a clearer picture emerged with the inclusion of additional items in the Hammersmith hospital studies, in that significant differences were found with all processes and across additional stages. Therefore approximately 60 items may be necessary to measure accurately detailed process use. Future researchers may wish to include additional items and it is plausible that 10 – 20 items could be used for exceptionally detailed measurement of each individual process. However this may restrict the number of processes measured at any one time. Certainly a questionnaire of over 100 items may be too cumbersome to be practically useful.

Of the remaining concepts decisional balance and self efficacy, certainly it appeared feasible to measure decisional balance with 10 items, 5 for pros and 5 for cons. Previous researchers Steptoe and Ounpouu (1996), Ling and Horwath (1999) and O’Connell and Velicer (1988) used measures containing 10 – 12 items. Indeed the evidence in these studies and this present thesis demonstrates that as expected decisional balance pros increase and decisional balance cons decrease with stage progression with crossover taking place at approximately preparation. This hypothesis concerning the increase in pros may now be accepted readily and it may be possible to measure these concepts with perhaps less items. With self efficacy the initial Clark and
Abrams (1991) scale contained 20 items looking at various situations where self efficacy may be critical. Previous researchers Ounpuu, Woolcott and Rossi (1999) looking at dietary fat reduction and Ling and Horwath (1999) used 12 – 20 item scales. The scale used in the exploratory study in this thesis also consisted of 20 items and this showed significant differences between preparation and other stages. Due to practical constraints this was reduced to 10 items in the Hammersmith studies, and the results were not as clear-cut particularly in the follow up study. It is possible that the concept of self efficacy is difficult to measure with perhaps individual’s levels varying significantly with circumstances. Future researchers may wish to research this concept in more detail perhaps using the original Clark and Abrams (1991) scale consisting of 20 items.

Overall if the present study were to be conducted again, the concepts of dietary knowledge and perceived risk would not be investigated, the dietary behaviour scale would contain 14-20 items, processes could still be measured with approximately 60-65 items, the scale measuring decisional balance decreased to 2- 4 items and the scale measuring self efficacy increased to 15 to 20 items. Future researchers may wish also to investigate the processes of change in more detail, but this may mean less than 9 processes of change being investigated in any one particular time frame. Having examined issues such as methodology and item inclusion the final question which needs to be addressed is how valid overall is the transtheoretical model in relation to dietary behaviour and in particular in this instance to low fat behaviours.

The validity of the transtheoretical model in relation to low fat behaviour

The final question to be addressed is the one asked initially in this thesis, the issue of the validity of the transtheoretical model in relation to dietary change, in this instance low fat behaviour. Certainly the results found in the present studies do not support the application of the established model to dietary change. Reference has previously been made to the initial criticisms by Sutton (1996) of the model and at this point the issue may be clarified further by referring to more recent criticisms by Sutton (2000) and comparing them to the results in the present studies. Sutton (2000) commented on the expected pattern of results for true stage and pseudo stage models to be expected in cross sectional studies. Sutton detailed five possible patterns, but only
two most suited to the present studies are summarised below in figure 6.1. Pattern A is that expected of a pseudo stage model and pattern B is a true stage model.

Figure 6.1. Pattern of results expected in pseudo stage and true stage models

Pattern A: Pseudo stage model

Pattern B: True stage model

Sutton commented that the pattern outlined in figure A is typical of pseudo stage models, with this there is simply a linear increase or perhaps a linear decrease across stages. Any division at any point along this line is simply a false one, which may be possibly be useful as a categorisation tool for practitioners but does not have any sound theoretical basis. Pattern B represents one option that might be expected with a true stage theory, in that there is no difference in the scores between the first two points in which a concept is not relevant. This is followed by a significant increase at point 3 where the concept is crucial to forward movement for the participant. This might in turn be followed by a decrease in the process as it was no longer of value in movement to later points. It is of interest to compare these expected outlines with the results obtained in the present studies. Virtually none match the pattern expected of a true stage model. The closest to the ideal model is stimulus control, which showed no change pre action stages followed by a significant increase in action and maintenance. With the concepts of change self efficacy showed a significant increase from action to maintenance suggesting that it may be a crucial factor in establishing long term adherence. Certainly the results on the basis of the low fat behaviour grouping match identically that outlined in pattern A with all of the processes with the exception of reinforcement management showing a linear increase. The increases in concepts also followed a linear pattern with the exception of the decisional balance
cons. Therefore overall there appears to be little evidence to support the conclusion that low fat behaviours with this sample follows the stage pattern outlined in the transtheoretical model.

There is however evidence as reported earlier in this thesis that processes such as consciousness raising may play a strong role in forward movement pre to post action. There is also evidence that behavioural processes are supportive in the post action stages and there is support for an increase in the pros of decisional balance also playing a role in movement from pre to post action. On that basis practitioners may find stage categorisation of value, but it is unlikely that any process or concept can be totally disregarded at any point in dietary behaviour change. However the transtheoretical model and strategies involved with dietary behaviour change are certainly worthy of further investigation and the final contribution in this thesis is an outline of the pattern an ideal study for investigating these concepts should follow.

**Future studies**

The pattern outlined is the model for an ideal study based on the experience gained in this thesis and on the work of previous researchers. As previously covered the time scale necessary for a thorough longitudinal study of the transtheoretical model is one year, with perhaps an ideal time frame being 2 years provided subject attrition was not extreme. This is the time frame used by Prochaska et al (1991) in a study with self changing smokers. Of the longitudinal studies with diet Campbell et al (1994) used a 4 month timescale but Glanz and Patterson (1998) surpassed both of these with a three year longitudinal study. Overall however a two year study would certainly give an adequate time frame to study thoroughly the validity of the transtheoretical model.

The next issue to be addressed is the quality and quantity of interventions to be used. Peyrot (1999) commented that an ideal test of a stage model is the inclusion of four groups, one a control receiving no intervention, the second a matched group receiving matched interventions, the third receiving mismatched stage interventions and the fourth receiving comprehensive interventions. This approach was covered to a degree in the present thesis where the general
intervention covered information relevant to all stages. However ideally an additional group would be included receiving mismatched staged interventions.

In addition the quality and quantity of interventions needs to be addressed. The model to be used in this instance is that outlined by Brug and Glanz (1998) with computer tailored interventions and iterative feedback. In this instance interventions were based not only on participants initial responses but also on responses throughout the study. Ideally therefore participant’s responses in each group could be monitored for example by the regular completion of questionnaires every 3-6 months and interventions tailored to those responses. This detailed diversity of responses, groups and interventions will give a full test to the validity of the transtheoretical model and to dietary intervention in general. Lastly also the sample used needs to be as diverse as possible, the main studies in this thesis focused on the responses of type two diabetics, whereas ideally several studies could be conducted including participants with a range of health problems and individuals merely wishing to improve their general health. Comprehensive studies such as these even if they did not support the transtheoretical model would provide invaluable insights into the processes involved with dietary change.

While studies such as these were beyond the scope and resources available to the present investigators, it is hoped the information and results in this thesis will provide a direction for future researchers to take which will lead to improved dietary interventions.

Concluding remarks

The transtheoretical model developed initially with the addictions has since been applied to a wide range of non addictive behaviours including dietary change. The main aims of this thesis were to examine firstly the validity of the transtheoretical model to dietary change in this instance low fat behaviour and secondly to gain an insight into the strategies used by successful changers. The studies conducted have addressed these issues in part. The studies have confirmed that the processes and constructs outlined in the model are applicable to increasing low fat behaviours however the pattern of use does not mirror that outlined in the original model. While there is weak support for a stage model with for example consciousness raising and decisional
balance pros being associated with forward movement from pre to post actions stages, overall the
evidence regarding the pattern of processes and constructs demonstrates with few exceptions that
these follow a linear rather than stage pattern.

This implies that with regard to low fat behaviour the model developed initially with addictions
requires alteration if it is to be applied effectively. Future studies conducted over a longer time
scale and with more diverse groups using a variety of qualitative and quantitative methods and to
other areas of dietary change for example fruit and vegetable intake are necessary to fully
evaluate the effectiveness of the model to dietary change. It is hoped that the methods used in
this thesis will be of value to researchers wishing to explore this model and the entire area of
improved dietary behaviour change in more detail. Certainly given the high cost in personal and
economic terms of poor dietary habits further investigation is desirable if not essential.
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Appendix One

Exploratory questionnaire and volunteer poster
The following questionnaire is part of a research student’s programme at the University of Surrey. The purpose of the questionnaires is to investigate people’s eating habits. All information is confidential and will not be used for any other purpose.

The researcher thanks you in advance for taking the time to fill out this questionnaire.
Firstly a few details about yourself.

Age

Sex

Occupation (*please state your previous occupation if you are a student over 24 years of age, or the occupation of your parents if you a student under 24)*

Level of Education
Which of the following qualifications do you have (*tick as many boxes as applicable*)

- level or GCSE
- A level or Scottish highers
- HNC or HND
- BSc/BA/BEd
- Higher Degree (eg Masters or PhD)
- None of the above

Please read the following question and all the possible answers carefully. Indicate which answer best describes you by placing a tick on the line beside it. *Do not tick more than one answer.*

**Do you consistently avoid eating high fat foods?**

Yes I have been for more than 6 months

Yes I have been but for less than 6 months

No but I intend to in the next 30 days

No but I intend to in the next 6 months

No and I do not intend to in the next 6 months
Please indicate on a scale of 1-5 how often you do the following things.

1 = Not at all
2 = Rarely
3 = 50% of the time
4 = Most of the time
5 = Always

I buy low fat foods to help me follow a low fat eating plan.
1..........2........3........4...........5

I limit the amount of salad dressings I use or if I do use them I use low fat ones.
1........2........3........4...........5

I substitute low fat dairy foods for high fat dairy foods
1........2........3........4...........5

I substitute low fat foods for high fat foods
1........2........3........4...........5

I grill or bake instead of frying foods
1........2........3........4...........5

I eat fruit or low calorie desserts instead of high fat desserts
1........2........3........4...........5

I count the grams of fat I eat
1........2........3........4...........5
Each statement in this questionnaire represents a thought that might occur to a person who is deciding whether or not to go on a low fat diet. Please indicate how important each of these statements might be to you if you were considering a decision to go on a low fat diet. There are five possible responses to each of the items, that reflect the answer to the question “How important would this be to you?” Please circle the number that best describes how important each statement would be to you if you were deciding whether or not to go on a low fat diet.

1 = Not important at all
2 = Slightly important
3 = Moderately important
4 = Very important
5 = Extremely important

1 Going on a low fat diet would be hard work
   1........2........3........4........5

2 I would feel more optimistic if I was on a low fat diet
   1........2........3........4........5

3 I would be less productive on a low fat diet
   1........2........3........4........5

4 I would feel sexier and more attractive on a low fat diet
   1........2........3........4........5

5 In order to stay on a low fat diet I would have to eat less appetizing foods
   1........2........3........4........5

6 My self respect would be higher on a low fat diet
   1........2........3........4........5

7 A low fat diet would make meal planning more difficult for my family or housemates
   1........2........3........4........5

8 My family and friends would be proud of me if I maintained a low fat diet
   1........2........3........4........5

9 I would not be able to eat my favourite foods on a low fat diet
   1........2........3........4........5

10 I would be less self conscious on a low fat diet
   1........2........3........4........5

11 A low fat diet takes the pleasure out of meals
   1........2........3........4........5
12 Others would have more respect for me if I maintained a low fat diet
1........2........3........4..........5
13 I would have to cut out some of my favourite foods if I was on a low fat diet
1........2........3........4..........5
14 If I was on a low fat diet I could wear more attractive clothing
1........2........3........4..........5
15 Going on a low fat diet would mean avoiding some of my favourite places or activities
1........2........3........4..........5
16 My health would improve on a low fat diet
1........2........3........4..........5
17 A low fat diet is expensive when everything is taken into account
1........2........3........4..........5
18 I would feel more energetic on a low fat diet
1........2........3........4..........5
19 I would have to cut down on my favourite snacks on a low fat diet
1........2........3........4..........5
20 I would be able to accomplish more on a low fat diet
1........2........3........4..........5
The following experiences affect the fat intake of some people. Think of similar experiences you may have had in trying to restrict fat intake. Please rate how FREQUENTLY you use or have used each of these over the past 3 months. There are FIVE possible responses to each item. Please circle the number that best describes your experience.

1 = Never  
2 = Seldom  
3 = Occasionally  
4 = Often  
5 = Always

1 I recall information from articles and advertisements about the benefits of a low fat diet.  
1...........2............3..........4............5

2 Society would be better if more people ate low fat diets  
1...........2............3..........4............5

3 I recall information people have given me about the health problems from eating a high fat diet.  
1...........2............3..........4............5

4 I think about information from articles and advertisements on how to change to a low fat eating plan.  
1...........2............3..........4............5

5 I pay close attention to television programmes about low fat diets  
1...........2............3..........4............5

6 I associate with people who are on low fat diets  
1...........2............3..........4............5

7 I have someone in my life who cares about my diet  
1...........2............3..........4............5

8 I have someone who listens when I need to talk about eating low fat foods  
1...........2............3..........4............5

9 I can be open with at least one special person about my experience with low fat dieting  
1...........2............3..........4............5

10 I can expect to be rewarded by others if I eat low fat foods  
1...........2............3..........4............5

11 Warnings about the health hazards of eating high-fat foods move me emotionally  
1...........2............3..........4............5
12 I have fearful feelings about developing heart trouble from eating too much high fat food.

13 Remembering studies about illnesses caused by high fat foods upsets me.

14 I react emotionally to health warnings about high fat foods.

15 Dramatic portrayals of the problems of people eating high fat foods affect me emotionally.

16 I notice the difficulty in society because of the high fat foods people eat.

17 I consider the belief that people consuming low fat diets will improve the world.

18 I think about the need for more people to understand the importance of a low fat diet.

19 Overconsumption of high fat foods is responsible for the high death rate from heart disease and cancer.

20 Eating low-fat food gives me a feeling of freedom.

21 My consumption of high fat foods makes me feel disappointed in myself.

22 I feel that improving my diet by eating low fat foods is one way to improve myself.

23 Choosing low-fat foods gives me a feeling of control.

24 I get upset when I think about my eating too much high fat food.

25 Eating low fat foods is one way to demonstrate my willpower.

26 I am rewarded by others when I keep to low fat foods.

27 Instead of eating high fat foods I do something else.
28 Other people in my daily life make me feel good when I eat low fat foods
1........2........3.......4........5
29 When I am tempted to eat high fat foods I think about something else
1........2........3.......4........5
30 I reward myself when I eat low fat foods
1........2........3.......4........5
31 I tell myself I can choose to maintain a low fat diet or not
1........2........3.......4........5
32 I tell myself that I am able to lose weight when I want to by maintaining a low fat diet
1........2........3.......4........5
33 I tell myself that if I try hard enough I can keep from eating high fat foods
1........2........3.......4........5
34 I make commitments to eat low fat foods
1........2........3.......4........5
35 When I am tempted to eat a high fat food I try to relax
1........2........3.......4........5
36 Instead of eating high fat foods I engage in physical activity
1........2........3.......4........5
37 I do something else instead of eating high fat foods when I need to relax or deal with tension.
1........2........3.......4........5
38 I think about something else when I am tempted to eat high fat foods
1........2........3.......4........5
39 I remove things from my place of work that remind me of eating high fat foods
1........2........3.......4........5
40 I keep things around my place of work that remind me not to eat high fat foods
1........2........3.......4........5
41 I put things around the home that remind me not to eat high fat foods
1........2........3.......4........5
42 I remove things from my home that remind me of eating high fat foods
1........2........3.......4........5
This form looks at typical eating situations. Everyone has situations which make it difficult for them not to eat fatty foods. The following are a number of situations relating to eating patterns and attitudes. Read each situation carefully and decide how confident you are that you will be able to resist eating fatty foods in each situation. In other words pretend you are in the situation now. On a scale from 0 = not confident to 9 = very confident choose one number which reflects how confident you feel now about being able to successfully resist the desire to eat high fat foods. Write this number down next to each item.

For Example

<table>
<thead>
<tr>
<th>Confidence Number</th>
<th>I am confident I can resist eating at weekends</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>7</td>
</tr>
</tbody>
</table>

I am confident that

1. I can resist eating high fat foods when I am anxious
   
2. I can control my eating of high fat foods at the weekend
   
3. I can resist eating high fat foods even when I have to say “no” to others
   
4. I can resist eating high fat foods when I am feeling physically run down
   
5. I can resist eating high fat foods when I am watching t.v.
   
6. I can resist eating high fat foods when I am depressed
   
7. I can resist eating high fat foods when there are many different kinds of food available
   
8. I can resist eating high fat foods when I feel it is impolite to refuse a second helping
   
9. I can resist eating high fat foods when I have a headache
   
10. I can resist eating high fat foods when I am reading
    
11. I can resist eating high fat foods when I am angry or irritable
    
12. I can resist eating high fat foods when I am at a party
    
13. I can resist eating high fat foods when others are
pressuring me to eat them
14 I can resist eating high fat foods when I am in pain

15 I can resist eating high fat foods just before I go to bed

16 I can resist eating high fat foods when I have experienced failure

17 I can resist eating high fat foods even when high calorie foods are available

18 I can resist eating high fat foods even when I think others will be upset if I don’t eat them

19 I can resist eating high fat foods when I feel uncomfortable

20 I can resist eating high fat foods when I am happy
Volunteers Needed for Dietary Study

I am a Phd student at the University, and I need volunteers to take part in a short interview, lasting 30 - 40 minutes researching the issues around dietary change. If you have switched to a healthier diet at any stage in the past six months or are thinking of doing so within the next six months, please contact Andrew on

01483 - 876939
OR
E-Mail PSP1AM@Surrey.ac.uk
Appendix Two

Ethics and consent forms
CONFIDENTIAL

HAMMERSMITH, QUEEN CHARLOTTE'S & CHELSEA AND ACTON HOSPITALS

RESEARCH ETHICS COMMITTEE

APPLICATION FOR ETHICAL APPROVAL OF PROPOSED CLINICAL RESEARCH

Please note:
- You should read this form and accompanying Guidance Notes carefully before attempting to complete it.
- You should complete all sections of the form. Where a section is not relevant to your proposed research project, you should write "N/A" in the space provided. Incomplete applications will not be accepted.
- Cross-referencing of answers is not acceptable, e.g. responses such as "refer to protocol" or "see above" must be avoided.
- Avoid the use of jargon wherever possible. If technical terms are to be used, explain them.
- Forms that have not been completed fully will not be passed to the Committee for appraisal.
- Upon completion this form, plus an electronic copy on disk / e-mail attachment (or an electronic copy alone accompanied or followed by the declaration and signature pages completed by hand), should be submitted to the Secretary's office at least 11 working days before each Committee meeting. (e-mail applications should be sent to: c.collett@ic.ac.uk)

Formal closing dates are available from the Secretary's office/REC website: http://www.med.ic.ac.uk/rescon/REC/index.html
(N.B. The web-site also contains information regarding meeting dates, guidance notes for completion of the application form, REC membership and constitution, ICH/GCP and links to useful resources.)

(N.B. applications will not be accepted after the closing date under any circumstances).

(Revised September 1998)
1. TITLE OF PROPOSED RESEARCH

An investigation of the psychological processes associated with dietary change in type 1 diabetes

2. INVESTIGATORS

(1) Principal investigator (NB. All correspondence will be addressed to the P.I.)

<table>
<thead>
<tr>
<th>Name and Title:</th>
<th>Mr Andrew Moore</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post and Employer:</td>
<td>PhD Student University of Surrey</td>
</tr>
<tr>
<td>Division and institution:</td>
<td>Psychology Department</td>
</tr>
<tr>
<td>Address:</td>
<td>University of Surrey, Guildford, Gu25XH</td>
</tr>
<tr>
<td>Telephone number:</td>
<td>01483-876939</td>
</tr>
<tr>
<td>E-Mail:</td>
<td><a href="mailto:a.moore@surrey.ac.uk">a.moore@surrey.ac.uk</a></td>
</tr>
</tbody>
</table>

(2) Other investigators (up to four)

<table>
<thead>
<tr>
<th>Name and Title:</th>
<th>Doctor Richard Shepherd</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post and Employer:</td>
<td>Reader: University of Surrey</td>
</tr>
<tr>
<td>Division and institution:</td>
<td>Psychology Department</td>
</tr>
<tr>
<td>City and postcode:</td>
<td>Guildford: GU25XH</td>
</tr>
<tr>
<td>Telephone number:</td>
<td></td>
</tr>
<tr>
<td>E-Mail:</td>
<td><a href="mailto:R.Shepherd@surrey.ac.uk">R.Shepherd@surrey.ac.uk</a></td>
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(3) Head of Section:   
(4) Head of Division:

3. COMPENSATION FOR DEATH OR PERSONAL INJURY
(1) Is the research being commercially sponsored? | No

(2) If so, give name of company and a contact name and address (please note that the company will be charged £750 for the administration of this application):

| N/A |

(3) Has the sponsoring company agreed to abide by:

| • the ABPI Clinical Trials Compensation Guidelines 1991 (patient studies)? If so, append a signed copy of the letter of indemnity (see Appendix III). | N/A |
| • the ABPI Guidelines for Medical Experiments in non-patient human volunteers 1988 (healthy volunteer studies)? If so, append a signed copy of the letter of indemnity (see Appendix III). | N/A |

(4) If the protocol is not commercially sponsored, give the name and address of the charity/research council or other sponsoring organization:

| N/A |

(5) If the research is not sponsored by a pharmaceutical company, state what arrangements or insurance are/is in place (if any) to compensate a subject in the event of personal injury or death arising out of participation in the research. If none, indicate that this is so.

| None |

4. THE RESEARCH

3
### (1) Background

#### (i) Purpose & Objectives (including statement of hypothesis):

The study will examine the psychological processes associated with dietary change and in particular if these match the processes outlined in the stages of change model. The transtheoretical stages of change model proposes that change is not an all or nothing phenomenon but a process consisting of 5 distinct stages. These are precontemplation, contemplation, preparation, action and maintenance. In addition the model proposes that that cognitive processes such as consciousness raising are emphasised at the earlier stages and behavioural processes for example social support are emphasised at the later stages. The theory also proposes that messages based on the stages of change will be more effective than standardised messages or no interventions. It is hypothesised firstly that stages of change will be a predictor of dietary improvement and that interventions based on the stages of change will be more effective than standardised interventions or mismatched interventions.

#### (ii) Scientific background (specifically the results of previous studies upon which your study is based):

Prochaska, DiClemente and Norcross (1982) following 12 years of research concluded that intentional change involved an individual going through 5 distinct stages. Much of the initial research however was conducted with addictive behaviours. For example Prochaska and Diclemente (1983) found support for the model in research with 872 smokers. Individuals at the earlier stages were found to use cognitive processes and those in the later stages were found to use behavioural processes. Prochaska Velicer and Rossi (1992) found evidence to support the model across 12 health behaviours including fat reduction, sunscreen use and addictive behaviours. However some researchers have criticised the model, Sutton (1996) doubted if the model truly described the processes or time scale individuals go through when adapting health behaviours. Povey, Sparks, Connor and Shepherd (1998) also criticised the research in support of the model for lacking longitudinal studies, particularly in relation to dietary behaviour.

#### (iii) Value of and need for the research:

The potential benefit of improved health behaviours is self evident. Yet participation in health improvement programmes is often disappointing. Recruitment and completion rates often reaching only 10% of those eligible (Prochaska and DiClemente 1992). Brug Campbell and VanAssema (1999) found 3 criteria to be effective in increasing adherence to dietary behaviour. These were (1) Attention to the relevant motivators and reinforcers (2) Personalised self evaluation (3) The active participation of participants. Face to face counselling provides all of these yet is unlikely to become widely available to large populations. However messages tailored to groups with the opportunity to provide feedback have the potential to become widely available. It is hoped in this way to enhance the results of dietary interventions.

#### (iv) Has the drug/device/method been used in previous studies? If so, justify any repetition of previous work;
Kramish, Campbell and De Villis (1994) found tailored messages to be more effective in helping participants to reduce fat intake and increase fruit and vegetable intake in comparison to a control group who received non tailored health messages. The messages however were not based on the stages of change model, also to my knowledge no research has been conducted examining the relationship between stages of change, and the dietary behaviour of patients with type 2 diabetes.
Design and methodology (i.e. randomized; explain method of randomization, placebo-controlled, double-blind etc): 
The study focuses on stages of change, in line with the model the following outcomes will be examined,
1 Movement through stages, that is will the person move for example from precontemplation to contemplation or action
2 Changes in decisional balance, that is will the participants perceptions of the pros and cons of a different diet change.
3 Change in self efficacy, will the participant believe they can maintain their dietary change
4 Changes in the processes used, that is will their be changes in for example the amount of social support a person needs, will they continue to read about dietary change, will their self evaluation increase as a consequence of dietary change.
5 On a practical level will levels of blood serum cholesterol show significant differences across stages and after interventions.

The study intends to focus on 2 areas, which are of interest to diabetes research, and these are fat intake and fruit and vegetable intake.

Sample
The study will consist of an opportunity sample of clients with type 2 diabetes at Hammersmith Hospital. The estimated sample size at baseline is 2000. These will be divided into 2 groups of 1000 (groups A and B). Group A will complete questionnaires on their attitude to fat intake, and group B on their attitude to fruit and vegetable intake. The questionnaires will assess their stage of change, level of fat or fruit and vegetable intake, processes of change, their assessment of the pros and cons of change, their belief in their ability to maintain change and demographic data. On completion of the questionnaires each group will be subdivided in 3 subgroups, A1, A2, A3, (fat intake) and B1, B2, B3 (Fruit and vegetable intake) each group will consist of 333 participants. Interventions tailored to stage of change (Appendix A) will then be given to groups A1and B1, Groups A2 and B2 will receive a general intervention(Appendix B) and groups A3 and B3 will act as a control group receiving no intervention other than standard hospital treatment (1-1 counselling and a diet sheet). A flow diagram below indicates the overall plan of the study. This procedure will be identical for both fat intake and fruit and vegetable intake.

Timescale
Stage One: Initial questionnaire and intervention
Stage Two: 3 months participants will receive a brief questionnaire assessing their reaction to the original study and stage of change.
Stage Three: 6 months after the start date participants will repeat the original questionnaire.

Results
Differences in the processes used, self efficacy, decisional balance and dietary behaviour will be examined.

Response Rate
A response rate of 60%-70% is anticipated, therefore from an initial group of 333 it is expected to have a final group of approximately 234. Sufficient participants will be recruited at baseline to allow for a 30% dropout. Also at the 3 months point some participants will be given the option of providing minimal feedback, if the drop out rate at this point is seen to be significantly higher than anticipated it will be possible to recruit more participants. Participants who drop out at this point (3 months) will not be contacted further. If however at the end of 6 months participants do not complete the final questionnaire they will be sent one reminder letter (copy in appendix).
The questionnaires consist of items from 2 sources. The primary source is the University of Rhode Island website. Their research centre has conducted considerable research regarding the relationship between stages of change and various health behaviours. Questionnaires have been reviewed in numerous peer reviewed journals. For example Prochaska, DiClemente and Norcross, J.C (1992), O'Connel and Velicer (1988), Hargreaves et al (1999) and Kristal, Shattuck and Henry (1990). Many of the items were developed in relation to weight control. The second source is a paper by Bowen and Meischke (1994) which examined the processes associated with dietary change. The questionnaires focus on areas associated with health behaviours that is processes of change, self-efficacy and decisional balance. The questionnaires broke down into the predicted factors when tested in a pilot study at the University of Surrey.

The standard hospital intervention referred to in the study, is 1-1 counselling with a dietician and standard hospital advice sheets.

References


(vi) The site(s) where the research will take place (e.g. which hospital(s), medical school(s), GP clinic(s) etc. - include all UK multi-centre sites):

| Hammersmith and Charing Cross Hospitals |

<table>
<thead>
<tr>
<th>(2) Is the research multi-centre? (NB. Clinical research studies involving five or more LREC's must seek approval from a MREC)</th>
<th>Yes/No</th>
</tr>
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</table>

<table>
<thead>
<tr>
<th>(3) Duration of study (approval is normally given for four years)</th>
<th>2 years</th>
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<table>
<thead>
<tr>
<th>(4) How will the data be analysed? Data analysed using S.P.S.S</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Is this a pilot study?</td>
</tr>
<tr>
<td>• What is the justification for the number of subjects to be studied?</td>
</tr>
<tr>
<td>2,000 participants need to be included to give a wide range of participants, to allow for enough participants to be included in subgroups to statistically detect any differences which occur.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>• What is the smallest clinically relevant difference that the study has been designed to detect, with the corresponding significance level and power?</th>
</tr>
</thead>
<tbody>
<tr>
<td>The smallest anticipated group of 234 will have a detection rate of 0.3 s.d this will give it a significance level of .05 and a power of .9.</td>
</tr>
</tbody>
</table>

| • Outline the statistical methods that will be used to analyse the data. |
Data will be analysed using analysis of variance tests, correlation coefficients and if necessary multivariate analysis.

- Who has provided the statistical advice?

University of Surrey, Research Methods Psychology Department

(5) Procedures: Administration of questionnaires

(i) Drugs: N/A

(a) Indicate the dosage and route of administration of the drug(s) used in the research (indicate which are being researched and which are in standard practice):

<table>
<thead>
<tr>
<th>Dosage and Route of Administration</th>
<th>N/A</th>
</tr>
</thead>
</table>

(b) Indicate the regulatory status of the study drug(s) by ticking the relevant box (append copy of relevant certificate or exemption):

<table>
<thead>
<tr>
<th>Regulatory Status</th>
<th>n/a</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product licence (PL)</td>
<td>n/a</td>
</tr>
<tr>
<td>Clinical Trial Certificate (CTC)</td>
<td>n/a</td>
</tr>
<tr>
<td>Clinical Trial Certificate exemption (CTX)</td>
<td>n/a</td>
</tr>
<tr>
<td>Doctors and Dentists exemption (DDX)</td>
<td>n/a</td>
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</tbody>
</table>

(c) State the known pharmacology of the drugs, including possible side-effects: n/a
(ii) Other substances and/or devices (indicate method of application or use):

N/a

(iii) Measurements and samples to be taken: N/A

(a) Specify the amount and frequency of any samples:

N/A

(b) Indicate whether any sample would be taken as part of normal patient care or specifically for the purposes of the research:

N/A

(c) Indicate whether if a sample would normally be taken as part of usual patient care the amount taken would be any greater due to participation of the subject in the research:

N/A

(d) Will any sample be taken for genetic studies (now or in the future) and stored for this purpose? No

(e) If samples are to be taken for genetic studies, will the samples be rendered anonymous? N/A

(iv) Indicate, by ticking the appropriate box, which of the following will be used in the research (append copies):

- Questionnaires?
- Visual aids?
- Psychological tests?

(v) Specify which research procedures may cause pain, discomfort, distress or inconvenience to a subject and indicate the likely extent of such pain, discomfort, distress or inconvenience:
No distress or discomfort anticipated, if however the client feels in anyway uncomfortable with the questionnaire they will be advised that they do not have to complete it.

(vi) Specify any particular requirements or abstentions which will be imposed upon the participating subject (e.g. multiple visits, abstention from alcohol, tobacco etc):

None

(vii) Irradiation

(a) Will subjects be exposed to additional ionizing radiation in the course of this study?  

<table>
<thead>
<tr>
<th>Radiation Source</th>
<th>Yes</th>
<th>No</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Additional ionizing radiation</td>
<td>No</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(b) If so, what age groups will be recruited (tick as appropriate)?

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Yes</th>
<th>No</th>
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</tr>
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<tbody>
<tr>
<td>0 - 18 years</td>
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<tr>
<td>18 - 35 years</td>
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<td></td>
<td></td>
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<tr>
<td>35 - 65 years</td>
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<td></td>
<td></td>
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<tr>
<td>&gt; 65 years</td>
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</table>

(c) Justify your choice (note: the Committee is likely to examine closely those protocols in which subjects are less than 35 years old):

Dietary change effects the health of a wide range of individuals, however as type 2 diabetes does not usually emerge until individuals are in their late 30’s it should be possible to obtain a sufficient sample from participants over the age of 35.

(d) Give details of any exposures to x-rays (e.g. conventional plain films, CT scans, digital subtraction angiography etc):

N/A

(e) Give details of the radioisotopes to be administered (including their activities (MBq) and chemical forms and their frequency of administration):

N/A

(f) Has the project been granted an approval by the Administration of Radioactive Substances Advisory Committee (append a copy of the appropriate ARSAC certificate)?

N/A

(g) State the radiation dose (EDE) arising from:

<table>
<thead>
<tr>
<th>Radiation Source</th>
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<tr>
<td>any clinical procedure (a)</td>
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<tr>
<td>all research procedure (b)</td>
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<td>Total (a+b)</td>
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(viii) Risks and hazards
(a) Describe the potential hazards or risks, if any, for the subject associated with participation in the research and the precautions being taken to minimize and deal with them:

No hazards or risks anticipated as questionnaires look at the processes involved and the tailored messages offer general advice.

(b) Specify the probability and seriousness of the hazard/risk in each case:

No hazards or risks anticipated

(ix) Therapeutic research (Note: the Committee will expect the Information Sheet to make clear that the research is therapeutic or not)

(a) Indicate (by ticking the appropriate box) which of the following statements applies to this research (Tick ONE only):

- the research may be of general benefit to the subjects themselves (i.e. therapeutic research):
- the research is intended to be of benefit of patients with the condition being studied, but not to the subjects themselves (i.e. non-therapeutic research):
- the research is intended to increase knowledge, but will not benefit the subjects themselves or patients suffering from a particular condition (i.e. non-therapeutic research):

(b) For therapeutic research involving patients, describe alternative/standard treatments (if any), normally given or available to the type(s) of patient(s) intended to be recruited to the research. Where a subject has been receiving such alternative and standard treatment prior to enrolment in the research, or would normally be prescribed such treatment, state whether such treatment will be temporarily suspended or withheld during the conduct of the research. State what the implications, if any, of such withholding or temporary suspension may be for the subject.
Clients at the hospital will be undergoing the standardised treatments available for clients with type 2 diabetes. There will be no need to suspend or interfere with any of these, however in addition to this one group will receive tailored messages based on the stages of change, one group will not and another group will a mixed intervention.

(x) Good clinical research practice. Confirm that the research will be carried out in accordance with recognized standards of good clinical practice - in particular, the Declaration of Helsinki and ICH/GCP Guidelines.

The research will be carried out in accordance with the recognized standards of good clinical practice.

5. THE SUBJECTS

(1) Subjects to be studied at this hospital

<table>
<thead>
<tr>
<th>Patients</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
<th>Volunteers</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>500</td>
<td>500</td>
<td>600</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Upper age limit</td>
<td>65</td>
<td>65</td>
<td></td>
<td>Upper age limit</td>
<td></td>
</tr>
<tr>
<td>Lower age limit</td>
<td>35</td>
<td>35</td>
<td></td>
<td>Lower age limit</td>
<td></td>
</tr>
</tbody>
</table>

(2) Total number of subjects to be studied in multicentre studies

<table>
<thead>
<tr>
<th>Patients</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
<th>Volunteers</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td></td>
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<tr>
<td>Upper age limit</td>
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<td>Upper age limit</td>
<td></td>
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<tr>
<td>Lower age limit</td>
<td></td>
<td></td>
<td></td>
<td>Lower age limit</td>
<td></td>
</tr>
</tbody>
</table>

(3) Special groups:

(i) Do subjects belong to any of the following groups (tick as appropriate):
- infants (i.e. of age less than 5 years)?
- children (i.e. of ages between 5 and 18 years)?
- pregnant women?
- nursing mothers?
- women of child bearing age (i.e. of ages less than 45 years)?
- the elderly (i.e. of ages greater than 65 years)?
- mentally incompetent?
- emergencies/unconscious patients?

(ii) State what special or additional arrangements, if any, will be applied particularly in information and consent procedures to safeguard the interests of such subjects:
No additional arrangements are necessary for this group as the questionnaires focus on the psychological processes within the person and the interventions can only lead to increased compliance with health instructions.

(iii) Explain why it is necessary to conduct the research in such subjects and whether the required data could be obtained by any other means:

Improved dietary behaviour is of benefit to women of child bearing age, the psychological processes of this group are of interest as they may be particularly concerned about the prospect of the adverse effects of poor health on any children they may have. Collecting the data by the use of questionnaires is also the most effective method of collecting information it also not feasible to gather the data in any other way.

(4) Recruitment of subjects

(a) Describe the type/class of subject (e.g. patients with specific diseases) to be recruited:

Clients with type 2 diabetes

(b) Set-out the inclusion criteria:

All clients with type 2 diabetes are expected to improve their dietary behaviour and can be included in the study.

(c) Indicate from where/what source will subjects be recruited and describe the means and methods of recruitment (i.e. by personal contact, by advertisement within the institution or by public advertisement)?
Subjects will be recruited by personal contact, when they visit the hospital or by a written letter inviting them to take part in the study.

(d) Describe the type of subject and range of conditions which are to be contraindicated and excluded from the study. What measures will be taken to identify and exclude subjects who have recently or who are concurrently taking part in other research projects?

All participants will need a fluent knowledge of English to take part in the study, it is therefore proposed to only include participants either with English as their first language or if they can demonstrate a clear command of the English language, for example clients who have been educated to GCSE level in English.

(e) Will travelling expenses be given? | No

(f) Indicate whether any payment is intended to be made to research subjects and, if so, the amounts in question.

Participation will be on a voluntary basis, no payment is anticipated.

(g) State the relationship, if any, which may/will exist between the investigator(s) and potential subjects: e.g. will any of the subjects be students, subordinates or colleagues of the investigator, or members of the Trust or ICSM staff.

There will be no relationship between the investigator and the participants.

(5) Consent

<p>| (a) Will information on the proposed research be provided to the subjects in written form (if so, please complete Appendix 1)? | Yes |
| (b) If not, justify the provision of verbal information alone: |   |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
</table>
| (c) | Confirm the method (oral or written) and manner (i.e. when and by whom) in which subjects’ consent to participation will be obtained, and where subjects will/may suffer from any difficulties of communication, the special methods to be employed both as to information and consent procedures to overcome these difficulties:  
Subjects will receive a letter describing the research and the purpose of the questionnaire and any further information they will receive. They will be given the opportunity to ask for clarification or further details by contacting either the researcher or hospital staff. |
| (d) | Indicate how long subjects will be given to consider participation in the research:  
Participants will be given approximately one month to consider participation |
| (e) | Will subjects be given the opportunity to consult with third parties, relatives or their GPs? If so, explain how this will be ensured.  
On receipt of the questionnaire participants will be advised that they are free to discuss their participation with anyone they deem necessary. |
| (f) | Where the subject (i.e. a child under 18 years old or mentally incompetent adult) is not judged able adequately to appreciate the nature and implications of the research in order to consent in their own right, will the subject’s assent and co-operation (as opposed to consent) be sought (append copy of Information Sheet)?  
N/a |
| (g) | Will there be separate Information Sheets for children and their parents?  
N/A |
| (h) | Will the consent of the carer (next of kin, parent, legal guardian) or the order/declaration of the Court, be sought in relation to the participation of such subjects in the research (append copy of the Information Sheet and Statement for Relatives)?  
N/A |
| (i) | State the manner in which any apparent objection to participation by a subject (particularly a child) will be handled:  
Participants will be advised that they are free not to take part and that if they decide not to participate their treatment at the hospital will in no way be compromised.  
N/A |
6. FINANCIAL AND OTHER ARRANGEMENTS

(1) State any financial or other interests the applicant, his Division or employer has in relation to the conduct of this research.
The researcher, his employer or division have no financial interest in relation to the research.

(2) Confirm that the necessary arrangements have been, or will be, made to comply with the requirements of the Data Protection Act 1984 with regard to the computer storage and processing of subjects’ personal information and generally, to ensure confidentiality of such data supplied and generated in the course of the research (note: any data stored must not be used for any other study other than that described in this protocol (as approved by the Research Ethics Committee) without the prior approval of the Research Ethics Committee.

All necessary steps will be taken to comply with the requirements of the data protection act 1984. Any data obtained will not be used for any purpose other than that described in the protocol without the approval of the research ethics committee being obtained.

7. CURRICULUM VITAE OF INVESTIGATOR(S)
(Additional investigators should provide similar information on a separate sheet)

<table>
<thead>
<tr>
<th>Surname</th>
<th>Forename(s)</th>
<th>Date of birth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moore</td>
<td>Andrew Paul</td>
<td>4-12-55</td>
</tr>
</tbody>
</table>

DEGREES, etc. (subject, class, University and date)

BSc Health Psychology, Thames Valley University 1998: Grade 2.1
MSc Research Methods and Psychological Assessment University of Surrey 1999. Grade 62%
POSTS HELD WITH DATES

Phd student, University of Surrey: 1999 - Present
Msc student, University of Surrey: 1998-1999
Psychology Undergraduate, Thames Valley University: 1995-1998
Part time care worker, Bournewood Trust: 1996 - Present

RECENT PUBLICATIONS (title and reference)

None

TITLE OF PROPOSED RESEARCH:
The application of the stages of change model to the dietary behaviour of patients with Type 2 diabetes.

8. PRINCIPAL INVESTIGATOR'S DECLARATION
I have read and understood the REC Guidance Notes and all documents pertaining to this research that I now enclose. The information therein and above is accurate to the best of my knowledge and belief and I take full responsibility for it.

I understand it is my responsibility to obtain management approval where appropriate from the relevant NHS body before the project takes place.

I confirm that this research will comply with all relevant UK legislation, including the Data Protection Act and the Access to Medical Records Act.

I agree to supply interim and final reports to the REC as required.

I agree to advise the REC of any adverse or unexpected events that may occur during this project. I also agree to advise the REC if this is withdrawn or not completed.

I agree to keep the signed consent forms with the research records as well as keeping copies in the patient's medical records for the statutory life of those records.

I agree to obtain the Research Ethics Committee's approval for any changes to the protocol. This includes any increase in the number of subjects.

I agree to provide data about the subjects studied and to produce the signed consent forms when requested by the Research Ethics Committee for audit purposes.

Signed __________________________________________Principal Investigator
Name __________________________________________
Dated_________________________19

9. SIGNATURES

Signed__________________________________________ Co-investigator 1
Dated ________________19

Signed__________________________________________ Co-investigator 2
10. DIVISIONAL APPROVAL

Signed ___________________________________________________ Head of Section/Unit
Dated _______________________19

Signed ___________________________________________________ Chairman, Div. Comm.
Dated _______________________19

Signed ___________________________________________________ Head of Division/
Designated Divisional signatory
Dated _______________________19

11. RESEARCH ETHICS COMMITTEE APPROVAL

Signed ___________________________________________________ Chairman
Dated _______________________19

THIS PROTOCOL IS VALID UNTIL _____________ 20
Appendix 1

Information Sheet for Patients and Healthy Volunteers

You will be given a copy of this Information Sheet

An investigation into the psychological processes associated with dietary Change

Dear Client

We would like to invite you to participate in a research project. The study is described in full on the attached page. You should not take part in the study if you do not wish to do so. If you do decide to take part, please let us know beforehand if you have been involved in any other study during the last year. If you decide not to take part your treatment will not be affected by your decision. You are free to withdraw at any time without explanation and your subsequent treatment will not be affected. You should be aware, however, that it may not be possible for you to continue to receive any interventions based on this research once your participation in the trial has ended. This study is being conducted purely for research, any materials you receive will only supplement but not replace any treatment or medication you are currently receiving. Therefore it has not been necessary to contact your GP or any medical staff regarding your participation. You are of course free to contact them if you have any doubts regarding your participation.

Yours Sincerely
Andrew Moore

(Version Date: / / )

The local Research Ethics Committee has approved the above statement:

Signed.........................................................(Chair)

Date.............................................

THIS INFORMATION SHEET IS VALID FOR USE UNTIL .........................

Dear Client
To introduce myself I am a research student at the psychology department of the University of Surrey and I am currently conducting research into the attitudes and psychological processes associated with dietary change. Below are the details of a study I am conducting, I would greatly appreciate it if you could read through them.

Background
Recent research suggests that dietary change follows a particular sequence and that interventions matched to this sequence will be more effective than standard interventions. The opinions of people with type 2 diabetes are of particular interest as the monitoring of diet is an important part of your treatment. It is hoped that by gaining an insight into the processes and strategies people like yourself use, that improved interventions can be developed for others. Therefore I would be very grateful if you could help me by taking part in a short study, the plan of which is outlined below.

Study Plan
1. You will be asked to fill out an initial questionnaire, which will focus on your attitude to either fat intake or fruit and vegetable intake.
2. On completion of the questionnaire you may receive some pamphlets giving guidelines on how to improve or maintain your adherence to your dietary programme.
3. Approximately 3 months after this you will be contacted again to for your opinions of the interventions and questionnaires.
4. At the end of 6 months you will receive a second questionnaire which will again examine your attitude to either fat intake or fruit and vegetable intake. Completion of the questionnaires an interventions should not be very time consuming taking a maximum of 45 minutes for each one. I would greatly appreciate your help if you decide to take part. It is hoped that the information gained will be of benefit to in the design of future dietary programmes.

Any Problems
I assure you that any information you give me will be used solely for the research I have described. If you have any queries regarding the research, I am available today to answer any questions you may have, alternatively please feel free to contact me at the University of Surrey on 01483-876883 or on e-mail at A.Moore@surrey.ac.uk. I will be happy to help in any way I can.

Yours Sincerely
Participant Consent Form

Title of project:

**An Investigation into the psychological processes associated with dietary change in type two diabetes**

The participant should complete the whole of this sheet him or herself.

(please tick each statement if it applies to you)

I have read the Information Sheet for Patients and Healthy Volunteers.  

I have been given the opportunity to ask questions and discuss this study.

I have received satisfactory answers to all my questions.

I have received enough information about the study.

The study has been explained to me by:

Prof/Dr/Mr/Mrs/Ms ____________________________

I understand that I am free to withdraw from the study at any time, without having to give a reason for withdrawing and without affecting my future medical care.

I agree to take part in this study.

Signed ...............................................................................Date ...........................................

(NAME IN BLOCK CAPITALS)........................................................................................................

Investigator's signature ....................................................................................Date: ...................................

(NAME IN BLOCK CAPITALS)..............................................................................................
Statement for Relatives/Carers etc.

Title of project:

Patient's Name:

The relative/carer should complete the whole of this sheet him or herself.

I have been fully informed of what the study involves for my relative/partner/friend who is named above.

The study has been explained to me by:
Prof/Dr/Mr/Mrs/Ms. ..............................................................................................................................

(please tick each statement if it applies to you)

I have read the Information Sheet for Patients and Healthy Volunteers. □

I have been given the opportunity to ask questions and discuss this study. □

I have received satisfactory answers to all my questions. □

I have received enough information about the study. □

I understand that my relative/partner/friend is free to withdraw from the study at any time, without having to give a reason for withdrawing and without affecting their future medical care. □

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

(NAME IN BLOCK CAPITALS)..........................................................................................

Relationship to patient:.................................................................................................

Investigator's signature.................................................................Date..........................

(NAME IN BLOCK CAPITALS)..........................................................................................
Appendix 3

[N.B. If the study is covered by a Sponsoring Company's indemnity this form must be submitted bearing BOTH institution (Trust or Medical School as appropriate) and Company signatures. Studies will not be approved until a signed copy this indemnity form is received.]

Form of Indemnity for Clinical Studies

To: [Name and address of sponsoring company] ("the Sponsor")

From: The Hammersmith Hospitals NHS Trust or The Imperial College School of Medicine [delete as appropriate] ("the Trust/Medical School")

Re: Project title: ............................................................. ("the Study")

REC Registration No: ..........................................................

1. It is proposed the Trust/Medical School [delete as appropriate] should agree to participate in the above sponsored study involving patients of the Trust/volunteers within the Medical School [delete as appropriate] ("the Subjects"), to be conducted by Professor/Dr [delete as appropriate] ........................................ ("the Investigator") in accordance with the protocol annexed, as amended from time to time with the agreement of the Sponsor and the Investigator ("the Protocol"). The Sponsor confirms that it is a term of its agreement with the investigator that the investigator shall obtain all necessary approvals of the applicable Local Research Ethics Committee and shall resolve with the Trust/Medical School any issues of a revenue nature.

2. The Trust/Medical School [delete as appropriate] agrees to participate by allowing the Study to be undertaken on its premises utilising such facilities, personnel and equipment as the investigator might reasonably need for the purpose of the Study.

3. In consideration of such participation by the Trust/Medical School [delete as appropriate], and subject to paragraph 4 below, the Sponsor indemnifies and holds harmless the Trust/Medical School [delete as appropriate], and its employees and agents against all claims and proceedings (to include any settlements or ex-gratia payments made with the consent of the parties hereto and reasonable legal and expert costs and expenses) made or brought (whether successfully or otherwise):

(a) by or on behalf of Subjects taking part in the Study (or their dependents) against the Trust/Medical School [delete as appropriate] or any of its employees or agents for personal injury (including death) to subjects arising out of or relating to the administration of the product(s) under investigation or any clinical intervention or procedure provided for or required by the Protocol to which the subjects would not have been exposed but for their participation in the Study.

(b) by the Trust/Medical School [delete as appropriate], its employees or agents by or on behalf of a subject for a declaration concerning the treatment of a Subject who has suffered personal injury.
4. The above indemnity by the Sponsor shall not apply to any such claim or proceeding:

4.1. to the extent that such personal injury (including death) is caused by the negligent or wrongful acts or omissions or breach of statutory duty of the Trust/Medical School [delete as appropriate], its employees or agents;

4.2. to the extent that such personal injury (including death) is caused by the failure of the Trust/Medical School [delete as appropriate], its employees, or agents to conduct the study in accordance with the Protocol;

4.3. unless as soon as reasonably practicable following receipt of notice of such claim or proceeding the Trust/Medical School [delete as appropriate] shall have notified the Sponsor in writing of it and shall, upon the Sponsor's request, and at the Sponsor's cost, have permitted the Sponsor to have full care and control of the claim or proceeding using legal representation of its own choosing.

4.4. if the Trust/Medical School [delete as appropriate], its employees or agents shall have made any admission in respect of such claim or proceeding or taken action relating to such claim or proceeding prejudicial to the defense of it without the written consent of the Sponsor such consent not to be unreasonably withheld provided that this condition shall not be treated as breached by any statement properly made by the Trust/Medical School [delete as appropriate], its employees or agents in connection with the operation of the Trust/Medical School's [delete as appropriate] internal complaint procedures, accident reporting procedures or where such statement is required by law.

5. The Sponsor shall keep the Trust/Medical School [delete as appropriate] and its legal advisers fully informed of the progress of any such claim or proceeding, will consult fully with the Trust/Medical School [delete as appropriate] in the nature of any defence to be advanced and will not settle any such claim or proceeding without the written approval of the Trust/Medical School [delete as appropriate] (such approval not to be unreasonably withheld).

6. Without prejudice to the provisions of paragraph 4.3 above, the Trust/Medical School [delete as appropriate] will use its reasonable endeavours to inform the Sponsor promptly of any circumstances reasonably thought likely to give rise to any such claim or proceeding of which it is directly aware and shall keep the Sponsor reasonably informed of developments in relation to any such claim or proceeding even where the Trust/Medical School [delete as appropriate] decides not to make a claim under this indemnity. Likewise, the Sponsor shall use its reasonable endeavors to inform the Trust/Medical School [delete as appropriate] of any such circumstances and shall keep the Trust/Medical School [delete as appropriate] reasonably informed of developments in relation to any such claim or proceeding made or brought against the Sponsor alone.

7. The Trust/Medical School [delete as appropriate] and the Sponsor will give to the other such help as may be reasonably required for the efficient conduct and prompt handling of any claim or proceeding by or on behalf of Subjects (or their dependents) or concerning such a declaration as is referred to in paragraph 3(b) above.
8. Without prejudice to the foregoing if injury is suffered by a subject while participating in the Study, the Sponsor agrees to operate in good faith the Guidelines published in 1991 by the Association of the British Pharmaceutical Industry and entitled “Clinical Trial Compensation Guidelines” (where the Subject is a patient) and the Guidelines published in 1988 (amended 1990) by the same Association and entitled “Guidelines for Medical Experiments in non-patient Human Volunteers” (where the Subject is not a patient) and shall request the Investigator to make clear to the subjects that the Study is being conducted subject to the applicable Association Guidelines.

9. For the purposes of this indemnity, the expression “agents” shall be deemed to include without limitation any nurse or other health professional providing services to the Trust/Medical School [delete as appropriate] under contract for services or otherwise and any person carrying out work for the Trust/Medical School [delete as appropriate] under such a contract connected with such of the Trust/Medical School [delete as appropriate] facilities and equipment as are made available for the Study under paragraph 2 above.

10. This indemnity shall be governed by and construed in accordance with English law.

SIGNED on behalf of the Hammersmith Hospitals NHS Trust/the Imperial College School of Medicine [delete as appropriate]:  

---------------------------------------------------------------------------------  
Name in block capitals..........................................................................................  
Position...............................................................................................................  
Dated......................................................................................................................

SIGNED on behalf of the Company  

---------------------------------------------------------------------------------  
Name in block capitals..........................................................................................  
Position...............................................................................................................  
Dated......................................................................................................................
Appendix Three

Final questionnaires and factor analysis exploratory and baseline
Let’s Look at our Attitude to Fat in our Diet
The following questionnaire is part of a research student’s programme at the University of Surrey investigating perceptions and attitudes to diet. All information will be treated as confidential and will not be used for any purpose other than research.

Please answer the questions inside and return the completed questionnaire to reception.

It should take about 30 minutes of your time

Firstly a few details about yourself.

Age

Sex

Occupation (please state your previous occupation if you are retired, unemployed a student over 24 years of age, or the occupation of your parents if you a student under 24)

Are you mainly responsible for buying preparing and cooking the food you eat. Circle the appropriate answer

Yes  No

Level of Education
Which of the following qualifications do you have (tick as many boxes as applicable)

- O level or GCSE
- A level or Scottish highers
- HNC or HND
- BSc/BA/BEd
- Higher Degree ( eg Masters or PhD)
- None of the above
This questionnaire examines your eating habits over the last 3 months. Please indicate on a scale of 1-7 how often over the last 3 months you have done the following things.

1 = Never  2 = Rarely  3 = Occasionally  4 = Usually  
5 = Frequently  6 = Almost Always  7 = Always

I buy low fat foods to help me follow a low fat eating plan
1........2........3........4........5........6........7

I limit the amount of salad dressings I use or if I do use them I use low fat ones
1........2........3........4........5........6........7

I substitute low fat dairy foods for high fat dairy foods
(If you do not take dairy products, please circle number 8)
1........2........3........4........5........6........7........8

I substitute low fat foods for high fat foods in general
1........2........3........4........5........6........7

I grill or bake instead of frying foods
1........2........3........4........5........6........7

I eat fruit or low calorie desserts instead of high fat desserts
1........2........3........4........5........6........7

I count the number of calories I eat
1........2........3........4........5........6........7

I avoid eating hamburgers and other high fat foods at fast food restaurants
1........2........3........4........5........6........7

When I eat at a restaurant I look for low fat foods to order
1........2........3........4........5........6........7

I avoid eating high fat meats (for example ham, pork, beef, lamb)
(If you do not eat meat circle number 8)
1........2........3........4........5........6........7........8

When I eat meats I choose low fat cuts or trim off the fat
(If you do not eat meat circle number 8)
1........2........3........4........5........6........7........8

I do not use butter or other high fat products as flavouring on vegetables or potatoes
1........2........3........4........5........6........7
I avoid eating cakes, pastries and processed snacks that are high in calories
1........2........3........4........5........6........7

I eat breads or rolls without high fat spreads such as butter
1........2........3........4........5........6........7

This next section examines your perception of your diet and whether or not you intend making any changes in your intake of fat over the next few months. Read each statement and indicate which one best describes you by putting a tick in the box beside it.

<table>
<thead>
<tr>
<th>Please tick only one box</th>
</tr>
</thead>
<tbody>
<tr>
<td>I have been on a low fat diet for more than 6 months and I do not intend reducing my fat intake any further.</td>
</tr>
<tr>
<td>I have been on a low fat diet for more than 6 months but I intend to reduce my fat intake further</td>
</tr>
<tr>
<td>I have been on a low fat diet for less than six months and I do not intend reducing my fat intake any further.</td>
</tr>
<tr>
<td>I have been on a low fat diet for less than 6 months but I intend reducing my fat intake further</td>
</tr>
<tr>
<td>I am not on a low fat diet but I intend to start one in next month</td>
</tr>
<tr>
<td>I am not on a low fat diet but I intend to start one in the next 6 Months</td>
</tr>
<tr>
<td>I am not on a low fat diet and I do not intend to start one in the next 6 months</td>
</tr>
</tbody>
</table>

Please rate on a scale of 1-10 how likely you believe it is that you could develop a significant health problem because of your intake of fatty foods.

1........2........3........4........5........6........7........8........9........10
Not at all  Very Likely

The maximum recommended level of energy derived from fat in the diet is

25%  35%  40%  45%  50%

The following questions look at the experiences which effect the dietary intake of people. Think of similar experiences you may have had in attempting to improve your diet and
rate how often you have used these over the past 6 months. There are 7 possible responses to each question. Please circle the number that best describes your experience.

1 = Never 2 = Rarely 3 = Occasionally 4 = Usually 5 = Frequently
6 = Almost Always 7 = Always

1. I recall information from articles and advertisements about the benefits of low fat diets.
   1.......2.......3........4.......5.......6.......7

2. Society would be better if more people ate low fat diets
   1.......2.......3........4.......5.......6.......7

3. I recall information people have given me about the health problems from eating a high fat diet.
   1.......2.......3........4.......5.......6.......7

4. I think about information from articles and advertisements on how to change to a low fat diet
   1.......2.......3........4.......5.......6.......7

5. I pay close attention to television programmes about low fat diets
   1.......2.......3........4.......5.......6.......7

6. I seek out information regarding reducing the fat in my diet
   1.......2.......3........4.......5.......6.......7

7. I talk to people about the systems or tricks they use to stay on low fat diets
   1.......2.......3........4.......5.......6.......7

8. I associate with people who are pursuing low fat diets
   1.......2.......3........4.......5.......6.......7

9. I have someone in my life who cares about my diet being low in fat
   1.......2.......3........4.......5.......6.......7

10. I have someone who listens when I need to talk about reducing the fat in my diet
    1.......2.......3........4.......5.......6.......7

11. I can be open with at least one special person about my experience with low fat eating
    1.......2.......3........4.......5.......6.......7

12. I can expect to be rewarded by others if I eat a low fat diet
    1.......2.......3........4.......5.......6.......7
13. The encouragement of others is a major factor in the lowering of fat in my diet
1........2........3........4........5........6........7

14. I make a point of talking to someone regularly about reducing my fat intake
1........2........3........4........5........6........7

15. Warnings about the health hazards of high fat diets move me emotionally
1........2........3........4........5........6........7

16. I have fearful feelings about developing heart trouble from eating too much fat
1........2........3........4........5........6........7

17. Remembering studies about illnesses caused by high fat diets upsets me
1........2........3........4........5........6........7

18. I react emotionally to health warnings about high fat diets
1........2........3........4........5........6........7

19. Portrayals of the problems of people eating high fat diets affect me emotionally.
1........2........3........4........5........6........7

20. Discussions about high fat diets affect me emotionally
1........2........3........4........5........6........7

21. News reports and official figures about the dangers of high fat diets upset me
1........2........3........4........5........6........7

22. I notice the difficulty in society because of the high fat diets people eat
1........2........3........4........5........6........7

23. I consider the belief that people consuming low fat diets will improve the world
1........2........3........4........5........6........7

24. I think about the need for more people to understand the importance of a low fat diet
1........2........3........4........5........6........7

25. High fat diets are responsible for the high death rate from heart disease and cancer
1........2........3........4........5........6........7

26. Eating low fat foods gives me a feeling of freedom
1........2........3........4........5........6........7

27. I believe that when I am on a low fat diet I get on better with people
1........2........3........4........5........6........7
28. I believe I could do more for my family and friends if I stayed on a low fat diet
   1......2......3......4......5......6......7

29. My consumption of high fat foods makes me feel disappointed in myself
   1......2......3......4......5......6......7

30. I feel that improving my diet by eating low fat foods is one way to improve myself
   1......2......3......4......5......6......7

31. Choosing low fat foods gives me a feeling of control
   1......2......3......4......5......6......7

32. I get upset when I think about my eating too much high fat foods
   1......2......3......4......5......6......7

33. Eating low fat foods is one way to demonstrate my willpower
   1......2......3......4......5......6......7

34. I believe that by eating a low fat diet I will become a healthier and happier person
   1......2......3......4......5......6......7

35. On a low fat diet I will deal with difficult and stressful situations better
   1......2......3......4......5......6......7

36. I am rewarded by others when I keep to a low fat diet
   1......2......3......4......5......6......7

37. Instead of eating high fat foods I do something else
   1......2......3......4......5......6......7

38. Other people in my daily life make me feel good when I eat low fat foods
   1......2......3......4......5......6......7

39. I leave situations where there are a lot of high fat foods
   1......2......3......4......5......6......7

40. I reward myself when I eat low fat foods
   1......2......3......4......5......6......7

41. Occasionally I reward myself with fatty foods if I have maintained a low fat diet
   1......2......3......4......5......6......7

42. Eating high fat foods is not a problem provided it does not happen too often
   1......2......3......4......5......6......7
43. I tell myself I can choose to maintain a low fat diet or not  
1........2........3........4........5........6........7

44. I tell myself that I am able to lose weight when I want to by maintaining a low fat diet  
1........2........3........4........5........6........7

45. I tell myself that if I try hard enough I can keep from eating high fat foods  
1........2........3........4........5........6........7

46. I make private commitments to eat low fat foods  
1........2........3........4........5........6........7

47. I tell myself I can make the necessary changes to maintain a low fat diet  
1........2........3........4........5........6........7

48. I tell myself I can dismiss the problems associated with low fat diets  
1........2........3........4........5........6........7

49. I make public commitments that I will maintain a low fat diet  
1........2........3........4........5........6........7

50. When I am tempted to eat high fat foods I try to relax  
1........2........3........4........5........6........7

51. Instead of eating high fat foods I engage in physical activity  
1........2........3........4........5........6........7

52. I do something else instead of eating high fat foods when I need to relax or deal with tension.  
1........2........3........4........5........6........7

53. I think about something else when I am tempted to eat high fat foods  
1........2........3........4........5........6........7

54. When I am tempted to eat high fat foods I eat some favourite health food  
1........2........3........4........5........6........7

55. I find keeping myself busy is a good way to avoid eating high fat foods  
1........2........3........4........5........6........7

56. Telling others about the benefits of a low fat diet helps me maintain a low fat diet  
1........2........3........4........5........6........7
57. I remove things from my place of work that remind me of eating high fat foods
   1......2......3......4......5......6......7

58. I keep things around my place of work that remind me not to eat high fat foods
   1......2......3......4......5......6......7

59. I put things around the home that remind me not to eat high fat foods
   1......2......3......4......5......6......7

60. I remove things from my home that remind me of eating high fat foods
   1......2......3......4......5......6......7

61. I avoid occasions where there are a lot of high fat foods
   1......2......3......4......5......6......7

62. I make sure there are plenty of low fat foods in my home
   1......2......3......4......5......6......7

63. When I shop I avoid areas where there are a lot of high fat foods
   1......2......3......4......5......6......7

The following questions look at the decisions people make when they decide whether or not to improve their diet. Please indicate how important each of the following statements...
would be to you if you were deciding to go on an improved diet. There are 7 possible responses to each of the items. Circle the number that best describes how important each statement would be to you if you were deciding whether or not to go on an improved diet.

1 = No importance at all 2 = Very little importance 3 = Slight importance 4 = Moderate importance 5 = Significantly important 6 = Very important 7 = Extremely important

1 Going on a low fat diet would be hard work
1......2........3........4........5........6........7

2 I would feel sexier and more attractive on a low fat diet
1......2........3........4........5........6........7

3 My self respect would be higher on a low fat diet
1......2........3........4........5........6........7

4 A low fat diet would make meal planning more difficult for my family or house mates
1......2........3........4........5........6........7

5 My family and friends would be proud of me if I maintained a low fat diet
1......2........3........4........5........6........7

6 Others would have more respect for me if I maintained a low fat diet
1......2........3........4........5........6........7

7 I would have to cut out some of my favourite foods if I was on a low fat diet
1......2........3........4........5........6........7

8 Going on a low fat diet would mean avoiding some of my favourite places or activities
1......2........3........4........5........6........7

9 I would feel better all round on a low fat diet
1......2........3........4........5........6........7

10. A low fat diet takes the pleasure out of meals
1......2........3........4........5........6........7
The next questions look at typical eating situations. Everyone has situations which make it difficult for them not to eat fatty foods. The following are a number of situations relating to eating patterns and attitudes. Read each situation carefully and decide how confident you are that you will be able to resist eating fatty foods in each situation. In other words pretend you are in the situation now. On a scale from 1 = not confident to 7 = very confident circle the number which reflects how confident you feel now about being able to successfully resist the desire to eat high fat foods.

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<td>when I am in pain</td>
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<td>just before I go to bed</td>
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For Example
I am confident I can resist eating high fat foods at weekends 1...2...3...4...5...6...7

I am confident that
1. I can resist eating high fat foods when I am anxious 1...2...3...4...5...6...7
   at the weekend 1...2...3...4...5...6...7
   when I am watching T.V 1...2...3...4...5...6...7
   when I am depressed 1...2...3...4...5...6...7

when I feel it is impolite to refuse a second helping 1...2...3...4...5...6...7

when I have a headache 1...2...3...4...5...6...7
when I am at a party 1...2...3...4...5...6...7
when others are pressuring me to eat them 1...2...3...4...5...6...7
when I am in pain 1...2...3...4...5...6...7
just before I go to bed 1...2...3...4...5...6...7
Dear Participant
Approximately 6 months ago you completed a questionnaire and were given a brochure with some information and exercises, three months later you were again sent a copy of the brochure. It would greatly assist me if you could complete the following brief questionnaire giving your opinion of the brochure you received Please circle the appropriate response.

Did you read the brochure? Yes No

Have you saved the brochure? Yes No

Did you find the brochure helpful? Yes No

Did you discuss the brochure with others? Yes No

Did you complete all the exercises Yes No

Did you complete some of the exercises Yes No
Factors processes of change exploratory study

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Appendix Four

Intervention pamphlets and letters
Thank you for recently completing my questionnaire on attitudes to nutrition and diet. According to your questionnaire results you may be eating above the recommended level of fat in your diet and you are not currently thinking of reducing it. On the following pages is some information, which you might find helpful. Please take the time to read it.
Firstly there are some issues I would like you to consider

Being overweight has been likened to a domino effect, in that it could be the first step to numerous health problems. Imagine a row of dominoes, you knock over the first one, this in turn knocks over the second which in turn knocks over the third which in turn knocks over the fourth and so on. A simple example of this is that excess weight can raise the level of unwanted fats in your blood, these in turn can clog your arteries which makes you more vulnerable to heart attacks and strokes. Excess fat has also been linked with increased risk of cancer, arthritis and of course diabetes. However the good news is that if you can stop this chain reaction by eating more healthfully, you may not develop these health problems. In fact you will most likely live longer and you will certainly live more comfortably and enjoyably.

Sadly it is estimated that the majority of the British population consume too much fat in their diet. Perhaps many people are ill informed regarding the damage caused by excess dietary fat, perhaps they feel it is not worth their while or practical to reduce their fat intake, they may have tried in the past and failed and just feel too frustrated with the whole issue of dietary change. Yet making a few simple changes can have tremendous long-term health benefits.

A certain amount of dietary fat is good for your health, supplying energy, essential fatty acids and promoting the absorption of some vitamins. However the consumption of too much fat, has many health disadvantages. Fats are a high calorie food. The average person requires in the region of 2,000-3,000 calories a day to maintain their body weight. Too much fat means too many calories, which in turn are stored in the form of excess weight. This can restrict the enjoyment of many everyday activities, from going for a walk with friends to partaking in sport events. It could also result in a general feeling of fatigue and constant breathlessness. The long term effects however can be much more devastating and undoubtedly many people die early as a result of high fat intake. Below are some examples of how excess fat can effect your health.

1. Breathing: excess fat can press on the lungs making it harder to breath.
2. Arthritis: Excess pounds can weigh heavy on the joints.
3 High blood pressure: Excess weight causes 30% to 50% of cases of high blood pressure.
Take the time to think about some of the following statements for a few minutes

Poor diet alone may contribute to 35% of the total cancers in the population and to lessen the probability of cancer one of the most highly recommended dietary changes is to reduce the percentage of calories provided by fats particularly saturated fats for example butter or lard.

Throughout the United Kingdom the average person gets 42% of their energy intake from fat, while the recommended level is 35%. The majority of people therefore need to reduce their fat intake. This means it is more probable than not that you eat too much fat.

Remember however reducing fat does not mean eliminating your favourite foods but controlling them.

Having read the previous statements you may feel fine that is all true, but it is my life and I am free to eat and live as I choose and so what if I lose a few years off my life at least I will be happy while I am alive. However consider the long-term effects your high fat intake may have on the family and friends around you. In the short term you may not be able to partake fully in many activities with them, in the long term premature ill health can be a serious burden to your nearest and dearest and they can be robbed of many years of worthwhile contribution from you. Spend a few minutes thinking about the many benefits you could bring to the people close to you by maintaining your health. Perhaps some of the following short statements may help you realise just how much of a difference you maintaining your health could mean to you and to the quality of the relationship you have with those close to you in the short term and the long term.

A woman of 51 describing her mother of 77 had this to say,

"She goes around looking after friends and shopping for them. She is active her mind’s alive. She paints and she’s a member of the theatre club and a lot of other groups"

Another woman aged 79 talking about herself commented

"To be well in health means I feel I can do others a good turn if they need help"

Another woman of 74 said

"You feel as though everyone is your friend, I can enjoy life more and I can work and help other people"
A 22 year old shop manager commented “When I am healthy I am very talkative. If I am feeling low I keep myself to myself- I am very outgoing when I am well and not moody.

29 year old mother said of herself “I clean the window and rush around like a mad thing. When I am not healthy is when I want to sit in front of the box.

An old saying is that a picture is worth a thousand words, and perhaps it can be a thousand times more effective, in promoting change. So picture yourself as a happier healthier more energetic person. Perhaps if there is someone you know who has improved themselves by reducing their fat intake, realise how much better they must feel and how much better you would feel. In the future spend a few minutes whenever you can imagining the benefits of a healthier more energetic you. Think of the person you could be and how much a better person that would be. Here are some short statements from people who have reduced the fat in their diet some from situations where they were extremely overweight. Take the time to read them remember if others can do it so can you.

One middle aged woman described it like this

“It was exciting, every week being weighed in and dropping and dropping and some weeks not dropping at all and other weeks going down. It was exciting, it was proving to myself I could do it and you know when the first stone went off it was just wonderful. That was just such an achievement and then getting more off.”

Another participant summed it up in a sentence

“I can do a lot more things now than I would have been able to do before. I think when I was that overweight it was a bit like being in a trance as well.

Another girl summed it up like this

“Oh much better, and that’s a really cheesy thing to say but I do feel a lot better, I have got much more energy, going out shopping is a brilliant experience, I can fit into, sizes I haven’t fitted into since I was much younger, and I do feel better.”
Thank you for recently completing my questionnaire on attitudes to nutrition and diet. Your results show that while you may be eating above the recommended level of fat in your diet, you are thinking about reducing your fat intake but not however in the immediate future. The following is some information which, you might find helpful. Please take the time to read it.

Well done you are taking the first step in making a positive change, that is you are thinking about improving your diet, even if you do not intend taking
any action in the immediate future. Controlling your fat intake could be the first step to a healthier and happier life. You may have many reasons for wanting to reduce your fat intake, from protection against long term health problems, to having more energy to simply looking better. Whatever your reason there are some issues and steps I would like you to consider which hopefully will make it easier for you to take action.

Any dietary change requires a certain amount of sacrifice and alteration to one’s lifestyle. Many people feel there are more disadvantages than advantages to improving their diet, particularly as the benefits of improved diet are not immediately apparent. However the long term benefits are undeniable, improved diet leads to increased energy and less risk of heart disease, cancer and obesity. However before you change this is something you must see for yourself. Research has shown that a key factor in bringing about change in any area is seeing that the advantages of change outweigh the disadvantages. There follows a simple 10 minute exercise that could help you greatly improve your life. On the following sheet in the left hand box list all the advantages you can think of that will come about by reducing your fat intake, in the right hand box list all the disadvantages you can think of associated with a high fat diet. When you have completed the sheet focus on the benefits that can come about hold them strongly in your mind, let them be the motivation that will bring you closer to change. When you think of a high fat intake see all the disadvantages associated with it and remember the advantages of a low fat diet far outweigh the disadvantages associated with a few changes. Firstly however let us look at some statements by others regarding the advantages of low fat dieting.

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<th>One woman commented</th>
<th>Another participant summed it up like this</th>
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<td>&quot;I feel so much better, much better, because I am much more mobile, I can get about now and I have so much more energy&quot;</td>
<td>In terms of feeling more alert, I am feeling much better, this morning I felt quite well even though I went to bed late and I know that if I had had a few beers or not eaten properly I would have not have felt so good.</td>
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A participant 6 weeks into a low fat diet said
"My quality of life, I guess it is improving I feel more positive because I know my goal is achievable which I never thought before, and I know it is not easy, and I know it is going to get harder later on but that it is achievable but so fat as my quality of life I feel better I feel healthier...........I feel happy enough in myself in that I know that I am eating so much

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<th>Advantages of a Low Fat Diet</th>
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Good you have completed the exercise, now focus on the many benefits you will have both health wise and emotionally as a result of improving your diet. Let them increase your motivation to move forward. Ideally once a week take some time to repeat this exercise. There is another similar exercise on the following page. Please take a few minutes to complete it.

Research has shown that an important factor in stimulating change are the evaluations we have of ourselves. Firstly consider how you would rate yourself if you keep eating a high fat diet, particularly now that you have taken the first step by thinking about making a change. Now take a few moments and consider how you will feel when you make the
changes and start on a diet low in fat. Imagine what an improved life you will have, you may feel more in control of your life believing that you have taken an important step in improving yourself and that you are a more capable person overall. You may also be able to cope with difficult and stressful situations better when you are a healthier and happier person. So as a second exercise in the left hand box list how you will feel about yourself if you reduce your fat intake and in the right hand box list how you will feel about yourself if you do not reduce your fat intake. Again for example people have reported feeling more in control of their life or having a sense of improving themselves if they improve their diet. Others have said that they feel disappointed or frustrated with themselves if they do not.

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Finally thanks for taking the time to read this, keep it safe somewhere and once a week for the next few weeks take 10 minutes to repeat the exercises. Remember any step forward will be a help. The information in this pamphlet is for general knowledge only it is not intended to replace information given by a health practitioner.

Rational behind contemplation brochure

In line with the stages of change model, an increase in the pros and a decrease in the cons is necessary before participants will move from contemplation to action (Prochaska 1999)
Thank you for recently completing my questionnaire on attitudes to nutrition and diet. According to your questionnaire results you are eating above the recommended level of fat in your diet, but you are however seriously thinking of reducing your intake in the near future. On the following pages is some information which you might find helpful. Please take the time to read it.
Congratulations you have made a definite commitment to change. You have become aware of the problems of too much fat in the diet and you feel it is worth your while making a significant change. However before you start your dietary change there are some techniques I would like you to become aware of which may help you to initiate and maintain your action plan.

Changing your diet will involve a lot of changes to your lifestyle some of which may not be easy, however with the proper plan and belief in yourself it is something you can achieve. Many people about to make changes are not sure of their ability to follow them through. Research has shown that if you have a strong belief in your ability to make a change, then your chances of success are much higher. **Therefore one of the first steps is to build up a belief in yourself that you can and will maintain change.** To help you to do this a simple plan follows. In the first box below are a list of situations which have proved difficult for people on a low fat diet. Read through them and consider if you would also find it difficult in similar situations.

**Box One: Problem Situations**

| Social Events, Festive Occasions, When I am feeling depressed, When I am feeling anxious, When I am feeling bored, When I am feeling angry, When I am feeling happy, When I am relaxing, When things do not work out, When low fat foods are not available, When it is impolite to refuse high fat foods, When I am overworked or under stress |

As you can see this covers a wide range of situations, which people have mentioned these as times when they tend to break their diet. The next box contains strategies which they feel helped them cope.

**Coping Strategies**

| I simply avoid situations, I tell people that I am on a low fat diet, I plan ahead to avoid situations where only high fat food is available, I distract myself with another activity, I reward myself with something other than high fat foods, I Remind myself taking high fat foods will not help, I Remind myself of the benefit of low fat foods, I try to relax, I tell others clearly why I am on a low fat diet, I take up exercise, I talk to a close friend, I Occasionally break the diet. |
Again these are the suggestions people have made for situations where they had found it difficult to maintain a low fat diet, spend a few minutes thinking about strategies you will use to help you cope in situations where you find it difficult to maintain your diet. Write them down in the box below, it does not matter if you repeat some of the suggestions already made. Just be clear that you have plans in place for coping with difficult situations. If necessary continue on a separate sheet of paper. Remember research has shown that if you are prepared and have a strong belief in your ability to succeed then your chances of success are much higher.

The next step is to make a definite commitment to change. However the first commitment you must make is to yourself. *So set a start date and prepare for it.* Remember to make it easier for yourself, have a plan also. Be certain you have a variety of foods available to you, plan for the first few days once the momentum starts you will find it easier to maintain it.

Aside from the commitment to yourself also make commitments to other people. At first this might seem a risky strategy but it has a number of advantages, in telling the people close to you that you are prepared to make a change the commitment to yourself is reinforced. Secondly it will give those close to you the opportunity to provide support. Changing a diet can be stressful at times and having the support of those close to you will be a tremendous help. If you really believe you can change you have nothing to lose and everything to gain by making a strong commitment. So make sure you have at least one person who you can talk to and is fully supportive of your effort to change your diet. If possible encourage them to help you by giving some active support. It could be going to an exercise class with you, or perhaps sharing some recipes with you. A loose plan is outlined on the next page, please add to it with some suggestions of your own.
You have made a serious commitment to change your diet, you know this will bring an improvement in your life both short term and long term. Here are some suggestions you might find helpful.

Firstly on the next line set out a date when you intend to start your improved diet and in the box underneath it write down why you are making these changes

Start Date ________________ :

Why I am improving my diet

In the next box write down the steps you intend to take, it could for example be cutting out high fat spreads or cutting out grilling foods. Try and put down 10-12 steps you intend to take.

In the next box write down the names of some people who you will tell about your commitment to change your diet for the better. Also write down some ways which you feel they might help you. Try to include one special person who you feel will be particularly supportive. Remember you stand a greater chance of success if you are committed to yourself and other people.
Finally thank you for taking the time to read this, keep it safe somewhere and once a week for the next few weeks take 10 minutes to repeat the exercises. You have made a strong commitment to change your diet for the better plan ahead and you will achieve the maximum. Good luck.
The information in this pamphlet is for general knowledge only, it is not intended as medical advice or to replace information given to you by your health practitioner.
Thank you for recently completing my questionnaire on attitudes to nutrition and diet. According to your questionnaire results you have reduced the amount of fat in your diet within the last 6 months. On the following pages is some information which you might find helpful. Please take the time to read it.
Firstly congratulations you have made a big step in improving your health. You are possibly already feeling the benefits of improving your diet. Now that you have made the first step it is just a question of gaining momentum and making sure you take to steps to maintain your progress. In this brochure there are some steps which it is recommended you take to help you along the way.

The first step is to see that you are properly rewarded for the efforts you have made. While it is helpful if others recognise your achievements and comment on your results this may not always happen. In fact others may take your progress for granted, not appreciating the work you have put in. It is essential therefore that you positively reward yourself, become your own best supporter and give yourself the recognition you deserve. In the first box below you will see a list of the rewards people give themselves when they have maintained their diet. In the second box make a list of the things you would like to reward yourself with when you have maintained your low fat diet and in the third box put in a rewards timetable. It is important to focus on rewarding yourself if you make the occasional slip do not feel disappointed or guilty with yourself. Simply feel good about the positive steps you have already taken.

In the box below are a list of the rewards people give themselves for staying on low fat diets.

| I buy myself some flowers or a new plant, | I buy myself some new clothes, |
| I buy some of my favourite music, | I go an see a show or film, | I have a nice day out, |
| I read a cook book and experiment with some new recipes, | I have a massage |
| I remind myself of the progress I have made |

In the next box list some of the rewards you would like to give yourself. They can be the same as the ones above or include some of your own. Remember improving your diet is meant to be enjoyable. Make sure it is something you enjoy.
Now you have seen a list of the rewards other people have given themselves and you have thought of some of your own. Now in the next box make a timetable of how you intend to reward yourself. For example after two weeks on my diet I will buy myself some c.d.'s.

An important factor in maintaining your dietary change is to have some friendly people on your side. Ideally it should be someone you can trust be open with and who is accepting of your need to change. In the next box list the names of someone or possibly a few people who you feel can help. If necessary consider self help groups but have some friends who can help you.

Now that you have identified a few people who you can help you with your programme in the next box list some specific ways in which they can help you. It could be that they might spend half an hour a week to talk with you, they might be willing to go to an exercise class with you or simply spend some time on the phone talking to you. It will however be a huge help to you if you can get some people in your corner.
At times it may be particularly difficult to stay on your low fat diet, it will be a tremendous help to have some techniques or strategies to fall back on which will assist you to maintain your diet. Research has shown that in particular individuals at your stage benefit from having enjoyable alternatives to high fat foods. Below are a list of activities other people have used perhaps you can add some of your own. Try some of the activities out and develop your own favourite few. Having a healthier alternative will pay big dividends in the long term.

When I feel like eating high fat foods I talk things over with a friend
   I listen to my favourite music,
   I look at television
   I read a favourite book
   I eat a health food,
   I think about the benefits of healthy eating
   I keep myself busy
   I take up exercise,
   I work in the garden,
   I have some fruit as a snack
   I think about the damage high fat foods do
   I talk to people about the benefits of a low fat diet

Above were some of the strategies other people use, some of these may suit you and some may not, however in the box below put down some of the activities you would partake in rather than eating high fat foods.
Good you have found yourself some alternatives to eating high fat foods, these may be activities you have not had time for in the past, already you can see how improving your diet is improving your whole life, take this opportunity to develop new interests and make your life more interesting. Now is the time to get started in the box below list some times when you will start your new interests. Perhaps fit them in at times when you feel you are most likely to break your diet.

The final step in helping you to maintain your healthier diet is to surround yourself with information that reminds you of the benefits of your new health programme. Make certain you have plenty of the right foods available to you. Have magazine articles or posters on the benefits of proper nutrition close to you. Also remove anything associated with high fat diets. In the box on the left hand side are some of the strategies other people use. Keeping a positive image of the benefits of your dietary programme will help you maintain it. It is all too easy to get downhearted and forget the benefits of what you are doing. Keep these clear in your mind and staying on your programme will become more fun. Once you have read through the suggestions in the left hand box take some time and fill in the right hand box with some new strategies of your own.

I keep a picture of myself when I was slim on the refrigerator door.
I put lists of the benefits of low fat foods where I can see them.
I put lists of the damage done by high fat foods around the house.
I keep pictures of role models around the house.
I put pictures of people I would not like to look like around the house.
I put lists of my goals where I can see them.
The main aim of this exercise is to constantly remind yourself of the benefits of your new eating pattern and the disadvantages of your old one while these are all interesting exercises they are of no benefit unless you put them into action. In the box below list some of the first steps you intend to take to remind yourself of the benefits of low fat foods. Make a definite commitment to get started.

For example: I intend to make a list of the benefits of a low fat diet next week

Finally thank you for taking the time to read this, keep it safe and once a week for the next few weeks take 10 minutes to repeat the exercises. Congratulations again on your change to a healthier lifestyle. The information in this pamphlet is for general knowledge only, it is not intended as medical advice or to replace information given by your health practitioner.
Thank you for recently completing my questionnaire on attitudes to nutrition and diet. According to your questionnaire results you have reduced the amount of fat in your diet for more than six months and you are considering reducing even further in the future. On the following pages is some information which you might find helpful. Please take the time to read it.
Firstly congratulations you have not only made a big step in improving your health but you have also maintained it for some time and you are considering making more improvements in the future. You have obviously managed to cope with many of the problems associated with staying on your improved diet. However this brochure contains a few suggestions which I hope you will find helpful.

An important step in helping you to maintain and improve your healthier diet is to surround yourself with information that reminds you of the benefits of your new health programme. In the box on the left hand side are some of the strategies other people use. Keeping a positive image of the benefits of your dietary programme will help you maintain it. It is all too easy to get downhearted and forget the benefits of what you are doing. Keep these clear in your mind and staying on your programme will become more fun. Once you have read through the suggestions in the left hand box take some time and fill in the right hand box with new strategies of your own.

I keep a picture of myself when I was overweight on the refrigerator door.

I put lists of the benefits I have obtained from low fat foods where I can see them.

I put lists of the damage done by my high fat diet in the past around the house.

I keep pictures of role models around the house.

I put pictures of people I would not like to look like around the house.

I put lists of my achievements and goals where I can see them.

In the box below list some of the first steps you will take to remind yourself of the benefits of low fat foods. Make a definite commitment to get started, that is by a certain date or time.

For example: I intend to make a list of my achievements and or goals and put them where I can see them in the next 2 weeks.
An important factor in maintaining and improving your diet is to have some friendly people on your side. Ideally it should be someone you can trust, be open with and who is accepting of your programme. You have been maintaining your diet for sometime and may already have friends you confide in. In the next box list the names of all the people you feel have helped you and any you feel may help you in the future. If necessary consider self help groups but have some friends who will encourage you with your diet.

Now that you have identified a few people who you can talk to about your programme in the next box list some specific ways in which they can help you maintain or improve your diet. It could be that they might spend half an hour a week to talk with you, they might be willing to go to an exercise class with you or simply spend some time on the phone talking to you. Perhaps you can spend sometime talking to others about diet. It will however be a tremendous help to reinforce your improved diet in this way. Remember the more people you have in your corner the more likely you are to maintain and improve your diet.
You have maintained your diet for sometime however at times it may be particularly difficult to stay on your low fat diet. In such situations it can be a tremendous help to have some techniques or strategies to fall back on which will help you maintain your diet. At your present stage you obviously have many strategies which you have already used. Research has shown that in individuals at your stage benefit from having enjoyable alternatives to high fat foods. Below are a list of activities other people have used perhaps you can add some of your own. Try some of the activities out and develop your own favourite few. The more alternatives and strategies you have the better in the long run.

When I feel like eating high fat foods I talk things over with a friend
I listen to my favourite music,
I look at television
I read a favourite book
I eat a health food,
I think about the benefits of healthy eating
I keep myself busy
I take up exercise,
I work in the garden,
I have some fruit as a snack
I think about the damage high fat foods do
I talk to people about the benefits of a low fat diet

Above are some of the strategies and techniques other people have used to maintain their low fat diets or health programmes. Some of these you may already use or you may have some strategies of your own. In the box below put down some of the activities you believe will help you to maintain and reinforce your health programme.
Good you have found yourself some alternatives, now in the next box put down some definite commitments as to when you intend to add these activities to your health programme.

In the box below are a list of the rewards people give themselves for staying on low fat diets. In the next box list some of the rewards you would like to give yourself. Make out a realistic plan. You have maintained your low fat diet for sometime now. There may however be certain anniversaries for example you may have maintained a particular weight lose for sometime when you would like to reward yourself. It is so easy for a diet to become monotonous and a strong factor in maintaining a diet is to make it as enjoyable as possible.

I buy myself some flowers or a new plant,  I buy myself some new clothes,
I buy some of my favourite music,  I go an see a show or film ,  I have a nice day out,
I read a cook book and experiment with some new recipes,  I have a massage
                          I remind myself of the progress I have made

In the next box list some rewards you in particular would like to give yourself. They can be the same as the ones above or include some of your own. Take a few minutes and see what you come up with.
Now you have seen a list of the rewards other people have given themselves and you have thought of some of your own. Now in the next box make a realistic timetable of how you intend to reward yourself. For example I will take a holiday when I have maintained my programme for a year.

**Slips**

You have maintained your diet for sometime now. However there may be times when you falter or slip. Remember this is nothing to be concerned about. It is only if a slip becomes extended for example if you stay on a high fat diet for a week rather than just breaking it for a social occasion, that it becomes a cause for concern. Again congratulations on having maintained your diet and finally make sure to take the time to remind yourself of the benefits you have achieved. Make a list of them and perhaps add a few new goals. In the next box make a list of what you have achieved and how it will benefit you in the future.

For example: by maintaining my low fat diet I have decreased my risk of heart disease
Congratulations again on your change to a healthier lifestyle and thank you for taking the time to read this brochure, keep it safe and once a week for the next few weeks take the ten minutes necessary to repeat the exercises.

The information in this pamphlet is for general knowledge only, it is not intended as medical advice or to replace information given by your health practitioner.
Thank you for recently completing my questionnaire on attitudes to nutrition and diet. According to your questionnaire results you have reduced the amount of fat in your diet and you have been doing so for more than six months. On the following pages is some information which you might find helpful. Please take the time to read it.
Firstly congratulations you have not only made a big step in improving your health but you have also maintained it for some time. You have obviously managed to cope with many of the problems associated with staying on your improved diet. However this brochure contains a few suggestions which I hope you will find helpful.

An important step in helping you to maintain your healthier diet is to surround yourself with information that reminds you of the benefits of your new health programme. In the box on the left hand side are some of the strategies other people use. Keeping a positive image of the benefits of your dietary programme will help you maintain it. It is all too easy to get downhearted and forget the benefits of what you are doing. Keep these clear in your mind and staying on your programme will become more fun. Once you have read through the suggestions in the left hand box take some time and fill in the right hand box with new strategies of your own.

I keep a picture of myself when I was overweight on the refrigerator door.

I put lists of the benefits I have obtained from low fat foods where I can see them.

I put lists of the damage done by my high fat diet in the past around the house.

I keep pictures of role models around the house.

I put pictures of people I would not like to look like around the house.

I put lists of my achievements and goals where I can see them.

In the box below list some of the first steps you will take to remind yourself of the benefits of low fat foods. Make a definite commitment to get started, that is by a certain date or time.

For example: I intend to make a list of my achievements and goals and put them where I can see them in the next 2 weeks.
An important factor in maintaining your dietary change is to have some friendly people on your side. Ideally it should be someone you can trust, be open with and who is accepting of your programme. You have been maintaining your diet for sometime and may already have friends you confide in. In the next box list the names of all the people you feel have helped you and any you feel may help you in the future. If necessary consider self help groups but have some friends who will encourage you with your diet.

Now that you have identified a few people who you can talk to about your programme in the next box list some specific ways in which they can help you maintain or improve your diet. It could be that they might spend half an hour a week to talk with you, they might be willing to go to an exercise class with you or simply spend some time on the phone talking to you. Perhaps you can spend sometime talking to others about diet. It will however be a tremendous help to reinforce your improved diet in this way. Remember the more people you have in your corner the more likely you are to maintain and improve your diet.
You have maintained your diet for sometime however at times it may be particularly difficult to stay on your low fat diet. In such situations it can be a tremendous help to have some techniques or strategies to fall back on which will help you maintain your diet. At your present stage you obviously have many strategies which you have already used. Research has shown that in individuals at your stage benefit from having enjoyable alternatives to high fat foods. Below are a list of activities other people have used perhaps you can add some of your own. Try some of the activities out and develop your own favourite few. The more alternatives and strategies you have the better in the long run.

When I feel like eating high fat foods I talk things over with a friend
I listen to my favourite music,
I look at television
I read a favourite book
I eat a health food,
I think about the benefits of healthy eating
I keep myself busy
I take up exercise,
I work in the garden,
I have some fruit as a snack
I think about the damage high fat foods do
I talk to people about the benefits of a low fat diet

Above are some of the strategies and techniques other people have used to maintain their low fat diets or health programmes. Some of these you may already use or you may have some strategies of your own. In the box below put down some of the activities you believe will help you to maintain and reinforce your health programme.
Good you have found yourself some alternatives, now in the next box put down some definite commitments as to when you intend to add these activities to your health programme.

In the box below are a list of the rewards people give themselves for staying on low fat diets. In the next box list some of the rewards you would like to give yourself. Make out a realistic plan. You have maintained your low fat diet for sometime now. There may however be certain anniversaries for example you may have maintained a particular weight lose for sometime when you would like to reward yourself. It is so easy for a diet to become monotonous and a strong factor in maintaining a diet is to make it as enjoyable as possible.

I buy myself some flowers or a new plant,  I buy myself some new clothes,

I buy some of my favourite music,  I go an see a show or film,  I have a nice day out,

I read a cook book and experiment with some new recipes,  I have a massage

I remind myself of the progress I have made

In the next box list some rewards you in particular would like to give yourself. They can be the same as the ones above or include some of your own. Take a few minutes and see what you come up with.
Now you have seen a list of the rewards other people have given themselves and you have thought of some of your own. Now in the next box make a realistic timetable of how you intend to reward yourself. For example I will take a holiday when I have maintained my programme for a year.

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Dear Participant

Thank you for recently filling out the dietary questionnaire at Hammersmith or Charing Cross hospitals. Enclosed is a brochure I hope you will find beneficial.

Yours Sincerely
Andrew Moore
Dear Participant

Firstly thank you very much for completing my questionnaire at either Hammersmith or Charing Cross hospitals 6 months ago. As I may have explained at the time a central aim of the study is to search for any changes, which take place in participant’s opinions after 6 months. With this in mind I have enclosed a second copy of the questionnaire for you to complete and return in the enclosed pre paid envelope. Again I would like to thank you in advance for taking the time to do this, your help is appreciated.

Yours Sincerely
Andrew Moore
Dear Participant

Firstly thank you very much for completing my questionnaire at either Hammersmith or Charing Cross hospitals 6 months ago. As I may have explained at the time a central aim of the study is to search for any changes, which take place in participant's opinions after 6 months. With this in mind I have enclosed a second copy of the questionnaire for you to complete and a short questionnaire looking at your opinions of the brochure you received. Please return both in the enclosed pre paid envelope. Again I would like to thank you in advance for taking the time to do this, your help is appreciated.

Yours Sincerely
Andrew Moore
Dear Participant

Thank you for recently completing my questionnaire at Hammersmith or Charing Cross hospital, I enclose a copy of the brochure you received when you completed the questionnaire. I hope you will have the time to complete some of the exercises again and that you will find them helpful.

Yours Sincerely
Andrew Moore