

ABSTRACT

Title of Dissertation: AN EXAMINATION OF A STRUCTURAL
EQUATION MODEL OF READINESS TO USE
COMPLEMENTARY AND ALTERNATIVE
MEDICINE AMONG AUSTRALIAN UNIVERSITY
STUDENTS

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Complementary and alternative medicine (CAM) use is increasing worldwide. However, there have been few theoretical models established to exploring psychosocial factors of CAM use. This study attempted to examine the potential for extending the Transtheoretical Model (TTM) to the area of CAM use. For this purpose, a hypothesized structural equation model of readiness of general CAM use was established based upon the literature. The model consisted of key constructs of the TTM which had been specific to CAM use and indicated the hypothesized relationships between key constructs. The purposes of this study were to 1) test the theory-based model use using structural equation modeling technique; 2) examine

hypothesized relationships among key constructs from the TTM; 3) improve model fit by modifying the pathways between the model constructs in a theoretically sensible way, and 4) test whether the relationships among the constructs differ across subgroups of gender and ethnicity. The research was a secondary analysis of survey data (n=518) taken from a study of complementary medicine use among Australian university students in 2000. Results: overall, the hypothesized structural model showed a satisfactory degree of fit to the observed data. Four conclusions of direct, significant relationships were drawn: 1) processes of change showed positive effects on stages of CAM use; 2) processes of change showed positive impacts on pros; 3) processes of change showed negative impacts on cons; and 4) cons showed negative effects on self-efficacy. Pros and cons were significantly and negatively correlated with each other. Conclusion: The finding of this study provided quantitative evidence of the applicability of the TTM to CAM use. The key constructs from the TTM substantially influenced the readiness of CAM use and explained the decisional making processes of CAM use among Australian university students.

AN EXAMINATION OF A STRUCTURAL EQUATION MODEL OF
READINESS TO COMPLEMENTARY AND ALTERNATIVE MEDICINE USE
AMONG AUSTRALIAN UNIVERSITY STUDENTS

by

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Dissertation submitted to the Faculty of the Graduate School of the
University of Maryland at College Park in partial fulfillment
of the requirement for the degree of
Doctor of Philosophy
2005

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DEDICATION

To Allen for sticking with me and providing supports through this process

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CHAPTER 1: INTRODUCTION

1.1. Statement of the Problem

Complementary and alternative medicine (CAM) encompasses health practices ranging from relatively new modalities (e.g., art therapy and biofeedback) to ancient skills of an initiated community (e.g., yoga, meditation), and traditional practices that are quite conventional in some cultures (e.g., traditional Chinese medicine) (Bensoussan, 1999). Almost all these practices are based on theories and explanatory mechanisms of action that do not conform to Western medical thinking. In the 1990s, the use of complementary medicine increased world wide, especially in the western developed countries, such as Northern America, Australia, and Europe (Fisher & Ward, 1994; MacLennan, Wilson & Taylor, 1996; Eisenberg et al., 1998). However, the reasons why a significant portion of the population was going outside mainstream biomedicine were still inconclusive.

Understanding the reasons for CAM use would promote the communication between health care providers and their patients about the practice of complementary therapies (Barnes, Powell-Griner, McFann & Nahin, 2004). Eisenberg et al. (1998) estimated that, in 1997, approximately 38.5% of alternative therapy use was disclosed to physicians (Eisenberg, 1998). Patients not only sought care from CAM practitioners, licensed or non-licensed, certified or uncertified, but also used CAM to self-prescribe and self-medicate. These practices have increased the chance of inappropriate use of CAM and resulted in negative consequences. Studying the causal

factors underlying the use of alternative medicine would provide information to conventional practitioners about patients' health beliefs and health needs that the present health care system may fail to meet (Astin, 1998). Thus, health care professionals would be able to develop greater awareness of the nature of and reasons for patients' use of unconventional self-care approaches and support individuals in making informed, safe, and appropriate CAM choices.

Inconclusive results have been reported from research on the psychosocial and personal factors that would determine general CAM use. For example, dissatisfaction with conventional medicine was reported as a significant predictor of CAM use in some studies (Furnham & Smith, 1988; Furnham & Kirkcaldy, 1996; Sirosis & Gick, 2002; Boon, Brown, Garin & Westlake, 2003) but was non-significant in other studies (Austin, 1998; Siahpush, 1999; Eisenberg et al., 2001; Chng, Neill & Fogle, 2003).

The reasons of these research limitations might be due to the lack of a unifying comprehensive model to account for the increasing use of CAM and the lack of established, valid construct measures to use in CAM studies. To date, most research exploring predictors of CAM used dichotomous yes-or-no outcome variables. The dichotomous nature of the outcome measures limited the choices of statistical methods in data analysis.

Another reason for inadequate research might be that the decision to use alternative medicine was situation dependent (e.g., influence of significant others who have used or not used alternatives) which made the prediction quite difficult (Austin, 1998). Some critical psychosocial factors, such as self-efficacy and social norms, have not been addressed in building theoretical models to explain the complex

behavior of alternative medicine use. Finally, the cross-sectional nature of studies precluded drawing any definitive conclusions regarding cause-and-effect relationships. It has been difficult to manipulate potential predictors in an experimental study of the alternative therapies that subjects selected.

1.2. Overview of the Theoretical Model

One model that may clarify the factors that have been proposed as potential predictors of CAM use is the Transtheoretical Model (TTM). The Transtheoretical Model integrates a set of constructs that can be organized into three dimensions (Ward et al., 2004). The first is the structural and temporal dimension, defined by the stages of change; the second is the multivariate outcome space, which includes self-efficacy, decisional balance, and target behaviors. The third dimension includes the independent variables such as the processes of change.

Since behavioral change is not an all-or-none, binary phenomenon, the TTM explains behavioral change as a process involving progress through a series of stages. Each stage is defined by intentions and behaviors related to the interested behaviors. The construct of stages of change describes when cognitive and behavioral changes occur and examines readiness to engage in a particular behavior. The assessment of the individual's readiness to practice CAM by the application of the stages of change can provide important additional information about the entire population's potential receptiveness for complementary medicine.

Decisional balance focuses on the perceived benefits (pros) and costs (cons) of a behavioral change and is important in decision making. The pros and cons are

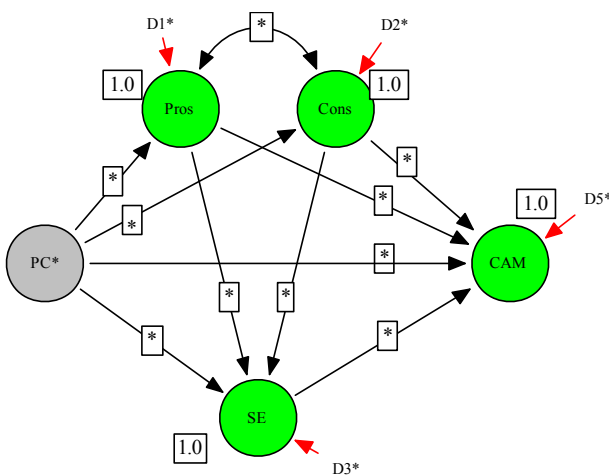
relevant in understanding and predicting transitions between stages of change (Herrick, Stone & Mettle, 1997; Pollak et al., 1998). In addition, self-efficacy (Bandura, 1977b) involves one's confidence that one can perform a behavior required to achieve a certain outcome across a variety of situations. It is also believed to be a critical predictor of stages of change (DiClemente, Prochaska & Gibertini, 1985). Finally, the processes of change describe how these stage shifts occur and are divided into experiential and behavioral processes. The TTM assumes that the use of change processes could promote the movement through the stages of change (Prochaska & Velicer, 1997). Therefore, The TTM integrates construct measures that are sensitive to progress through all stages of behavioral change.

This study attempted to examine the potential for extending the TTM to the area of CAM use. A hypothesized structural model of CAM stages of change (see Figure 1) was built based upon the literature of the TTM for the purpose of examining which constructs could related to CAM stages of change and how. The proposed, theory-based model (Figure 1) was composed of five constructs from the TTM which had been specified to CAM use. As shown in Figure 1, processes of change, self-efficacy, and pros and cons of behavioral change were hypothesized to have direct effects on the stages of CAM use. A detailed discussion of the construct relationships was presented in Chapter Two, literature review.

This research involved a secondary analysis of survey data taken from a study of complementary medicine use among Australian university students in 2000 (Feldman & Laura, 2004). The level of general CAM use was measured based on Prochaska and DiClemente's stages of change model (1983). Since the purpose of this

research was to study general CAM use, all scales selected from the original survey were measured in terms of general CAM use. No individual CAM therapy was discussed separately. More details about the original survey were discussed in Chapter three on the research methods.

Figure 1. Hypothesized Structural Model of Complementary and Alternative Medicine Use among Australian University Students



○ = Unobserved (latent) factor
 D = Residual error (disturbance) in prediction of unobserved factor
 * = Signifies path to be estimated
 → = Signifies direction of relationship between variables and/or factors
 ↔ = Covariance between variables and/or factors

Pros: Perceived benefits of CAM use
 Cons: Perceived costs of CAM use
 SE: Self-efficacy in CAM use
 PC: Processes of change of CAM use
 CAM: Stages of change of CAM use

1.3. Specific Aims and Research Questions

The purposes of this study were to 1) test an theory-based model of CAM stages of change shown in Figure 1 using structural equation modeling technique (the

extent to which the observed data fit the overall model was evaluated); 2) examine the hypothesized relationships among key constructs that borrowed from the TTM (each of the specific hypothesized pathways delineated in Figure 1 is examined for its level of statistical significance); 3) improve model fit by modifying the pathways between the model's constructs in a theoretically sensible manner; and 4) test whether the relationships among the factors differ across populations, comparing Asian Australian and European Australian, male and female students.

Research questions

Four research questions were answered in this study:

1. Overall, will the structural equation model specified in Figure 1 show a satisfactory degree of fit to the observed data?
2. Will the pros and cons, processes of change, and self-efficacy have statistically significant effects on CAM stages?
3. Will the diagnostic modification indices provided by EQS statistical software suggest any theoretically sensible modifications to the proposed model?
4. Do the paths among factors differ across population, comparing Asian Australians to European Australians, as well as male to female students?

1.4. Significance of the Study

The proposed study was one of the first that applied the TTM to CAM studies by testing a hypothesized structural model of CAM stages of change. Structural equation modeling (SEM) allowed researcher to study the relationships among latent factors with cross-sectional data (Byrne, 1994). Internal causal paths between the constructs of self-efficacy, decisional balance, processes of change, and CAM stages of change were theoretically analyzed. The significance and strengths of the effects of key constructs on the CAM stages of change were clarified. The study results added to the increasing body of evidence about whether the TTM can be useful in describing, explaining, and predicting the stages of CAM use.

A critical aspect for testing a theoretical model involves operationalizing the construct measures. SEM allows researchers to examine the adequacy of the CAM instruments (construct validity) and reveals major measurement problems with multiple observed indicators of latent factors. Therefore, this study would serve to shed light on the usefulness of the CAM construct measures in a sample of university students. SEM provided a unique analysis that simultaneously considers questions of both measurement and prediction. Given these characteristics, SEM was chosen as the study methodology in this nonexperimental research, where methods for testing CAM use theories have not been well developed before and ethical considerations make experimental design unfeasible.

1.5. Definition of Terms

Transtheoretical Model (TTM): The Transtheoretical Model (Prochaska & DiClemente, 1983), an integrative model of behavior change, is based on the premise that people move through a series of stages in their attempt to change a behavior. Compared to other behavior theories, it focuses on the process of intentional changes and the decision making of the individual. Core constructs in the TTM include stages of change, processes of change, pros and cons, and self-efficacy.

Stages of Change: The central organizing construct of the TTM is the stages of change, which represent a temporal dimension of behavioral changes (Prochaska & DiClemente, 1983). In the TTM, behavioral change is a process involving progress through a series of five stages (Prochaska & DiClemente, 1983). Precontemplation (PC) is the first stage in which people never think about a behavioral change and are not intending to take action in the foreseeable future, usually measured as the next six months. People may be in this stage because they are uninformed or under-informed about the consequences of their behavior. They might tend to avoid reading, talking or thinking about changing a behavior. The second stage is contemplation (C) in which people are thinking about starting to change in the next six months. They are more aware of the pros of changing but are also acutely aware of the cons. This balance between the costs and benefits of changing can produce profound ambivalence that can keep people stuck in this stage for long periods of time. Preparation (PR) is the third stage in which people are intending to take action in the

immediate future, usually measured as the next month. These individuals have a plan of action, such as consulting a counselor or talking to their physician. Action (A) is the fourth stage in which people have made specific overt modifications in their behaviors within the past six months. The last stage is maintenance (M) in which people have modified their behavior for 6 months or more and are working to prevent relapse but they do not apply change processes as frequently as do people in action.

Decisional Balance (Pros and Cons): The decisional balance construct reflects the individual's relative weighting of the pros and cons of behavioral changing. It is derived from the Janis and Mann's model of decision making (1985) that included four categories of pros (instrument gains for self and others and approval for self and others) and four categories of cons (instrumental costs of self and others and disapproval from self and others). Across studies of twelve different behaviors, the two-factor structure, pros (positive image, values, and beliefs) and cons (negative image, values, and beliefs), was found to be remarkably stable in the process of behavioral change (Prochaska et al, 1994).

Processes of Change: Processes of change are ten covert and overt activities that people use to progress through the five stages (Prochaska et al., 1985). The first five processes are cognitive or experiential in nature, and the remaining five processes are behavioral in nature.

- Consciousness raising involves finding and learning new facts, ideas, and tips that support the healthy behavioral change.

- Dramatic relief refers to experiencing the negative emotions that go along with unhealthy behavioral risks.
- Self-reevaluation comes when individuals realize that the behavioral change is an important part of one's identity as a person.
- Environmental reevaluation comes when individuals realize the negative impact of the unhealthy behavior or the positive impact of the healthy behavior on one's proximal social and physical environment.
- Self-liberation is to make a firm commitment of behavioral change.
- Helping relationships refers to seeking and using social support for the healthy behavioral change.
- Counterconditioning is to substitute healthier alternative behaviors and cognitions for the unhealthy behaviors.
- Contingency management is increasing the rewards for the positive behavioral change and decreasing the rewards of the unhealthy behavior.
- Stimulus control is to remove reminders or cues to engage in the unhealthy behavior and adding cues or reminders to engage in the healthy behavior.
- Social liberation refers to when individuals realize that the social norms are changing in the direction of supporting the healthy behavioral change.

Self-efficacy: Self-efficacy (Bandura, 1977b) refers to the confidence individuals have in their own ability to successfully carry out a behavior. Bandura proposed that the actual performance of a particular behavior is highly related to individuals' beliefs in their abilities to perform that behavior in specific situations. An individual with

low self-efficacy is likely to have lower expectations of successfully performing the behavior and is more affected by situational temptations that are counterproductive to promoting and maintaining behavior change. In contrast, an individual who has high self-efficacy not only expects to succeed but is actually more likely to do so.

Complementary and Alternative Medicine: Complementary and alternative medicine practices was defined as those health care and medical practices not currently an integral part of conventional medicine (Eisenberg et al., 1997). It encompasses health practices ranging from relatively new modalities (e.g., art therapy and biofeedback) to ancient skills of an initiated community (e.g., yoga, meditation), and traditional practices that are quite conventional in some cultures (e.g., traditional Chinese medicine) (Bensoussan, 1999).

Structural Equation Modeling: The term structural equation modeling conveys two important aspects of the procedure: (a) the causal processes under study are represented by a series of structural (i.e., regression) equations, and (b) these structural relations can be modeled pictorially to enable a clearer conceptualization of the theory under study (Byrne, 1994). The hypothesized model can then be tested statistically in a simultaneous analysis of the entire system of variables to determine the extent to which it is consistent with the data. If goodness of fit is adequate, the model argues for the plausibility of postulated relations among variables; if it is inadequate, the tenability of such relations is rejected (Byrne, 1994).

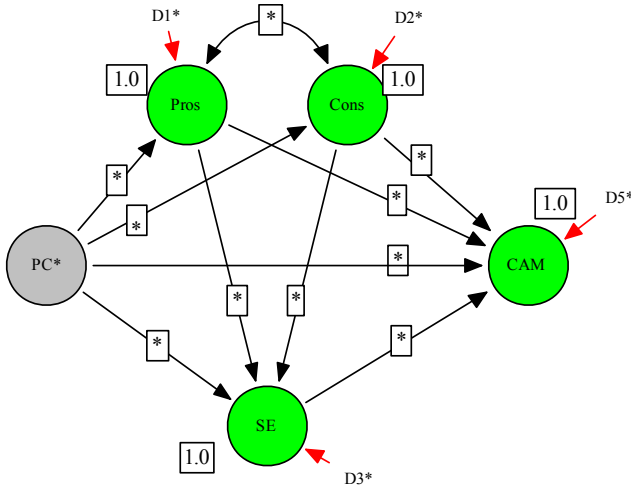
CHAPTER 2: LITERATURE REVIEW

In Chapter Two, the first section contains the literature review related to CAM use in Australia. Section two includes a review of the factors associated with CAM use. The third section discusses the relative theories used in explaining CAM use in previous studies. Section four reviews the TTM and why the four specific constructs of pros, cons, self-efficacy, and processes of change are hypothesized to have a distinct pattern of direct effects on stages of CAM use in the proposed model. An introduction of the original Australian CAM study is in section five. Section six is an overview of structural equation modeling. Finally the literature review is summarized.

A hypothesized structural model of CAM stages of change (see Figure 1) was built based upon the literature of TTM for the purpose of examining which constructs could relate to CAM stages of change and how. The proposed, theory-based model was composed of five constructs from the TTM which had been specified to CAM use. The primary purposes of this study were to test the theory-based model of CAM stages of change shown in Figure 1 using structural equation modeling technique and examine hypothesized relationships in the model among key constructs. The specific constructs of pros, cons, self-efficacy, and processes of change were presumed to have direct effects on the stages of CAM use. Each of the specific hypothesized pathways delineated in Figure 1 was examined for its level of statistical significance. The research involved a secondary analysis of survey data from a study of complementary medicine use among Australian university students in 2000 (Feldman

& Laura, 2004).

Figure 1. Hypothesized Structural Model of Complementary and Alternative Medicine Use among Australian University Students



2.1. Complementary and Alternative Medicine Use

Eisenberg et al. (1993) described complementary and alternative medicine practices as “those interventions neither taught widely in medical schools nor generally available in US hospitals” (Eisenberg et al., 1993, Page 1569). More specifically, CAM encompasses health practices ranging from relatively new modalities (e.g., art therapy and biofeedback) to ancient skills of an initiated community (e.g., yoga, meditation), and traditional practices that are quite conventional in some cultures (e.g., traditional Chinese medicine) (Bensoussan, 1999). Increasing use of complementary therapies has been reported throughout the industrialized world during the last decade (MacLennan, Wilson & Taylor, 1996; Eisenberg et al., 1998).

MacLennan, Wilson & Taylor (1996) surveyed a representative population (n=3004) living in South Australia in 1993 and reported that the overall use of alternative therapies was 48.5%, and 20.3% of respondents had visited at least one of 10 types of alternative practitioners. In 1997, the Australian government estimated that approximately 57% of Australians used CAM (Commonwealth Department of Health and Family Services, 1997). Australians consumed as much nontraditional medicine and vitamin and mineral supplements as prescription drugs (Australian Bureau of Statistics, 1998). Among a sample of 924 Australian PLWHA (people living with HIV/AIDS), 55% of the respondents reported using CAM (Visser & Grierson, 2002). Most PLWHA did not choose CAM as an alternative but as a complement to their Western medical treatments. Visser & Grierson (2000) argued that the use of CAM among PLWHA was not related to patients' clinical factors but to their attitudes toward CAM, and CAM use was part of broader lifestyle patterns rather than a reaction to the illness (Visser & Grierson, 2002).

The proposed research involves a secondary analysis of survey data taken from a study of complementary and alternative medicine use among Australian university students in 2000. To better understand the CAM use in the general population, researchers examined the reasons and motivations of CAM use among university students (Feldman & Laura, 2004). University students have generally been innovators and early adopters of new health practices, for example, smoking cessation and vegetarian diets (Rogers, 1995). In a 2003 study, about 36% of Australian university students (n=171) reported using more than one of the complementary therapies, and CAM users were more likely to be female

(O'Callaghan & Jordan, 2003). The most common CAM practices reported by students were naturopathy, aromatherapy, and acupuncture (O'Callaghan & Jordan, 2003). In addition, since surveys of the general populations of Western industrialized nations showed that Australia had one of the highest rates of CAM use, it would be useful to study the reasons for CAM use in Australia to gain a better understanding of potential worldwide trends in the use of CAM (Feldman & Laura, 2004).

2.2. Factors Associated with CAM Use

In the last decade, there have been more studies attempting to explore the predictors of CAM use. The following psychosocial factors were reported to be related to CAM use.

2.2.1. Demographic variables

A great amount of CAM studies reported that CAM users were more likely to be female, younger, better educated, wealthier, and of poorer health status (Eisenberg et al., 1993; Kelner & Wellman, 1997; MacLennan, Wilson & Taylor, 1996). However these demographic factors were not consistently found as predictors of attitudes, beliefs, and behaviors related to CAM (Vincent & Furnham, 1997; Sirois & Gick, 2000; Visser & Grierson, 2002). Gray et al. (2002) surveyed 4404 health plan members in the U.S. and reported that CAM use was higher among female (46% female vs. 38% male), younger (<55 years), more highly educated (college graduate or more), while those with chronic conditions were no more likely to report CAM use.

Visser & Grierson (2002) reported that CAM users among PLWHA in Australia were significantly more likely to be younger, women, and educated, but poverty was not significantly correlated to CAM use. Sirois & Gick (2002) also found that income was not a significant predictor of CAM use.

Ethnicity was investigated as a possible determinant of CAM use, because many alternative therapies were medically mainstreams in other countries and might form part of the cultural health care traditions of some families (Baugniet, Boon & Ostbye, 2000). MacLennan, Wilson & Taylor (1996) found that CAM users in Australia were more likely to be Australian-born. Astin (1998) reported that racial/ethnic differences did not predict use of alternative medicine in the U.S. (Astin, 1998) when comparing White, Black, and Hispanic Americans. However, a national survey in the U.S. showed that Asian adults were more likely (43.1%) to use CAM (excluding megavitamin therapy and prayer) than White adults (35.9%) or Black adults (26.2%) (Barnes, Powell-Griner, McFann & Nahin, 2002). The inconclusive results suggested a need for further investigation of the effects of demographics on CAM use.

2.2.2 Health Beliefs

Research suggests that a variety of health beliefs and values, called the postmodern philosophy, are associated with CAM use (Siahpush, 1999; O'Callaghan & Jordan, 2003). People who hold postmodern values generally emphasize nature remedies, believe in a holistic view of health, reject scientific authority, and stress the individual's responsibility for achieving good health (Siahpush, 1999). A holistic view

of health focuses on the important roles of body, mind, and spirit in health maintenance and stresses that body, mind, and spirit are closely related.

In a survey among 787 participants in Victorian, Australia, postmodern values were a significant determinant of attitudes toward CAM (Siahpush, 1999). In addition, O'Callaghan and Jordan (2003) surveyed 171 adults in an Australian university to explore the relationship between postmodern values and people's attitudes and behaviors of CAM use. The postmodern values, together with age, significantly predicted attitudes to CAM and actual CAM use. Individuals subscribing to postmodern values about health hold more positive attitudes towards CAM and were more likely to use CAM because the underlying philosophies of many such therapies were congruent with their belief systems (O'Callaghan & Jordan, 2003).

However, drawing causal inferences from these studies is difficult due to the nature of the cross-sectional data. Astin (1998) argued that people who hold this philosophical orientation might be attracted to alternative health care because "they saw in these therapeutic systems a greater acknowledgment of the role of nonphysical (mind/spirit) factors in creating health and illness" (Page 1552); or people who involved with alternative medicine had their belief systems influenced by these therapeutic modalities and the philosophies underlying them.

2.2.3 Perceived Effectiveness

Another influential factor in people's decision to use alternative health care may be its perceived potential efficacy (Astin, 1998). A study of attitudes of Australian medical students toward CAM revealed that Australian medical students

were positive toward CAM in general and that they perceived meditation, massage and acupuncture the most useful practices (Hopper & Cohen, 1998). Most students (75%, n=800) agreed that complementary therapies included ideas and methods from which conventional medicine could benefit, that these therapies could provide a useful supplement to mainstream medicine (70%), and that CAM did not threaten public health (62%). Chez et al. (2001) applied Hopper's questionnaire in surveying American medical students and similar positive attitudes toward CAM were reported. A national survey in the U.S. concluded that adult CAM users were most likely to utilize CAM because they believed that CAM combined with conventional medical treatments would help (Barnes, Powell-Griner, McFann & Nahin, 2004).

Sparber et al. (2000) reported that CAM use was common among cancer patients. The major reasons for these CAM practices were that most patients believed that "these therapies helped to improve their quality of life through more effective coping with stress, decrease the discomforts of treatment and illness, and give them a sense of control" (Sparber et al., 2000, Page 629).

Astin (1998) reported that the three most frequently endorsed benefits of CAM use were, "I get relief for my symptoms, the pain or discomfort is less or goes away, I feel better," "The treatment works better for my particular health problem than standard medicine does," and "The treatment promotes health rather than just focusing on illness" (Astin, 1998, Page 1552). Also, Swartzman et al. (2002) asked American undergraduates to rate 19 alternative approaches to the treatment of chronic back pain. CAM treatments, compared to conventional therapies, were seen to be more appealing, less invasive, and with less side effects.

2.2.4. Patient-practitioner relationships

Furnham & Smith (1998) argued that for patients with chronic disease who need support and time to discuss ways of coping with their illness, patient-practitioner communication might be a main reason for seeking complementary and alternative medicine. Complementary practitioners were perceived as more sympathetic, having more time to listen, being more sensitive to emotional issues, better at explaining treatment, and better at explaining why a patient was ill (Furnham & Smith, 1998).

Dissatisfaction with conventional medicine might be the primary factor which served to shape positive opinions about alternative therapies. Sirois & Gick (2002) claimed that different types of alternative therapies shared one element in common: an emphasis on treatments that consider the whole person rather than just the specific health problem. The conventional medical system's lack of holism, inadequate information regarding diet, nutrition and exercise, and ignorance of social and spiritual dimensions, were motivations for people turning to CAM (Sirois & Gick, 2002). Also, this dissatisfaction might be related to beliefs about negative side effects of prescription drugs and the safer, more effective options provided by many natural remedies (O'Callaghan & Jordan, 2003). Sparber et al. (2000) reported that patients were willing to talk to physicians about their use of CAM, but they seldom were asked about it. Patients also wanted their physicians to be aware of these hopeful therapies and supportive of their use (Sparber et al., 2000).

However, Astin (1998) found that users of CAM were no more dissatisfied with or distrustful of conventional care than nonusers were. This result was consistent

with the Eisenberg et al. (2001) findings that fewer than 21% of CAM users (175 out of 831) agreed that alternative therapies were superior to conventional medicine, and 79% agreed that using both conventional and complementary therapies was better than using either one alone. Eisenberg argued that the use of CAM could not be attributed primarily to perceived dissatisfaction with conventional medical care or caregivers.

2.2.5. Safety Concerns and Lack of Evidence for CAM

A negative factor that prevented people from practicing CAM might be that most of therapies had not been satisfactorily evaluated for their relative effectiveness, safety, or mechanisms of action (Eisenberg et al., 2001). Hopper and Cohen (1998) argued that although medical students perceived CAM as generally useful (51%), they seemed divided on whether therapies that were not scientifically tested should be discouraged. Students seemed unsure “whether the effects of complementary therapies were due to a placebo effect and whether they stimulate the body’s natural healing powers” (Hopper and Cohen, 1998, Page 70). A large majority of medical students reported that scientific evidence was important in their decision to support an alternative therapy (Hopper & Cohen, 1998). About 66% of students agreed that nonmedical practitioners of CAM should be registered, and 80% thought that physicians should receive training before practicing CAM (Hopper & Cohen, 1998). In addition, Baugniet, Boon & Ostbye (2000) reported that perceptions differed among the different health professional student groups about the usefulness of CAM therapies and the kind of evidence needed before they should be incorporated into

standard care. Medical and pharmacy students were more likely than other health student groups to value evidence-based rather than anecdotal forms of support for CAM (Baugniet, Boon & Ostbye et al., 2000).

2.3. Relative Theories for Explaining CAM Use

Astin (1998) has tested some tentative explanatory models that account for alternative medicine use. He hypothesized that three factors related to CAM use: 1) dissatisfaction with conventional treatment; 2) need for more personal autonomy and control over health care decisions; and 3) philosophical congruence: alternative therapies are attractive because they are seen as more compatible with patients' values, spiritual/religious philosophy, or beliefs regarding the nature and meaning of health and illness. His study results showed that dissatisfaction with conventional medicine was not predictive of CAM use (Astin, 1998). However, the study did provide strong support for the philosophical/value congruence theory in explaining CAM use (Astin, 1998). Since the dependent variable, CAM use, was dichotomous in nature, logistic regression analysis was the main method used in this research.

Based upon social behavioral models (Anderson & Newman, 1973), Sirois and Gick (2002) hypothesized that three factors contribute to individuals' health care use. They were 1) predisposition to use health services (e.g., demographic, beliefs, and social variables); 2) ability to secure health services (e.g., income); and 3) medical needs. Sirois & Gick (2002) found that two predisposing factors (health-aware behaviors and dissatisfaction with conventional medicine) and medical needs

were significant predictors, and income was a significant discriminator of CAM use. The results supported the utility of the three social-behavioral components (predisposing, enabling, and need factors). However, the study focused mainly on four provider-based practices which included chiropractic, homeopathy, acupuncture and massage therapies, and discriminant function analysis was the primary method in the data analysis.

2.4. Transtheoretical Model of Behavior Change

The Transtheoretical Model (Prochaska & DiClemente, 1983) is based on the premise that people move through a series of stages in their attempt to change a behavior. It attempts to explain how, rather than why, behavioral change occurs by describing the processes of intentional changes and the decision making of the individual. The empirical support for the model came from a variety of behaviors (Prochaska et al., 1994). In an integrative review, it was demonstrated that the same pattern of change across the stages occurred for decisional balance for 12 distinct problem areas which included smoking cessation, weight control, exercise adoption, sunscreen use, mammography screening, HIV risk reduction, dietary fat reduction, and adolescent delinquent behavior (Prochaska et al., 1994). However, no study identified has attempted to apply the TTM to study the general CAM practice.

The TTM integrates a set of constructs that are sensitive to the whole process of a behavioral change. The stages of change present the structural and temporal dimension of behavioral changes. Self-efficacy and decisional balance provide a

multivariate outcome space for measuring intentional and behavioral changes. Processes of change act as independent variables which promote the stages of change. To date, a great amount of researches have provided strong support for the reliability and validity of core constructs of TTM (Lam, McMahon, Priddy, & Gehred-Schultz, 1988; Marcus, Rossi, & Selby et al., 1992).

2.4.1 Stages of Change

The stages of change are the central organizing construct which assesses five stages of behavioral change. The five stages include precontemplation, contemplation, preparation, action, and maintenances (see Definition of Terms in Chapter One). Moving through the five stages of change may not occur in a linear fashion; often individuals move through the stages repeatedly in a cyclical manner before maintenance is reached.

Assessment of the individual's readiness to practice CAM using the stages of change can provide important additional information about the entire population's potential receptiveness for the complementary medicine. Wang, Peloquin & Kain (2002) reported that 32% (n=275) of patients undergoing surgery actually used CAM therapies in the past year, although a majority of patients (55.4%) claimed that they believe in CAM therapies.

The decision making of CAM use is assumed to be a complex process of seeking health care. CAM users might progress from weighing the benefits and costs of CAM practice to searching for information from friends and family, from shopping for health products or contacting alternative practitioners to actually practicing the

CAM therapies. Therefore, the stages of change has been consistently reported to be related to the use of processes of change (Prochaska & DiClemente, 1985; Prochaska & Velicer, 1987), to self-efficacy (DiClemente, Prochaska, & Gibertini, 1985), and to the decision-making construct (Velicer, DiClemente et al., 1985) for smoking cessation. The relationships between stages and other key constructs are discussed in the following sections.

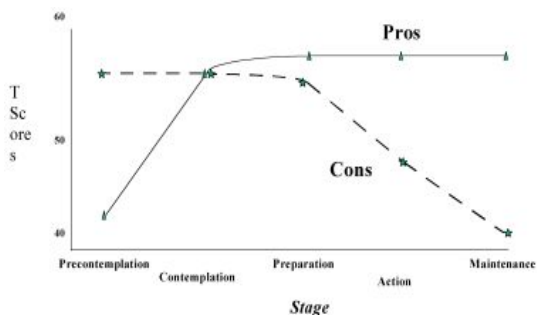
2.4.2 Decisional Balance (Pros and Cons)

The decisional balance construct reflects the individual's relative weighting of the pros and cons of changing. The pros and cons scales capture some of the cognitive changes that are required for progress through the stages of change. It was demonstrated that the same pattern of change across the stages occurred for decisional balance for 12 distinct problem areas (Prochaska et al., 1994) (see Figure 2). In the precontemplation stage, the cons of changing always outweigh the pros. During the progress of behavioral change, the pros of changing increase between precontemplation and contemplation stages. In contemplation, these two scales are approximately to be equal. After that, the cons of changing decrease from contemplation to action. It is estimated that the process from precontemplation to action involves approximately one standard deviation increase in the pros of changing, and a 0.5 standard deviation decrease in the cons of changing (Prochaska et al., 1994).

Herrick, Stone & Mettle (1997) argued that progressing from precontemplation to preparation and preparation to maintenance depends on an increase in pros scores and a decrease in cons scores. Prochaska, DiClemente, Velicer,

Ginpil & Norcross (1985) reported that the pros and cons scales were predictors of change in the stages of precontemplation and contemplation, and the decisions were always made prior to the behavioral changes (Prochaska, DiClemente, Velicer, Ginpil & Norcross, 1985). In longitudinal studies, decisional balance has been especially useful in predicting movement from the precontemplation to the contemplation stage and in predicting behavior change (Prochaska, Velicer, DeClemente, Guadagnoli, & Rossi, 1991).

Figure 2. The Relationship between Stage and the Decisional Balance for a Healthy Behavior



Available at <http://www.uri.edu/research/cprc/TTM/detailedoverview.htm> , accessed Feb.8, 2005

2.4.3. Self-efficacy

Self-efficacy (Bandura, 1977b) refers to the confidence individuals have in their own ability to successfully carry out a behavior. Self-efficacy has been emphasized as a key variable in predicting stages of change from contemplation to action and from action to maintenance (DiClemente, Prochaska & Gibertini, 1985). In a study on smoking cessation, DiClemente, Prochaska & Gibertini (1985) documented and described the concordance of self-efficacy in performing a specific

task and subsequent initiation and level of performance of that task. It was found that subject's self-efficacy at the initial assessment was related to changes in status for recent quitters and contemplators at the follow-up. Subjects with higher self-efficacy scores tended to initiate and maintain smoking cessation when compared with their cohorts. This predictive ability for both smokers contemplating quitting and recent quitters supported the contention that self-efficacy mediated behavioral changes (DiClemente, Prochaska & Gibertini, 1985). The perceived self-efficacy successfully predicts the degree of change in a variety of behavioral studies (Prochaska, DiClemente, Welicer, Ginpil & Norcross, 1985).

In addition, DiClemente, Prochaska & Gibertini (1985) found the decisional balance variables also demonstrated a significant relationship with self-efficacy. The more individuals valued smoking, the less confident they were in their ability to quit smoking. This relationship was also reported from studies of pregnancy and STD prevention (DiClemente, Prochaska & Gibertini, 1985; Horowitz, 2003).

2.4.4. Processes of Change

One of the assumptions of the TTM is that there is a common set of change processes people can apply to promote the stages of change (Prochaska et al., 1985). These processes (see Definition of Terms in Chapter One) include ten covert and overt activities that people use to progress through the five stages. Previous studies have found that the stages of change is an effective dimension for integrating 10 processes of change that have their theoretical origins in diverse system of psychotherapy (DiClemente et al., 1991; Gottlieb et al., 1991; Prochaska, DiClemente,

Welicer, Ginpil & Norcoss, 1985; Prochaska, Rossi, & Wilcox, 1991). Researchers suggested that in early stages (precontemplation to contemplation), people applied cognitive, affective, and evaluative processes to progress through the stages, such as consciousness raising and dramatic relief. In later stages, people relied more on commitments, conditioning, contingencies, environmental controls, and support from progressing toward maintenance (Prochaska et al., 1991).

These 10 processes of change were said to be “like independent variables that people need to apply to promote the stages of change” (Prochaska & Velicer, 1997, P.39). Prochaska, DiClemente, Welicer, Ginpil & Norcoss (1985) found two processes of change, self-reevaluation and helping relationships, were the most efficacious predictors of addictive behavioral changes (Prochaska, DiClemente, Welicer, Ginpil, Norcoss, 1985). CAM research also reported that greater social support from friends was associated with higher levels of CAM use (Guarino, 2002). Kosma, Cardinal and McCubbin (2004) used Transtheoretical Model constructs to examine predictors of physical activity stage of change for mostly inactive adults with physical disabilities. A direct discriminant function analysis revealed that the most important stages of change predictors were the behavioral and cognitive processes of change, followed by self-efficacy and decisional balance.

Processes of change were also reported to be related to self-efficacy in smoking cessation, increased process use was related to higher self-efficacy (DiClemente, Prochaska & Gibertini, 1985). These results were consistent with the TTM assumption which proposes that the construct of processes works as the independent variable to predict the stages of change and the change in decisional

balance and self-efficacy.

2.5. Feldman and Laura's Study

Feldman and Laura (2004) firstly applied the TTM in a study of complementary medicine use among Australian university students in 2000 (Feldman & Laura, 2004). A convenience sample consisted of 518 students from a comprehensive university in Australia completed the survey on CAM use. The questionnaire (see Appendix 1) was a self-report measure that assessed the constructs of stages of change, processes of change, self-efficacy and decisional balance of CAM use. The measures were specific for the behavior of CAM use.

According to the primary results of the investigation, the most common practices among students were relaxation techniques, massage therapy, herbal medicine, and art therapy. Female students showed significant greater use of CAM in general. The main reasons for using CAM were reported to be the search for better results, lifestyle, fewer side effects, and holistic approach.

Subjects were successfully categorized in the five stages of change (see Table 1). A total of 19.9% of respondents reported never using any complementary therapy. For all 24 CAM therapies, 70.1% of students reported being in the precontemplation stage on average. This revealed that most students had not yet thinking about engaging in each of the CAM therapies. On average, students reported being in the maintenance stage were 12.9%, contemplation 9.5%, action 4.2%, and preparation 2.5%. Since subjects were asked their practices of each of 24 CAM therapies, it was

possible that one participant falls into multiple CAM stage categories. These categorical differences exactly reflect the subject's receptiveness or readiness of CAM use in general.

Table 1. Distribution of Stages of Change of CAM Use in Feldman and Laura's Study (2004)

CAM Practices\ Stage	1	2	3	4	5
Aromatherapy	93.3	2.8	1.0	0.4	0.8
Biofeedback	90.9	4.3	1.2	1.0	1.8
Hypnosis	86.6	7.7	0.8	1.0	2.4
Self-Help Groups	85.7	4.3	2.8	1.6	4.3
Ayurvedic Medicine	84.9	4.7	1.6	2.2	5.5
Energy Healing	83.1	9.0	1.6	1.6	4.1
Homeopathy	82.9	6.5	1.8	1.8	4.9
Spiritual Healing	82.7	4.3	1.2	1.2	9.6
Acupuncture	79.6	10.4	2.0	2.0	5.7
Tai Chi	77.6	12.2	2.8	2.4	4.1
Mental Imagery	74.3	5.5	2.0	6.1	12.0
Folk/Home Remedies	68.6	4.5	2.4	3.7	19.8
Chiropractic Services	68.4	14.5	2.4	3.3	10.4
Prayer	64.2	2.8	1.4	2.6	28.5
Lifestyle Diet	60.9	12.0	3.5	6.3	16.3
Yoga	59.3	19.4	6.3	4.9	9.2
Music Therapy	58.2	9.2	2.9	4.9	24.6
Meditation	56.8	16.3	3.3	6.9	15.5
Art Therapy	49.9	14.7	1.8	7.7	24.6
Herbal Medicine	46.2	12.6	3.1	10.0	27.1
Relaxation Techniques	36.1	16.5	4.9	12.2	29.5
Massage Therapy	32.0	22.0	7.1	11.0	26.9
Megavitamin Therapy	75.0	6.3	2.2	3.7	10.2
Dance Therapy	77.0	9.4	1.8	3.3	7.9

1. Precontemplation
2. Contemplation
3. Preparation
4. Action
5. Maintenance

The primary investigations had provided encouraging results for extending the TTM to the area of CAM use (Feldman & Laura, 2004). First, a pool of items was developed guided by the TTM and yielded principal components consistent with major decisional balance constructs (Feldman & Laura, 2004). These outcomes were important for the development of a measurement model of CAM stage of change. Second, the key constructs reflected the hypothesized differences across stages of CAM use, with students who engaged in high CAM use (those reporting having used five or more therapies) scoring significantly higher on decisional balance, self-efficacy, and process of change scales. This outcome provided the evidences for building a structural model of CAM stages of change.

2.6. Structural Equation Modeling

Structural equation modeling is a relatively new statistical technique. The first computer program that could perform SEM was not developed until the late 1970s. It is also referred to as covariance structure modeling, because covariance, instead of correlation, is analyzed in SEM. Since SEM is considered a causal modeling technique, it can be performed with either cross-sectional or longitudinal data and is not typically used to analyze data produced from an experimental design. The main task of SEM is “to determine the goodness of fit between the hypothesized model and the sample data” (Byrne, 1994, P. 7). A good fit suggests that the hypothesized relations among constructs are plausible; a bad fit suggests the rejection of the theorized relations among constructs in the model.

A structural equation model normally consists of a measurement model and a

structural model. The measurement model (Figure 3 to Figure 7 in Chapter Three) defines relations between measured/observed variables (indicators) and the latent/unobserved variables for which they are used as approximations. All latent factors are allowed to covary in the measurement model. The structural model (Figure 1) specifies the hypothesized causal structure among latent variables which is indicated as a path or arrow connecting the two variables.

All latent variables need to have an assigned unit of measurement either by specifying a reference variable or standardizing the factors. Endogenous factors only have measurement assigned by specifying a reference variable. The relationships in the hypothesized structural model are expressed using structural equations. A structural equation is a regression-type equation expressing each dependent variable as a function of all elements having a direct effect on it (i.e., each single-headed incoming arrow). These structural equations have implications for the variances and covariance that should be observed in the data according to the hypothesized relations. Thus, each parameter is expressed as a function of covariance or variances of the latent factors. The parameters that need to be estimated in the process of model estimation are called free parameters.

SEM analysis processes include model specification, identification, estimation, assessment of data-model fit, and possible model modification and re-estimation.

2.6.1. Model Specification

Model specification is the act of stating a model by describing the relationships among the variables that will be analyzed. The specified model should

be grounded in a sound theoretical framework regarding the expected relationship between the variables. Three types of relationships among constructs are specified in SEM: (1) association (non-directional relationship), (2) direct effect (direct causal relationship), and (3) indirect effect (the effect of one independent variable travels through an intervening variable) (Hoyle, 1995). The hypothesized relationships are depicted in a path diagram by arrows, or paths, connecting the latent factors in ways that represent the hypothesized directions and magnitudes of the causal relations. Two headed arrows represent covariance between two factors, and single-headed arrows represent causal relations between factors.

2.6.2. Model Identification

Model identification refers to the correspondence between the free parameters (t = the number of parameters requiring estimation) and the observed variances (p = the number of variables in the model). The parameters to be estimated are the regression coefficients in structural equations and the variances and covariances of independent variables (Bentler & Wu, 1995). A just-identified structural model ($t = p[p+1]/2$) has unique solutions for the unknown parameters. An over-identified structural model ($t < p[p+1]/2$) is one in which multiple expressions exist for one or more parameters. An under-identified structural model ($t > p[p+1]/2$) is a model in which some or all of the parameters can not be estimated on the basis of data alone. The hypothesized model in this study is an over-identified structural model with 42 observed variables and 90 free parameters needed to be estimated.

2.6.3. Model Estimation

For just and over-identified models, parameter estimates can be obtained through estimation methods such as maximum likelihood. This estimation method iteratively minimizes a function of the discrepancy between the observed (co)variances and those reproduced by a substitution of iteratively changing parameter estimates into the model implied relations (Hancock & Mueller, 2001). The maximum likelihood estimation procedure selects parameter estimates so as to maximize the likelihood of the observed data and is robust to violations of normality (Loehlin 1998). Therefore, all parameter estimation in this study will be conducted using the maximum-likelihood method of estimation.

2.6.4. Assessment of Model Fit

Although the estimations minimize the differences between the observed data and the proposed model, a model still may not fit the data on an acceptable level. Statistical tests can be performed to test the fit between the observed data and the hypothesized model. There are three categories of fit indices, absolute fit indices, parsimonious fit indices, and incremental fit indices, through which model fitness assessment can be made.

Absolute fit indices, such as the model Chi-square statistic, the Standardized Root Mean Square Residual (SRMR), and the Goodness of Fit Index (GFI), improve as the discrepancy between the observed and reduced (co)variances decrease. These fit indices tend to improve as the complexity of the model increases. The lower the Chi-square, the better the model fits. It is recommended that the ratio of Chi-square to

its degree of freedom should be less than 3.

Parsimonious fit indices, such as the Adjusted Goodness of Fit Index (AGFI) and the Root Mean Square Error of Approximation (RMSEA), take into account not only the overall absolute fit but also the degree of complexity required to achieve that fit. These indices indicate the best model fit when there is good absolute fit and the models are relatively simple (i.e. have few parameters). Incremental fit indices, such as the Normal Fit Index (NFI) and the Comparative Fit Index (CFI), test the fit of the model in relation to a baseline model with fewer parameters.

Judgments regarding data-model fit or misfit are based on several criteria. First, individual parameter estimation and associated statistics must be scrutinized for substantive and/or statistical impossibilities. Second, multiple overall fit indices should be considered since each was developed for a different purpose and comes with certain disadvantages (Mueller, 1996). Joint criteria for acceptable fit (Hu and Bentler, 1999) have been adopted in this study. This criteria requires a $CFI > 0.90$ together with a $RMSEA < 0.05$ or with an $AGFI > 0.90$.

2.6.5. Model Modification and Respecification

Once a model has been estimated and its fit tested, the next phase is model modification and respecification, if necessary. New models can be developed as a refinement based on analysis results from the Lagrange Multiplier (LM) test, a test that provides 'post hoc theory' dictates as determinants of the model respecifications. Covariances between two error residuals or a new path between two latent factors might be added into the new models. The models should be retested again with the

adjustments included and the same steps should be repeated in determining whether or not to add more residual error covariances or paths.

A theoretical modification is strongly cautioned against. After modifications, subsequent fit results may be due to a chance rather than true model improvements. To know when to stop fitting a structural model, the researcher should have 1) a thorough knowledge of the substantive theory, 2) an adequate assessment of statistical criteria based on information pooled from various indices of fit, and 3) a watchful eye on the parsimony of the model (Byrne, 1994).

2.6.6. SEM Applications to the Transtheoretical Model Studies

Two studies identified examined the relationship between key constructs of the TTM using structural equation modeling. Pollak et al. (1998) investigated causal relationships between processes of change and decisional balance using structural equation modeling, and attempted to clarify how people consider and take action to stop smoking. Study results indicated that using the processes of change has causal predominance over decisional balance for smokers in the contemplation stage (Pollak et al., 1998). This result was consistent with the TTM assumption which proposed that the construct of processes works as the independent variables to predict the change in decisional balance.

Velicer, Rossi & Prochaska (1996) proposed a three-construct model which incorporated pros and cons as outcome measures of intentional and behavioral changes. Cross-sectional confirmatory factor analysis modeling and longitudinal latent variable panel design modeling both provided supports that the outcome model

had strong construct validity and accurately reflected the movements between the stages (Velicer, Rossi & Prochaska, 1996).

2.7. Summary of Literature Review and Rationale for Study

In summary, CAM studies have consistently revealed that several psychosocial factors, such as postmodern values, perceived effectiveness of CAM use, and patient-practitioner relationships, predicted the attitudes and the behaviors of CAM use. This literature provides support for establishing a measurement model specific to CAM use. For example, the perceived effectiveness and patient-practitioner relationship can be used as indicators of the construct of pros of CAM use; and the lack of evidence and safety concerns can be used for measuring the construct of cons of CAM use.

The TTM provides a theoretical framework for better understanding the processes of intentional change and decision making of CAM use. The organizing construct of TTM, stages of change, involves a series of intermediate/outcome measures (self-efficacy, pros and cons) that are more sensitive to a full range of cognitive and behavioral changes than yes-or-no outcome measures. The processes of change were reported as independent variables which caused the changes in self-efficacy, decisional balance, and stages of changes. This literature provides a base for establishing a structural model of CAM stages of change (see Figure 1) which attempts to describe which constructs could relate to CAM stages of change and how.

The hypothesized CAM model is grounded in a sound theoretical framework of the TTM regarding the expected relationship among key constructs.

CHAPTER 3: METHODOLOGY

The discussion of methodology within Chapter Three begins with a description of the original Australian CAM study including its participants, procedures, and questionnaire used, followed by a description of the secondary data collection for this study, then SEM analysis method, and finally, a summary of study methods and human subjects.

A hypothesized structural model of CAM stages of change (see Figure 1) was built based upon the literature of TTM. The proposed, theory-based model was composed of five constructs borrowed from the TTM which had been specified to CAM use. The primary purposes of this study were to test the theory-based model of CAM stages of change shown in Figure 1 using structural equation modeling technique and examine hypothesized relationships among key constructs. The specific constructs of pros, cons, self-efficacy, and processes of change were presumed to have direct effects on the stages of CAM use. Each of the specific hypothesized pathways delineated in Figure 1 was examined for its level of statistical significance. The research involved a secondary analysis of survey data from a study of complementary medicine use among Australian university students in 2000 (Feldman & Laura, 2004).

3.1 Primary Study Design

This research involved a secondary analysis of survey data taken from a study of complementary medicine use among Australian university students in 2000 (Feldman & Laura, 2004). The purpose of the original study was to examine CAM use among Australian university students.

3.1.1. Participants

The study was a cross-sectional, self-report survey of Australian university students in 2000 (Feldman & Laura, 2004). A convenience sample consisting of 518 students from a comprehensive university in Australia completed the survey on CAM use. The students were recruited from undergraduate classes in the social sciences, health disciplines and other student organizations. Of the 518 participants, 75.6% were female. About 63% were between the ages of 18 and 22, nearly 98% were undergraduates, and 89% were born in Australia. In order to examine ethnic differences between students from Asian backgrounds and students from European backgrounds, students from China were oversampled. The sample contained 74 Asian-Australians and 314 European-Australians (see Table 2).

3.1.2. Procedures

The survey conducted in 2000 at the University of Newcastle in Australia was a self-administered written questionnaire that required approximately 15 minutes to complete (Feldman & Laura, 2004). Institutional Review Board approval was

received from the Human Research Ethics Committee of the University. The data collection was confidential and anonymous. The students were told that the purpose of the study was to learn about the CAM use among university students. A term sheet was attached to the questionnaire and handed to all respondents before they began filling out the survey to provide the definitions of 24 complementary therapies (See Appendix 1).

Table 2. Demographic Characteristics of Survey Sample (N=518) of the Preliminary Study

Category	Number n=518	Percent %
Sex		
Women	382	73.7
Men	123	23.7
Missing	13	2.5
Ethnicity		
European	314	60.6
Asian	74	14.4
Others	20	3.8
Missing	110	21.2
Age		
18-22 years old	318	61.4
Over 22 years old	187	36.1
Missing	13	2.5

3.1.3. Questionnaire

The questionnaire used was a self-report measure that assessed the stages of change, processes of change, self-efficacy and decisional balance of CAM use (Feldman & Laura, 2004). The measures were specific to general CAM use, as well as to acupuncture and meditation practices. Demographic information was collected in the survey, as well as the reasons for using or not using CAM therapies.

This questionnaire used in the Australian study was developed on the base of a

CAM instrument that was previously administered in a sample of American university students in 1998. Therefore, the definition of 24 CAM practice were adopted from the Web site of the U.S. National Center of Complementary and Alternative Medicine of the National Institutes of Health. Complementary and alternative medicine practices were defined as those healthcare and medical practices not currently an integral part of conventional medicine. Each part of the questionnaire, in Appendix 1, included clear and complete instructions on how to complete them.

(1) CAM Stages of Change Items. The first section of the questionnaire contained a comprehensive list of 24 CAM therapies (see Table 3). For each of the complementary practice listed, the participants were asked to indicate the level of their use by choosing one of five alternatives. Level of use was based on Prochaska and DiClemente's Stages of Change model that measures readiness to engage in a particular behavior. For each of the CAM practices participants were asked whether they were (1) not thinking about using, (2) thinking about starting in the next 6 months, (3) definitely planning to start in the next 30 days, (4) already doing it for less than 6 months, or (5) already doing it for 6 or more months.

(2) Health reasons for use or considering use. In the second section of the questionnaire, participants were asked to indicate the health reasons for their use or considering using CAM. The 14 items (YES/NO) were listed in Table 4.

(3) General reasons for use. Participants were asked to indicate the general reasons for their use or considering using CAM in section three. The 18 items (YES/NO) were listed in Table 5.

Table 3. Complementary and Alternative Practices

Acupuncture	Lifestyle Diet
Aromatherapy	Massage Therapy
Art Therapy	Meditation
Ayurvedic Medicine	Megavitamin Therapy
Biofeedback	Mental Imagery
Chiropractic Services	Music Therapy
Dance Therapy	Prayer
Energy Healing	Relaxation Techniques
Folk/Home Remedies	Self-Help Groups
Herbal Medicine	Spiritual Healing
Homeopathy	Tai Chi
Hypnosis	Yoga

- (1) Not thinking about using
- (2) Thinking about starting in the next 6 months
- (3) Definitely planning to start in the next 30 days
- (4) Already doing it for less than 6 months
- (5) Already doing it for 6 or more months.

Table 4. Health Reasons for CAM Use or Considering CAM Use (Yes/No)

Allergies	Headaches
Anxiety	High blood pressure
Arthritis	Insomnia
Back problems	Pain
Colds and flu	Sprains or strains
Digestive problems	Stop smoking
Depression	Stress
	Other

Table 5. General Reasons for CAM Use (Yes/No)

Availability	Holistic approach
Belief system	Lifestyle
Curiosity	Looking for better results
Emphasis on prevention	More caring health environment
Family/traditional background	More convenient
Fewer side effects	Sense of control
Financial	Referral from doctor
Dissatisfaction with conventional doctors	Referral or gift from someone else
Dissatisfaction with conventional medicine	Other

(4) Reasons for not using CAM. In section four, participants were asked to check out the reasons for their not using or considering using CAM. The 12 items (YES/NO) were listed in Table 6.

(5) Decisional Balance Items. Section 5 of the questionnaire presented a scale of 14 items designed to measure aspects of decisional balance according to the TTM. The content of the items was based on literature review of attitudes, beliefs, and behavior of CAM use. Participants were asked to respond on a 5-point Likert scale (strongly disagree, disagree, unsure, agree, and strongly agree) to statements regarding the value, efficacy, benefits, and costs of CAM therapies (see Table 7). A scale of 6 items (3 of pros and 3 of cons) was designed to measure general CAM use. Meditation and acupuncture use were measured by 4 items each.

(6) Self-Efficacy Items. In section 6 of the survey, participants were asked 10 self-efficacy items (4 items for general CAM use, 3 items each for meditation and acupuncture use) measuring the extent to which individuals felt they could be successful at practicing CAM therapies. Participants were asked to respond on a 5-

point Likert scale (strongly disagree, disagree, unsure, agree, and strongly agree) to statements regarding self-efficacy (see Table 8).

Table 6. Reasons for Not Use CAM (Yes/No)

Distrust of alternative practitioner	Lack of credibility
Family/traditional background	Lack of doctor's referral
Fear of side effects	Lack of research
High cost	Moral/religious
Inconvenience	Not covered by Medicare
Lack of availability	Other

Table 7. Perceived Benefits and Costs of CAM Use

1. Most alternative medicine is as effective as conventional medicine.
 2. Meditation is a waste of time.
 3. Most alternative medicine practitioners care more about their clients than conventional medicine practitioners.
 4. Acupuncture is a worthwhile type of treatment.
 5. Most alternative medicine is quackery.
 6. Meditation helps a person feel less stressed.
 7. Acupuncture is a risky procedure.
 8. There is little evidence to support alternative medicine.
 9. Many people gain from acupuncture.
 10. The perceived benefits of alternative medicine are real.
 11. Meditation is hard to do.
 12. Acupuncture is a useless procedure.
 13. Meditation makes a person feel better.
 14. Alternative medicine is dangerous.
1. Strongly disagree; 2. Disagree; 3. Unsure; 4. Agree; and 5. Strongly agree

Table 8. Self-efficacy in CAM Use

1. I am sure I can practice meditation.
2. I am sure I can use complementary and alternative medicine.
3. I am sure I can obtain acupuncture treatments.
4. I am sure I can use alternative medicine, even if others are not using it.
5. I am sure I can meditate almost every day.
6. I am sure I can find an acupuncturist in my community.
7. I am sure I can find appropriate alternative medicine in a local health food shop.
8. I am sure I have the time for an acupuncture treatment.
9. I am sure I can find an alternative medicine practitioner.
10. I am sure I can find the time to meditate.

1. Strongly disagree; 2. Disagree; 3. Unsure; 4. Agree; and 5. Strongly agree

(7) Social Influence. Participants were asked to respond on a 5-point Likert scale (strongly disagree, disagree, unsure, agree, and strongly agree) to statements regarding perceived social supports and social norms of CAM use (see Table 9).

Three items are for general CAM use and four items for meditation and acupuncture use.

Table 9. Social Influences on CAM Use

1. Most people I know use complementary and alternative medicine.
2. People important to me feel I should use complementary and alternative medicine.
3. I have been encouraged to use complementary and alternative medicine.
4. Most people I know meditate.
5. I have been encouraged to meditate.
6. Most people I know have had an acupuncture treatment.
7. I have been encouraged to have an acupuncture treatment.

1. Strongly disagree; 2. Disagree; 3. Unsure; 4. Agree; and 5. Strongly agree

(8) Processes of Change Items. In Section 8, the scale included eight of the traditional ten processes of change constructs found in the TTM (consciousness raising, environmental reevaluation, dramatic relief, helping relationships, social liberation, self-reevaluation, counter-conditioning, and stimulus control) which were related to the adoption of CAM use behaviors. Two processes (self-liberation and reinforcement

management) were omitted from the scale. Participants were required to rate the frequency of their thoughts on the use of CAM therapies on a new 5-point Likert scale (never, rarely, sometimes, often, or very often). Specifically, participants were asked to rate how often in the past month they had done or experienced the thoughts or actions described in the eight statements (see Table 10).

Table 10. Processes of Change of CAM Use

1. I looked for information about complementary and alternative medicine.
2. I reminded myself that if I use complementary and alternative medicine I will be a good role model for other people.
3. I was inspired by friends or family who use complementary and alternative medicine.
4. People around me have encouraged me to use complementary and alternative medicine.
5. I have noticed that more people are using complementary and alternative medicine.
6. I have seen myself as a person who uses complementary and alternative medicine.
7. I have realised that using complementary and alternative medicine is a better choice.
8. I have kept things around me to remind me to use complementary and alternative medicine.

1. Never; 2. Rarely; 3. Sometimes; 4. Often; 5. Very often

3.2. Secondary Data Collection

A total of 518 data from the original study was analyzed in this study. Since this proposed research mainly focused on the key scales that borrowed from the TTM, unrelated items, such as reasons for using or not using CAM and social influences, were not included in the structural model. Since the scales used in this research attempted to measure the level of receptiveness or readiness to use CAM use in general, those measures specific to acupuncture and meditation use were excluded from this secondary analysis. Demographic data from the students were used for

examining the subgroup differences. The scales used in this study were listed as the followings:

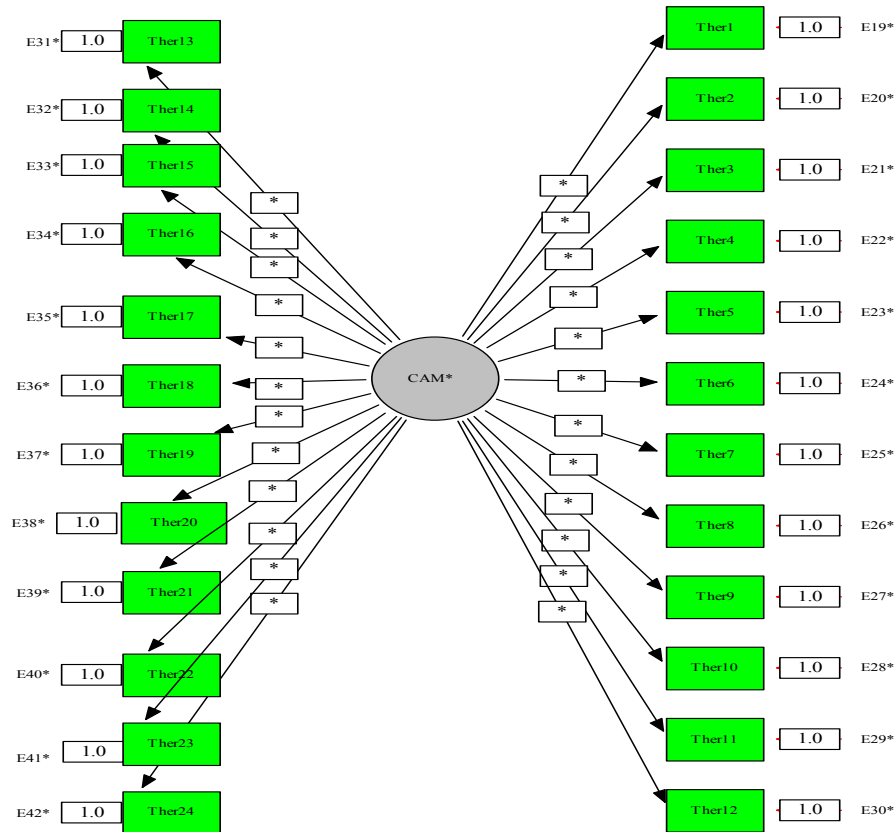
(1) Stages of Change. Figure 3 presented the measurement model of the construct of stages of change. Since complementary and alternative medicine involves a variety of therapies, the scale of stages of general CAM use included 24 items, a comprehensive list of 24 CAM therapies (see Table 11). The Cronbach's alpha of the scale was reported to be 0.85 (Feldman & Laura, 2004).

(2) Pros and Cons. Figure 4 and 5 represented the measurement models of pros and cons. Three statements for each construct represented perceived benefits or costs of general CAM use (see Table 12 and 13).

(3) Self-Efficacy. Figure 6 represented the measurement model of self-efficacy. Four items of self-efficacy in general CAM use were used (see Table 14).

(4) Processes of Change. Figure 7 represented the measurement model of processes of change. Eight items addressing the processes of change were used in this study (see Table 15).

Figure 3. Measurement Model of the Construct of the CAM Stages of Change



□ = Observed variables
 ○ = Unobserved (latent) factor
 E = Measurement error associated with observed variable
 * = Signifies path to be estimated
 → = Signifies direction of relationship between variables and/or factors

Table 11. Items of the Construct of Stages of Change in CAM Practices

Variable	Item	Variable	Item
Ther1	Acupuncture	Ther13	Lifestyle Diet
Ther2	Aromatherapy	Ther14	Massage Therapy
Ther3	Art Therapy	Ther15	Meditation
Ther4	Ayurvedic Medicine	Ther16	Megavitamin Therapy
Ther5	Biofeedback	Ther17	Mental Imagery
Ther6	Chiropractic Services	Ther18	Music Therapy
Ther7	Dance Therapy	Ther19	Prayer
Ther8	Energy Healing	Ther20	Relaxation Techniques
Ther9	Folk/Home Remedies	Ther21	Self-Help Groups
Ther10	Herbal Medicine	Ther22	Spiritual Healing
Ther11	Homeopathy	Ther23	Tai Chi
Ther12	Hypnosis	Ther24	Yoga

Figure 4. Measurement Model of the Construct of Pros

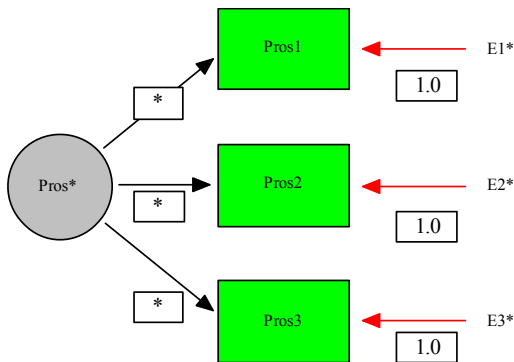


Table 12. Items of the Construct of Pros

Variable	Item
Pros1	Most alternative medicine is as effective as conventional medicine.
Pros2	Most alternative medicine practitioners care more about their clients than conventional medicine practitioners.
Pros3	The perceived benefits of alternative medicine are real.

Figure 5. Measurement Model of the Construct of Cons

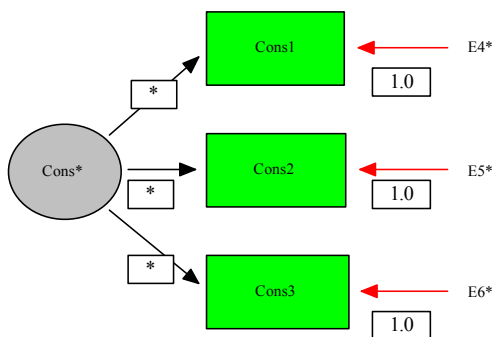


Table 13. Items of the Construct of Cons

Variable	Item
Cons1	Most alternative medicine is quackery.
Cons2	There is little evidence to support alternative medicine.
Cons3	Most alternative medicine is dangerous.

Figure 6. Measurement Model of the Construct of Self-efficacy

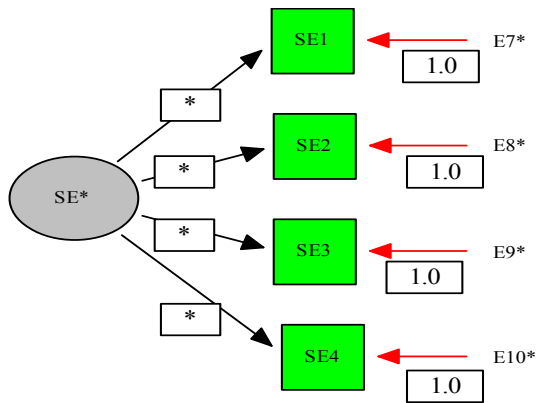


Table 14. Items of the Construct of Self-efficacy

Variable	Item
SE1	I am sure I can use alternative medicine, even if others are not using it.
SE2	I am sure I can use complementary and alternative medicine.
SE3	I am sure I can find appropriate alternative medicine in a local health food shop.
SE4	I am sure I can find an alternative medicine practitioner.

Figure 7. Measurement Model of the Construct of Processes of Change

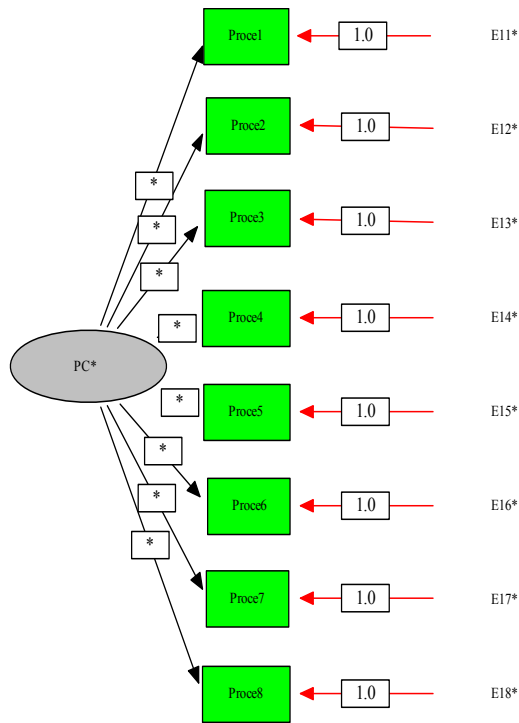


Table 15. Items of the Construct of Processes of Change

Variable	Label	Item
Proce1	Consciousness Raising	I looked for information about CAM.
Proce2	Environmental Reevaluation	I reminded myself that if I use CAM I will be a good role model for other people.
Proce3	Dramatic Relief	I was inspired by friends or family who use CAM.
Proce4	Helping Relationships	People around me have encouraged me to use CAM.
Proce5	Social Liberation	I have noticed that more people are using CAM.
Proce6	Self-revaluation	I have seen myself as a person who uses CAM.
Proce7	Counterconditioning	I have realized that using CAM is a better choice.
Proce8	Stimulus Control	I have kept things around me to remind me to use CAM.

3.3. Data Analysis

3.3.1. Data Cleaning

Data cleaning started with the examination of outliers and missing data for errors in response or entry. Descriptive statistics were generated for each variable of interest including means and standard deviations. Bivariate associations among observed variables were tested using Pearson (continuous variables) or Spearman (dichotomous variables) correlation coefficients. However, variables that were not significantly correlated with the outcome of interest were still included in the structural equation model. This is because if the direct relationships, and/or spurious relations in the SEM are of competing signs, it is possible that a significant total correlation between the variable and the outcome may be canceled out.

3.3.2. Instrument Reliability and Validity

Though some items contained in the questionnaire had been utilized in a previous study in the U.S., all were mainly used for descriptive purposes. Therefore, there was little validity information for them. Confirmatory factor analysis, an application of SEM, was used in this study to test the scale validity, which represented how well the measures reflected their intended constructs. This analysis would provide information about the usefulness of these measures in the samples of university students.

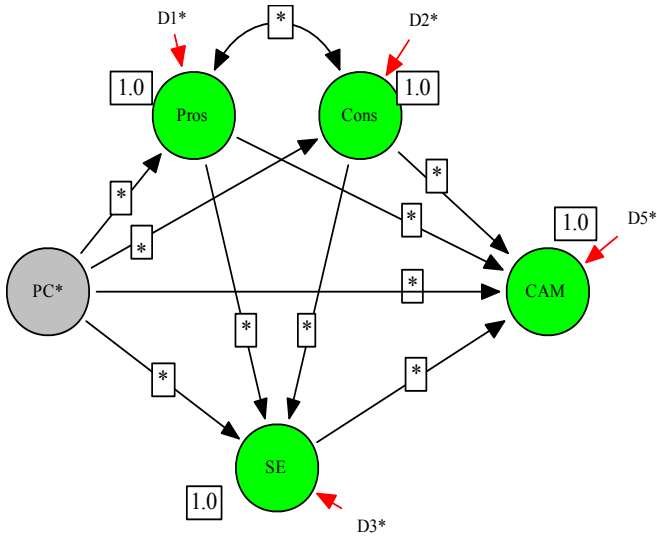
3.3.3. Sample Size

Structural equation modeling is a large sample technique (Bentler, 1993; Kelloway, 1998). Both the estimation methods and tests of model fit are based on the assumption of large samples. In general, a sample size of at least 200 observations would be an appropriate minimum. Bentler and Chou (1987) suggested that the ratio of sample size to number of free parameters can go as low as 5:1 with normally or elliptically distributed data. For this study, a sample of 518 university student should be sufficient to test the hypothesized model with 90 free parameters.

3.3.4. Analyses of Answer Research Questions

A structural model (Figure 1) of stages of CAM use was built based upon the literature review. The specified model was grounded in a sound theoretical framework of the TTM regarding the expected relationship among key constructs. The primary objective of this dissertation was to test the hypothesized structural model which integrated the key constructs of the TTM. Pros, cons, self-efficacy, and processes of change were examined in terms of their effects on stages of CAM use. All analyses were performed using the EQS program (Bentler, 1995). Compared to other SEM software, EQS offers flexible test procedures for model respecification. Also EQS features special estimation procedures and statistics that may be especially useful for non-normal distributed data.

Figure 1. Hypothesized Structural Model of Complementary and Alternative Medicine Use among Australian University Students



Research Question 1: Overall, will the hypothesized structural model specified in Figure 1 show a satisfactory degree of fit to the observed data?

To answer this research questions, a two-step process was used to test the measurement and structural models of CAM stages of change. The purpose of the first step was to evaluate the contributions of the multiple measures to the measurement of the latent constructs. Confirmatory Factor Analysis (CFA), an application of SEM, was used to determine the construct validity (the extent to which items designed to measure a particular factor actually do so). Testing the validity of the measurement model before evaluating the structural model allows the research to distinguish rejections of the proposed model because of problems stemming from measurement inadequacies from problems related to the actual proposed theory

(Mueller, 1996).

First, the initial measurement model (Figure 3 to Figure 7) was tested by allowing all latent factors to covary. This null model served as a basis for the computation of some of the fit indices. Maximum likelihood estimation was performed and model fit was tested using the joint criteria of $CFI > 0.90$ and $AGFI > 0.90$ or $CFI \geq 0.90$ and $RMSEA < 0.05$. If the initial measurement model did not fit satisfactorily, new models would be developed as a refinement of measurement model based on analysis results from the Lagrange Multiplier (LM) test. Lagrange Multiplier (LM) determined if any of the fixed parameters should be freed by allowing the specific error coefficients to covary and whether any cross-loading items should be dropped, in order to ensure that the items only loaded on one factor. Any decision to drop items and to add error covariances to the model was supported by the substantive theory. The modified models were retested again. The final measurement model gained significant goodness of fit and retain the revised specification throughout all analyses of the structural model in the next phase.

The second step tested the theorized causation of the structural model, which was in the direction of the key constructs causing stages of change of CAM use. First, the initial structural model (see Figure 1) was imposed on the final measurement model. Maximum Likelihood (ML) was used to estimate the path coefficients between the latent variables; same criteria of fit indices ($CFI > 0.90$ and $AGFI > 0.90$ or $CFI \geq 0.90$ and $RMSEA < 0.05$) were used to test the fit of the structural model.

Research Question 2: Will the pros and cons, processes of change, and self-efficacy have statistically significant direct effects on CAM stages?

When the hypothesized structural model fits well to the observed data, each of the standardized and unstandardized pathway coefficients and their associated t-scores (a t-score of 1.96 or greater is considered to be significant at the 0.05 level) was examined to draw conclusions about specific model relations (e.g., direct effects and correlations) for the purposes of answering research question two. Standard path coefficients represented the strength of the relationships among latent factors. The extent to which the four key factors collaborated influenced the stages of CAM use was reflected in the disturbance value of the outcome variable (D5) in the structural model.

Research Question 3: Will the diagnostic modification indices provided by EQS statistical software suggest any theoretically sensible modifications to the proposed model?

Respecification was performed using the LM test to determine if additional paths among key factors are necessary to improve model fit. The respecified models should be retested again with the adjustments included, and the same steps were repeated in determining whether or not to add more paths between factors. A discussion of model modification and respecification has been presented in Chapter

Two in the general introduction of SEM.

Research Question 4: Do the paths among factors differ across population, comparing Asian Australians and European Australians, as well as male and female students?

For question four, multi-group structural equation modeling analyses were used for making inferences about population differences in relationships between observed and latent variables, as well as in causal structures of the models. In the measurement phase of the multi-group structural modeling, the researcher assessed if the proposed measurement model was tenable for each subpopulation of interest. Individual model modifications may be made, if theoretically justifiable. Secondly, the investigator tried to fit multiple populations' measurement models simultaneously, preserving any prior individual modifications in each subgroup model. Third, test differences between corresponding measurement parameters using the following strategy: Constrain all theoretically interesting parameters to be equal across groups; sequentially release constraints if LM tests indicate a significant improvement in data-model fit. Parameters whose constraints were released were inferred to differ across groups; those whose constraints were not released were inferred to be invariant across the groups. The same strategy would be used to test the multi-group structural models.

3.4. Human subjects

This research involved a secondary analysis of survey data taken from a study of complementary medicine use among Australian university students in 2000 (Feldman & Laura, 2004). A convenience sample consisted of 518 Australian students from a comprehensive university completed the original survey on CAM use in 2000. The Australian university IRB approved all recruitment and data collection procedures before they were implemented. In this study, the data was obtained from previous study investigator, and it was recorded in such a manner that subjects cannot be identified. There is no student identifying information obtained from original study. Computer data files are only accessed to the investigator and the dissertation committee chairperson. The University of Maryland IRB had approved this dissertation study. Risks from this study to participants are none. Students may not directly benefit from participation in this study immediately. However, findings from this study may help health care providers to advise students making informed decision in CAM use and protect them from negative effects in the future.

3.5. Summary

Several features of SEM qualify it as a research method for this nonexperimental study. First, SEM is considered a causal modeling technique for examining causal relationships among latent factors with cross-sectional data. The test of structural model uses substantive theory as the driving force behind model

conceptualization and evaluation. Secondly, SEM allows researchers to examine the adequacy of the instruments (construct validity) which are intended to measure the latent factors of CAM use in the hypothesized model. Each observed variable is treated as a different measure of a construct (latent factor), instead of totaling item responses into one lump sum. And measurement error is estimated and removed from the relationships between theoretical constructs (Munro, 2001). Therefore, it is possible to get a more precise test of theories. In summary, SEM is the proper research method for this study which attempted to test a well defined, theoretically sound structural model of CAM use with multivariate measurements of the constructs.

CHAPTER 4 RESULTS

In chapter four, descriptive statistics of the instruments employed in this study (e.g., means, standard deviations, and Cronbach's alphas) were reported. Secondly, the SEM results were presented separately for each of the four research questions followed by a summary of study findings.

4.1. Introduction

This chapter presents the findings of the study. The primary purposes of the study were to 1) test an theory-based model of CAM stages of change shown in Figure 1 using structural equation modeling technique; 2) examine relationships among key constructs that borrowed from the TTM; 3) improve model fit by modifying the pathways between the model's constructs in a theoretically sensible manner; and 4) test whether the relationships among the factors differ across populations, comparing Asian Australian and European Australian, male and female students.

Research question one was concerned about the goodness of fit of the overall structural model. The extent to which the observed data fit the overall model was evaluated. Question two examines which relationship (path) among constructs was significant. Each of the specific hypothesized pathways delineated in Figure 1 was examined for its level of statistical significance. Question three provided clues of how

to make the model fit better. The last question compared structure models by gender and ethnicity.

4.2. Descriptive Characteristics

Of 518 participants in the primary study, 17 cases were eliminated due to their large number of missing responses (more than 10 variables). No special missing data patterns were found from the 17 cases. Other missing data from the remaining cases were replaced by the mean values of the corresponding variables. Consequently, data from 501 participants were used in this study to address the research questions.

Mean and standard deviation of each variable were listed in Table 16. The factor scales were examined for their internal consistency reliability using Cronbach's alpha. Processes of change showed a high Cronbach's alpha value of .919. Both self-efficacy and stages of change had an acceptable reliability coefficients (.732 and .845 respectively). However, pros and cons yielded reliability coefficients under .700 (.583 and .684 respectively). This should be taken into consideration when the researcher interprets the results related to pros and cons.

To check the contribution of each item to the factor reliability, the "Cronbach's alpha if one certain item was deleted" were also calculated (see Table 16). For example, if the second item of pros (pros2, most alternative medicine practitioners care more about their clients than conventional medicine practitioners) were dropped, the reliability coefficient of pros would increase from .583 to .591, which meant that pros2 was responsible for lowering the construct reliability.

Similarly, biofeedback (V23), chiropractic services (V24), hypnosis (V30), and prayer (V37) were found to be the items that lowered the Cronbach's Alpha of the stages of change.

Table 16. Univariate Statistics of Constructs and Variables

Factor	Factor Variable	Mean	SD	Cronbach Alpha Cronbach Alpha if Item Deleted
Measured indicator variable				
PROS	F1=PROS			.583
Most alternative medicine is as effective as conventional medicine.	V1=pros1	3.178	.875	.407
Most alternative medicine practitioners care more about their clients than conventional medicine practitioners.	V2=pros2	3.044	.911	.591
The perceived benefits of alternative medicine are real.	V3=pros3	3.572	.740	.448
CONS	F2=CONS			.684
Most alternative medicine is quackery.	V4=cons1	2.254	.877	.517
There is little evidence to support alternative medicine.	V5=cons2	2.683	.919	.682
Most alternative medicine is dangerous.	V6=cons3	2.174	.841	.570
Self-Efficacy	F3=SE			.732
I am sure I can use alternative medicine, even if others are not using it.	V7=se1	3.868	.737	.649
I am sure I can use complementary and alternative medicine.	V8=se2	3.772	.844	.665
I am sure I can find appropriate alternative medicine in a local health food shop.	V9=se3	3.762	.830	.715
I am sure I can find an alternative medicine practitioner.	V10=se4	3.659	.886	.656
Processes of Change	F4=PC			.919
I looked for information about CAM.	V11=proce1	2.460	1.189	.908
I reminded myself that if I use CAM I will be a good role model for other people.	V12=proce2	1.887	1.037	.913
I was inspired by friends or family who use CAM.	V13=proce3	2.321	1.210	.905
People around me have encouraged me to use CAM.	V14=proce4	2.321	1.154	.908
I have noticed that more people are using CAM.	V15=proce5	2.922	1.090	.916
I have seen myself as a person who uses CAM.	V16=proce6	2.580	1.214	.901
I have realized that using CAM is a better choice.	V17=proce7	2.688	1.156	.904
I have kept things around me to remind me to use CAM.	V18=proce8	2.079	1.168	.910

Mean is average score of each item based on a 5-point Likert scale 1 to 5.

Table 16. Univariate Statistics of Constructs and Variables

Factor Measured indicator variable	Factor Variable	Mean	SD	Cronbach Alpha Cronbach Alpha if Item Deleted
Stages of Change of CAM Use	F5=CAM			.845
Acupuncture	V19=ther1	1.439	1.050	.846
Aromatherapy	V20=ther2	1.094	.473	.848
Art Therapy	V21=ther3	2.411	1.695	.843
Ayurvedic Medicine	V22=ther4	1.373	1.033	.846
Biofeedback	V23=ther5	1.173	.664	.848
Chiropractic Services	V24=ther6	1.718	1.304	.851
Dance Therapy	V25=ther7	1.554	1.203	.844
Energy Healing	V26=ther8	1.331	.910	.843
Folk/Home Remedies	V27=ther9	2.006	1.630	.842
Herbal Medicine	V28=ther10	2.595	1.734	.838
Homeopathy	V29=ther11	1.363	.985	.846
Hypnosis	V30=ther12	1.221	.731	.849
Lifestyle Diet	V31=ther13	2.038	1.542	.846
Massage Therapy	V32=ther14	2.796	1.628	.838
Meditation	V33=ther15	1.652	1.320	.846
Megavitamin Therapy	V34=ther16	2.063	1.503	.837
Mental Imagery	V35=ther17	1.746	1.416	.839
Music Therapy	V36=ther18	2.276	1.713	.843
Prayer	V37=ther19	2.283	1.804	.850
Relaxation Techniques	V38=ther20	2.815	1.695	.836
Self-Help Groups	V39=ther21	1.328	.948	.844
Spiritual Healing	V40=ther22	1.484	1.213	.845
Tai Chi	V41=ther23	1.415	.966	.845
Yoga	V42=ther24	1.851	1.297	.843

Mean is average score of each item based on a 5-point Likert scale 1 to 5.

4.3. Analyses of Answer Research Questions

Question 1: Overall, will the observed data show a satisfactory degree of fit to the structural equation model specified in Figure 1?

To answer this research questions, a two-step process was used to assess the goodness of fit of the measurement model and the structural model. Joint criteria for acceptable fit (Hu and Bentler, 1999) have been adopted in this study. This criteria requires a CFI>0.90 together with a RMSEA<0.05 or with an AGFI>0.90.

4.3.1. Measurement Model Fitness

Before the test of the structural model, the measurement model was tested for construct reliability and validity. The measurement model hypothesized a priori that: 1) The stages of CAM responses can be explained by four factors: pros, cons, self-efficacy, and processes of change; 2) each subscale measure has a nonzero loading on the factor that is designed to measure (target loading), and zero loadings on all other factors (nontarget loadings); 3) the five factors, consistent with the theory, are correlated; and 4) error/uniquenesses (E1 to E42) associated with each measure are uncorrelated. Based upon the priori, there were two ways suggested for model respecifications. First, subscale measures with extremely low standardized factor loadings would be dropped from the latent factor measurement. Cross-loading items, those that have significant loadings on more than three factors simultaneously, also would be deleted. Secondly, error covariance parameters would be added into

measurement model for model modification.

Maximum Likelihood (ML) technique showed dissatisfied data-model fitness result from the test of the initial measurement model (see Table 17). The initial comparative fit indices of CFI (.827) and AGFI (.799) indicated an unacceptable data-model fit, below the accepted level of good model fit of .900 (Bentler, 1992). However, RMSEA (.047) met the criteria of fitness evaluation ($<.050$). The Chi-square (1708, $df = 809$) was statistically significant ($p < .001$), and its ratio to the degree of freedom was less than 3.

A Lagrange Multiplier (LM) test was then performed to determine if any error covariance parameters should be added to the model to improve the model fitness. The test results indicated that the first potential respecification came from an error covariance parameter E13, E14. Since the correlation between E13 (I was inspired by friends or family who use CAM) and E14 (People around me have encouraged me to use CAM), two indicators of processes of change, clearly made theoretical sense, the respecification was made by allowing E13 and E14 to covary. The new measurement model, with E13, E14 added, was retested using ML technique and yielded a CFI of .850, which was an improvement over the initial model, but still not high enough to be considered an acceptable fit ($CFI > .90$).

Following the same modification processes, four more error covariance parameters were added, incrementally, into the model (see Table 17). The second error covariance parameter added to the model was E27 (folk/home remedies), E28 (herbal Medicine). In addition, two more error covariance parameters added into measurement model were E14, E15, and E13, E15. Lastly, an error covariance

parameter, E9, E10, was added into the model. The decisions to make these modifications were all theory-grounded with literature supports. A justification of the model respecification was presented in Chapter Five in discussion of measurement issues. After these respecifications, the CFI was further raised to .883 and AGFI to .829 (see Table 17). For the sake of model parsimony it was decided to stop adding more error covariance parameters into the measurement model.

Table 17. Summary of Parameter Addition to Measurement Models

Run	Chi-square (df)	CFI	AGFI	RMSEA (Confidence Interval)
Run Initial Measurement Model	1708 (809)	.827	.799	.047 (.044 - .050)
Add E13, E14 (Proce 3, Proce4)	1589 (808)	.850	.812	.044 (.041 - .047)
Add E14, E15 (Proce4, Proce5)	1526 (806)	.862	.816	.042 (.039 - .045)
Add E27, E28 (Folk, Herbal)	1500 (805)	.866	.820	.042 (.038 - .045)
Add E9, E10 (SE3, SE4)	1426 (802)	.880	.827	.039 (.036 - .043)
Add E13, E15 (Proce3, Proce5)	1408 (801)	.883	.829	.039 (.036 - .042)
Drop V12 (Proce2)	1321 (762)	.887	.837	.038 (.035 - .042)
Drop V21 (Art Therapy)	1205 (723)	.899	.848	.037 (.033 - .040)
Drop V24 (Chiropractic)	1128 (685)	.905	.852	.036 (.032 - .040)
Drop V37 (Prayer)	1075 (650)	.906	.854	.036 (.032 - .040)
Drop V30 (Hypnosis)	1039 (614)	.906	.854	.037 (.033 - .041)
Drop V23 (Biofeedback)	976 (579)	.912	.860	.037 (.033 - .041)
Drop V2 (Pros2)	924 (545)	.915	.862	.037 (.033 - .041)

To obtain an acceptable level of data-model fit (CFI>.90), a post hoc review of the construct items was performed to see if there were any cross-loading items that needed to be dropped. Proce2, an item of processes of change, was found to be cross loaded on self-efficacy, pros, and cons simultaneously (see Table 18). And Ther3 (Art Therapy), an item of CAM Stages of Change, crossly loaded on processes of change, pros, and cons. The CFI further increased to .899, and AGFI to .848 after these two

cross-loading items (see Table 17) were deleted. At this point, the modified measurement model had almost gained an acceptable level of fit (CFI>.90).

Table 18. Summary of Cross-loading Items Dropped from Measurement Model

Number	Items Name	Factor	Cross-loading Factors
1	Proce2 (V12)	Processes of Change	SE, Pros, Cons
2	Art Therapy (21)	CAM Stages of Change	PC, Pros, Cons

To further improve the parsimony and the fitness of the model, the researcher made a final respecification by dropping five items with low loadings on their targeted latent factors. Of the five items, four variables, biofeedback, chiropractic services, hypnosis, and prayer, were measures of Stages of CAM use with loadings of 0.27, 0.20, 0.26, and 0.29 respectively. One item (pros2, Most alternative medicine practitioners care more about their clients than conventional medicine practitioners) was the measure with a loadings of .36 on Pros. The decision to drop these items with low factor loadings was also supported by the internal consistency reliability tests using Cronbach's alpha (see Table 16). These respecification efforts eventually raised the CFI to .915 and AGFI to .862.

To this point, the final measurement model that was gained showed significant data-model fit with a CFI well above the .90 level (Bentler, 1992). In total, 5 error coefficient parameters were added into the measurement model and 7 items were dropped due to low factor loadings or cross-loadings. As indicated in Table 19, from the initial measurement model to final measurement model, the Chi-square reduced by 784, and degree of freedom reduced by 264, which showed a significant improvement of measurement model fitness ($p<.001$) (see Table 19). The final measurement model would retain the revised specifications throughout all analyses of

the structural model in the second step.

Table 19. Fit Indices of Measurement and Structural Models

Model	Chi-square (df)	CFI	AGFI	RMSEA (Confidence Interval)
Initial Measurement Model	1708 (809)	.827	.799	.047 (.044 - .050)
Final Measurement Model	924 (545)	.915	.862	.037 (.033 - .041)
Hypothesized Structural Model	924 (545)	.915	.862	.037 (.033 - .041)
Modified Structural Model	941 (550)	.912	.861	.038 (.034 - .042)

All Chi-square values are significant at a level of $p < .001$

4.3.2. Structural Model Fitness

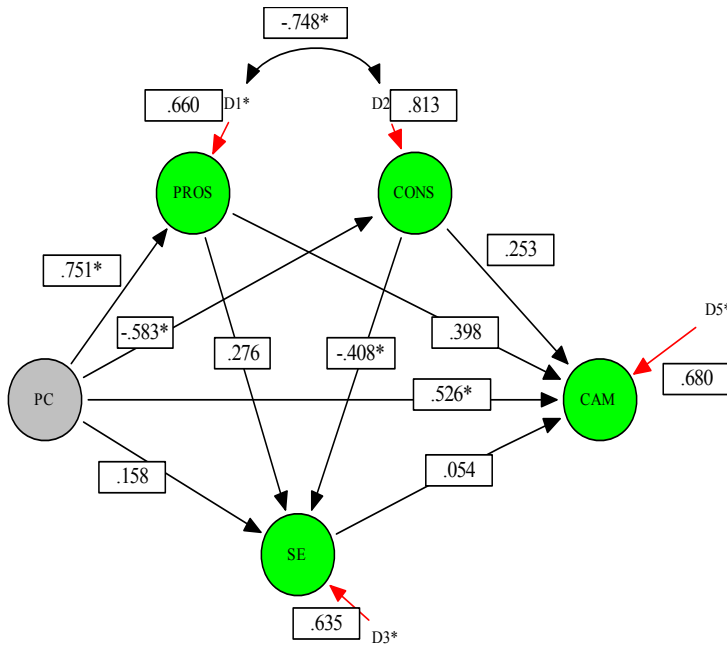
The second phase tested the theorized causation of the structural model, which was in the direction of the key constructs causing Stages of Change of CAM use. When the hypothesized structural model was imposed on the final measurement model, it yielded fit indices (CFI=.915, AGFI=.862, RMSEA=.037) that met a joint criteria of data-model fit (CFI \geq 0.90 and RMSEA $<$ 0.05). And it was important to note that the model fit did not change from the final measurement model analysis (CFI=.915, AGFI=.862, RMSEA=.037) to the structural model analysis. These results indicated that, overall, the hypothesized structural model showed a satisfactory degree of fit to the observed data (Research Question 1). And the structural model of stages of CAM use can be retained as one of many possible explanations of the data.

Question 2: Will pros and cons, processes of change, and self-efficacy have statistically significant direct effects on CAM stages?

From the ML estimate results of the structural model, standardized and unstandardized pathway coefficients and their associated t-scores (a t-score of 1.96 or greater was considered to be significant at the 0.05 level) were examined to draw conclusions about specific model relations (e.g., direct effects and correlations) for the purposes of answering research question two.

A review of the unstandardized solution revealed that, of 9 paths among latent factors, 4 were found to be statistically significant (see Figure 8). These significant pathway coefficients reflected: 1) direct, positive effects of processes of change on pros; 2) direct, negative effects of processes of change on cons; 3) direct, positive effects of processes of change on stages of CAM; and 4) direct, negative effects of cons on self-efficacy. See Figure 8 for diagram of the structural model.

Figure 8. Standardized Solutions of the Structural Model of Complementary and Alternative Medicine Use among Australian University Students



* Path coefficient is significant at $p < .05$

Standard path coefficients represented the strength of the relationships among latent factors (see Table 20). The higher a path coefficient is the stronger effect the casual factor has on the dependent variable. PC had a path coefficient of .751 on pros, and it explained 56.4% of the variance of pros (R-square value of path coefficient). PC also had a negative coefficient of -.583 on cons, and accounted for 34.0% of the variance of cons. Path coefficient between PC and stages of CAM was .526, and PC explained 27.7% of the variance of stages of change. Finally, cons had a negative coefficient of -.408 on self-efficacy and explained 16.7% of the variance of self-efficacy. Pros and cons significantly and negatively correlated at a level of -.748 (see Figure 8).

The extent to which the four factors influenced the stages of CAM use was reflected in the disturbance value (D5) in the structural model (see Figure 8). A disturbance of .658 indicated that the error on the stages of change accounted for 43.3% of the variance of stages of change. Overall, pros, cons, self-efficacy, and processes of change explained the remaining 56.7% of the variance.

The five non-significant paths (see Figure 4.2) among latent factors were 1) pros on self-efficacy (.276); 2) pros on stages of CAM (.398); 3) cons on stages of CAM (-.253); 4) self-efficacy on stages of change (.054); and 5) processes of change on self-efficacy (.158).

Table 20. R-square values of standard path coefficients

From	To	Path Coefficient	R-square
PC	Pros	.751*	.564
PC	Cons	-.583*	.340
PC	CAM	.526*	.277
PC	SE	.158	.025
Pros	CAM	.398	.156
Pros	SE	.276	.076
Cons	CAM	.253	.064
Cons	SE	-.408*	.166
SE	CAM	.054	.003

* Path coefficient is significant at $p < .05$

4.3.3. Contributions of Subscale Measures to Latent Factors

From the ML estimate results of the structural model, unstandardized factor loadings and their associated t-scores (a t-score of 1.96 or greater was considered to be significant at the 0.05 level) were examined for the significance of each factor loading. Standardized factor loadings (see Figure 9 to Figure 13) indicated the strengths of the contribution of each observed variable to the measurement of the latent construct based on data from the sample. The larger a factor loading is, the

more variances of the observed variable the latent construct explains, and the more the observed variable contributes to the construct measurement.

Of the two measures of the factor pros (see Figure 9), pros3 (the perceived benefits of alternative medicine are real) was the strongest item that loaded on pros with a factor loading of .724 (see Figure 9). Proc1 (most alternative medicine is as effective as conventional medicine) had a factor loading of .580 on pros (see Figure 9). It meant that pros accounted for 52.4% of the variance of pros3 and 33.6% of the variance of pros1. Pros2 (Most alternative medicine practitioners care more about their clients than conventional medicine practitioners) had been dropped due to its low factor loading in measurement model.

All three items loaded well on the factor of Cons (see Figure 10). The highest factor loading (.722) was from cons1 (most alternative medicine is quackery). Cons2 (there is little evidence to support alternative medicine) and cons3 (most alternative medicine is dangerous) had loadings of .523 and .664 respectively (see Figure 10).

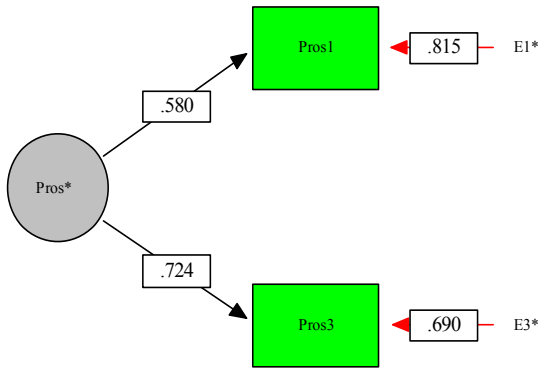
Observed variables se1 and se2 loaded well on the factor of self-efficacy with a loading of .773 and .708 (see Figure 11). Se3 and se4 had relatively lower loadings (.448 and .574 respectively), and their error parameters, E9 and E10, were significantly correlated (.259).

Of the seven items of processes of change, proce6 (I have seen myself as a person who uses CAM) and proce7 (I have realized that using CAM is a better choice) had high factor loadings, .899 and .874 (see Figure 12). Proce1 and proce8 also loaded well at .776 and .767 (see Figure 12). Three items loaded relatively lower, proce3 (.694), proce4 (.659), and proce5 (.599), and they were significantly correlated

with each other (see Figure 12). Proce3 (E13) and proce4 (E14) had a correlation coefficient of .568, proce3 (E13) and proce5 (E15) of .237, proce4 (E14) and proce5 (E15) of .353. Proce2 (I reminded myself that if I use CAM I will be a good role model for other people) had been dropped due its cross-loading on self-efficacy, cons, and pros in the measurement model.

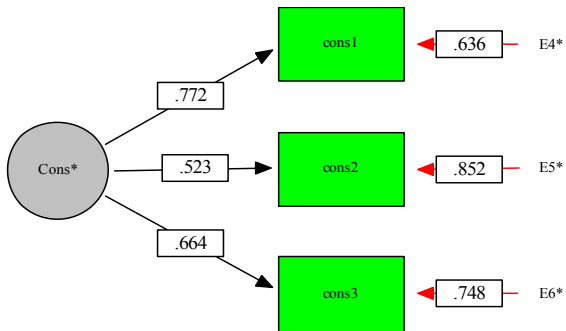
As showed in Figure 13, of 19 items of stages of change, megavitamin therapy and relaxation technique had the highest standard factor loadings (.652 and .620). Energy healing, herbal medicine, massage therapy, mental image, and yoga loaded on CAM stages of change at the level between .500 and .600 (see Figure 13). Next, dance therapy (V25), fold/home remedies (V27), homeopathy (V29), lifestyle diet (V31), music therapy (V36), self-help groups (V39), spiritual healing (V40), and Tai Chi (V41) had lower factor loadings between .400 and .500 (see Figure 13). Finally, items that loaded under the level of .400 were acupuncture, aromatherapy, ayurvedic medicine, and meditation (see Figure 13). E27 and E28 (folk/home remedies and herbal medicine) significantly correlated at .281 (see Figure 13). Four items (biofeedback, chiropractic services, hypnosis, and prayer) had already been deleted in the measurement model due to their low factor loadings, as well as the cross loading item of art therapy.

Figure 9. Standardized Solutions of the Measurement Model of Pros



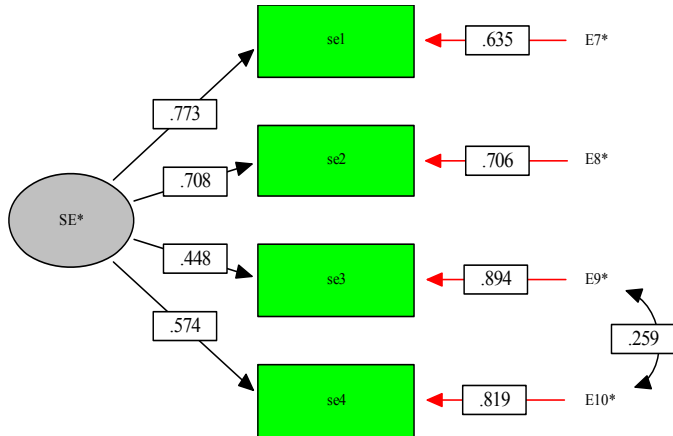
Note: All paths significant at $p < .05$

Figure 10. Standardized Solutions of the Measurement Model of Cons



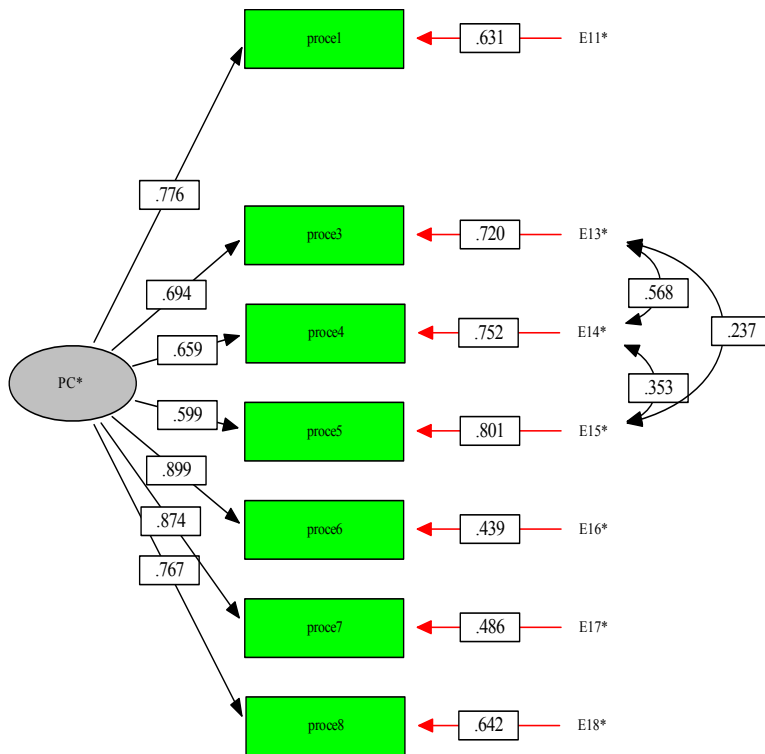
Note: All paths significant at $p < .05$

Figure 11. Standardized Solutions of the Measurement Model of Self-efficacy



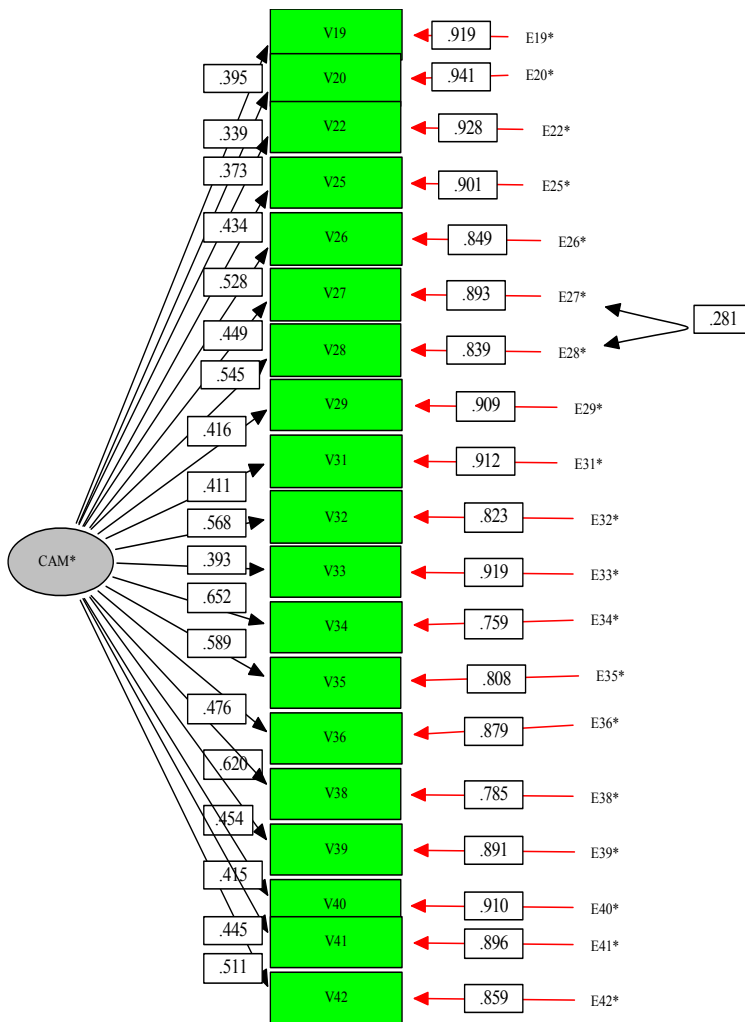
Note: All paths significant at $p < .05$

Figure 12. Standardized Solutions of the Measurement Model of Processes of Change



Note: All paths significant at $p < .05$

Figure 13. Standardized Solutions of the Measurement Model of Stage of Change



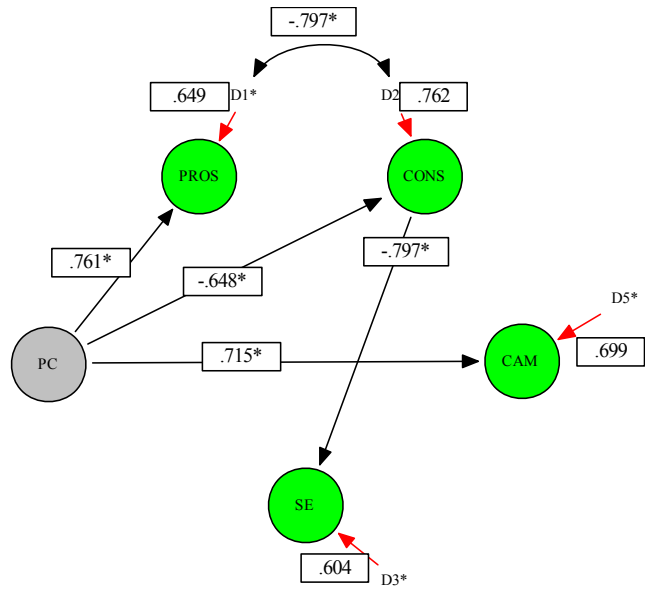
Note: All paths significant at $p < .05$

Question 3: Will the diagnostic modification indices provided by EQS statistical software suggest any theoretically sensible modifications to the proposed model?

One potent aspect of structural model is that through evaluation of the modification indices, theoretically paths may be suggested for the purpose of improving the goodness of fit in structural model. However, in this study, the LM test suggested no additional pathways to be added to improve the structural model fitness.

Since 5 of the 9 path coefficients in the model were under the significant level, based upon the parsimonious principle, the goodness of fit of the structural model might be improved by deleting these 5 non-significant paths. Consequently, the modified model (see Figure 15) without the 5 paths yield almost the same fit index (CFI=.912 and AGFI=.861) as the initial structural model did. All significant path coefficients from the initial structural model still remained significant, and the strength of the effects increased. Especially, the path coefficient between cons and self-efficacy increased from .408 to .797, and the path coefficient between processes and stages increased from .526 to .715 (see Figure 15).

Figure 15. Standard Solutions of Modified Structural Model of Complementary and Alternative Medicine Use among Australian University Students



* Path coefficient is significant at $p < .05$

Question 4: Do the paths among factors differ across population, comparing Asian Australians and European Australians, as well as male and female students?

For answering research question four, multi-group structural equation modeling was run to make inferences about population differences firstly in measurement model. Unstandardized factor loadings can be used to compare validity results across different samples in measurement model.

Table 21. Fit Index of the Measurement Models of Subgroups

Model		Chi-square (df)	CFI	AGFI	RMSEA
Initial Measurement Model	European	1318 (809)	.833	.773	.045 (.041-.050)
	Asian	1168 (809)	.683	.522	.079 (.068-.088)
Initial Measurement Model	Female	1540 (809)	.814	.779	.049 (.045-.053)
	Male	1141 (809)	.715	.605	.059 (.050-.066)

4.3.4. European vs. Asian

There were 308 participants describing themselves as European descents, and 73 Asian descents. In the measurement phase, ML results revealed that the proposed measurement model did not fit the two subgroups separately, with a CFI of .833 from European model and a CFI of .683 from Asian model (see Table 21). Additionally, the LM test failed to provide any significant respecification clues for the Asian model. Therefore, the poor model fit of the Asian model did not allow researcher to further explore the Asian structure models and made the structural-model comparison between the two subgroups impossible. Still, based upon the initial measurement model results, unstandardized factor loadings were compared to examine the

differences of indicator-factor relationships between the two subgroups (see Table 22).

There were some obvious differences in unstandard factor loadings between the two subgroups. For example, the European model loaded lower on acupuncture (.245 vs. .720), Tai Chi (.317 vs. .683), biofeedback (.075 vs. .375), hypnosis (.154 vs. .442), prayer (.484 vs. .824), and self-help groups (.316 vs. .885) than the Asian model did. However it loaded higher on art therapy (1.087 vs. .005).

4.3.5. Female vs. Male

There were 375 female and 120 male completed surveys. First, the initial measurement model was tested for the two subgroups separately. The measurement models showed dissatisfied fit indices from the two subgroups with a CFI of .814 for female and a CFI of .715 for male (see Table 21). No significant model respecification was suggested by the LM test of the male model. Therefore, it did not allow researcher to further test the structural model of each group.

There were five obvious differences in the unstandard factor loadings between the two subgroup measurement models (see Table 23). Male loadings were higher on aromatherapy (.415 vs. .083), lifestyle diet (.983 vs. .507) and spiritual healing (.734 vs. .442) compared to female loadings. Female loading was higher on music therapy (.909 vs. .657).

Table 22. Comparisons of Unstandardized Paths of Measurement Models of European and Asian

Variable	Factor		Unstandardized European's Path	Unstandardized Asian's Path
V1=pros1	PROS		.521	.438
V2=pros2	PROS		.365	.233
V3=pros3	PROS		.519	.482
V4=cons1	CONS		.695	.405
V5=cons2	CONS		.442	.693
V6=cons3	CONS		.489	.342
V7=se1	Self-Efficacy		.480	.611
V8=se2	Self-Efficacy		.477	.672
V9=se3	Self-Efficacy		.411	.378
V10=se4	Self-Efficacy		.476	.488
V11=proce1	Processes of Change		.918	.884
V12=proce2	Processes of Change		.650	.780
V13=proce3	Processes of Change		.849	1.019
V14=proce4	Processes of Change		.769	.971
V15=proce5	Processes of Change		.689	.591
V16=proce6	Processes of Change		1.098	1.009
V17=proce7	Processes of Change		1.004	.951
V18=proce8	Processes of Change		.831	1.100
V19=ther1	Stages of Change		.245	.720
V20=ther2	Stages of Change		.138	.116
V21=ther3	Stages of Change		1.087	.005
V22=ther4	Stages of Change		.370	.620
V23=ther5	Stages of Change		.075	.375
V24=ther6	Stages of Change		.262	.213
V25=ther7	Stages of Change		.426	.832
V26=ther8	Stages of Change		.427	.621
V27=ther9	Stages of Change		.801	.795
V28=ther10	Stages of Change		1.047	.863
V29=ther11	Stages of Change		.478	.235
V30=ther12	Stages of Change		.154	.442
V31=ther13	Stages of Change		.561	.886
V32=ther14	Stages of Change		.968	.849
V33=ther15	Stages of Change		.517	.632
V34=ther16	Stages of Change		1.007	.823
V35=ther17	Stages of Change		.828	.944
V36=ther18	Stages of Change		.742	1.056
V37=ther19	Stages of Change		.484	.824
V38=ther20	Stages of Change		1.131	.912
V39=ther21	Stages of Change		.316	.885
V40=ther22	Stages of Change		.382	1.083
V41=ther23	Stages of Change		.317	.683
V42=ther24	Stages of Change		.715	.547

Table 23. Comparisons of Unstandardized Paths of Measurement Models of Female and Male

Variable	Factor		Unstandardized Female's Path	Unstandardized Male's Path
V1=pros1	PROS		.452	.680
V2=pros2	PROS		.323	.364
V3=pros3	PROS		.500	.588
V4=cons1	CONS		.642	.549
V5=cons2	CONS		.457	.506
V6=cons3	CONS		.550	.465
V7=se1	Self-Efficacy		.553	.497
V8=se2	Self-Efficacy		.546	.614
V9=se3	Self-Efficacy		.361	.593
V10=se4	Self-Efficacy		.535	.536
V11=proce1	Processes of Change		.931	.831
V12=proce2	Processes of Change		.693	.728
V13=proce3	Processes of Change		.903	.925
V14=proce4	Processes of Change		.801	.920
V15=proce5	Processes of Change		.689	.690
V16=proce6	Processes of Change		1.068	1.045
V17=proce7	Processes of Change		.959	1.015
V18=proce8	Processes of Change		.876	.897
V19=ther1	Stages of Change		.406	.451
V20=ther2	Stages of Change		.083	.415
V21=ther3	Stages of Change		.834	.647
V22=ther4	Stages of Change		.425	.258
V23=ther5	Stages of Change		.184	.219
V24=ther6	Stages of Change		.273	.172
V25=ther7	Stages of Change		.556	.454
V26=ther8	Stages of Change		.425	.689
V27=ther9	Stages of Change		.764	.826
V28=ther10	Stages of Change		.984	.971
V29=ther11	Stages of Change		.413	.349
V30=ther12	Stages of Change		.203	.149
V31=ther13	Stages of Change		.507	.983
V32=ther14	Stages of Change		.912	.992
V33=ther15	Stages of Change		.552	.446
V34=ther16	Stages of Change		.928	1.029
V35=ther17	Stages of Change		.848	.758
V36=ther18	Stages of Change		.909	.657
V37=ther19	Stages of Change		.557	.432
V38=ther20	Stages of Change		1.082	.997
V39=ther21	Stages of Change		.375	.610
V40=ther22	Stages of Change		.442	.734
V41=ther23	Stages of Change		.365	.583
V42=ther24	Stages of Change		.635	.569

4.4. Summary

Chapter Four presented the descriptive statistics of the data obtained from 509 Australian university students. All construct specified to CAM use showed acceptable internal reliability coefficients except for pros and cons. Research question one was addressed by assessing the overall structural model fitness. At the measurement model level, the final measurement model, with 5 error coefficient parameters added and 7 items dropped, showed significant data-model fit. At the structural model level, overall, the hypothesized structural model showed a satisfactory degree of fit to the observed data (Research Question 1). It suggested that the structural model of stages of CAM use can be retained as one of many possible explanations of the data. In answering question two, four conclusions of direct and significant relationships were drawn: 1) processes of change showed positive effects on stages of CAM use; 2) processes of change showed positive impacts on pros; 3) processes of change showed negative impacts on cons; and 4) cons had negative effects on self-efficacy. Pros and cons were significantly and negatively correlated with each other. In research question three, the structural model was modified by eliminating the five non-significant pathways among CAM constructs. With less variables left in the model, the fit index yielded was almost as good as that from the original structure model. All significant paths in original model remained to be significant in the reduced model. When addressing research question four, unfortunately, the poor fitness of the subgroup measurement models did not allow researcher to further compare the group differences in structural models.

Chapter 5 DISCUSSIONS

Chapter Five presents the summary, conclusions and discussions of the research findings. A number of potential reasons are discussed about the hypothesized relationships between the key constructs. Limitations of the study were listed followed by recommendations for future studies. Lastly, conclusions and major contributions to research theory and practice are presented.

5.1. Study Summary

Complementary and alternative medicine (CAM) use is increasing worldwide. However, there have been few comprehensive, theoretical models established to explain the psychosocial factors of CAM use. This study attempted to examine the potential for extending the TTM to the area of CAM use. The purposes of this study were to test a theory-based model of CAM stages of change using structural equation modeling technique and examine relationships among key constructs from the TTM.

CAM studies have revealed that several psychosocial factors, such as postmodern values, perceived effectiveness of CAM, and patient-practitioner relationships, predict the attitudes and the behaviors of CAM use. This literature provided support for establishing a measurement model specific to CAM. For example, the perceived effectiveness and patient-practitioner relationship can be used as indicators of the construct measure of pros of CAM use; and the lack of evidence and safety concerns can be used for measuring the construct of cons of CAM use.

This study applied the TTM as a theoretical framework for better understanding the intentional change and decision making for CAM use. The organizing construct of TTM, Stages of Change, involved a series of intermediate/outcome measures (self-efficacy, pros and cons) that were sensitive to a full range of cognitive and behavioral changes. The TTM literature provided a base for establishing a structural model of CAM stages of change (see Figure 1) which attempted to explore which constructs could relate to CAM stages of change and how. For example, processes of change were reported as independent variables which caused the changes in self-efficacy, decisional balance, and stages of changes. Therefore, the hypothesized CAM model was grounded in a sound theoretical framework of the TTM regarding the expected relationship among key constructs.

This research involved a secondary analysis of survey data taken from a study of complementary medicine use among Australian university students in 2000 (Feldman & Laura, 2004). The students who participated in the primary study were largely young, undergraduate students, and 75.6% were female participants. The sample contained 74 Asian-Australians and 314 European-Australians. Almost all of the data (509 out of 518) was used in this secondary study. SEM, a causal modeling technique, was performed with the cross-sectional data to examine the fitness of the hypothesized structural model, as well as the relationships between the constructs.

Research question one concerned the goodness of fit of the overall hypothesized structural model. SEM results revealed that, overall, the hypothesized structural model showed a satisfactory degree of fit to the observed data (Research Question 1). And the structural model of stages of CAM use can be retained as one of

many possible explanations of the data. Question two examined the significances and strengths of the paths between the TTM constructs in the structural model. Processes of change showed direct, significant effects on stages of CAM, as well as on pros and cons. Cons had significant, negative effects on self-efficacy. And pros and cons were significantly and negatively correlated with each other. The justification of these findings was presented in the next section discussing the results.

Question three concerned about how to make the model fit better. The reduced model without five non-significant pathways between constructs had better parsimony and yielded fit indices as good as the initial structural model did. All significant path coefficients from the initial structural model still remained significant in the reduced model, and the strength of these effects indicated by standard solution increased.

The last question attempted to compare the subgroups in terms of the relationships between key constructs. Consequently, the poor fit indices yielded from the Asia measurement model made it impossible to proceed to the structural model tests. Therefore only the unstandardized factor loading of each variable from the measurement models were compared for each subgroup. No conclusions could be drawn from this research question.

In summary, the finding of this study provided quantitative evidence of the applicability of the TTM to study the readiness of CAM use. Together, pros, cons, self-efficacy, and processes of change explained 56.7% of the variance of stages of CAM. It implied that the key constructs from the TTM would substantially determine the readiness of CAM use and explain the decisional making processes of CAM use

among Australian university students. It also demonstrated that the key constructs could be specified to CAM use and be operationalized with acceptable construct reliability and validity.

5.2. Discussion of Results

5.2.1. Effects of the Processes of Change

This study was designed to provide a comprehensive analysis of factors that influence the readiness of CAM use. The processes of change were found to be the most powerful factor that related to CAM stages of change in the hypothesized structural model. Of the four constructs, PC was the only significant one that directly, significantly related to stages of CAM use. It explained 27.6% of the variance of the stages of change which was almost half of the total variances explained (56.4%). It demonstrated the unique contribution of the PC in determining the readiness of CAM use among university students. It implied that the use of the processes could have promoted the movement along the stages of change. The more processes individuals used, the more advanced stages they were in. This result was supported by the literature of the TTM. Prochaska et al. (1985) had claimed that processes of change were the most efficacious predictor of the movement along the stages of change. Kosma, Cardinal, and McCubbin (2004) used discriminant function analysis examining the predictors of physical activity stages of change and reported that the most important predictors were the behavioral and cognitive processes of change.

PC in this study was also found to be a significant contributing factor of

decisional balance of CAM use. It showed strong, positive effects on pros and explained more than 50% of the variance of pros. This implied that the use of the processes could have increased the perceived benefits of CAM use. The more processes individuals used, the more benefits they perceived from CAM use. PC also showed negative effects on cons. The more processes individuals used, the less cost they perceived from CAM use. Further, PC had stronger effects on pros than on cons (.751 vs. -.583, path coefficients). It implied that the use of processes was more important in increasing pros than decreasing cons of CAM use for students who are mostly in the precontemplation stage.

This result was consistent with the TTM assumption which proposed that the use of the processes predicted the change in decisional balance (Pollak et al., 1998; Schnoll et al., 2002). Pollak et al. (1998) investigated causal relationships between processes of change and decisional balance using structural equation modeling. Study results indicated that using the processes of change had causal predominance over decisional balance for smokers in the contemplation stage (Pollak et al., 1998).

TTM assumes that PC use would increase self-efficacy of behavioral change. However, the path between PC and self-efficacy was found to be non-significant. The potential reason of this result is discussed in the section self-efficacy effects.

5.2.2. Effects of Pros and Cons

Although the direct effects of pros and cons on stages of CAM were observed, neither of these effects was significant. This finding was inconsistent with the literature that progressing along the stages of change depends on an increase in pros

and a decrease in cons (Prochaska, Velicer, DeClemente, Guadagnoli, & Rossi, 1991, Herrick et al., 1997). There is also a potential reason for this non-significant result. Since there were only two valid subscale measures for the construct of pros and three item measures for cons, the instrument used to assess pros and cons might be an insufficient measurement scale to capture their significant effects on CAM stages. The low levels of internal reliability coefficients of the two constructs (Cronbach alpha, .58 and .68 respectively) were additional evidence of this measurement concern. Therefore, an alteration of the instrument could result in a measure that would more adequately capture the influences of pros and cons on the stages of CAM.

Based upon the literature review (DiClemente, Prochaska & Gibertini, 1985), it was hypothesized that both pros and cons would have significant impacts on self-efficacy of CAM use. Consequently, this study showed an interesting finding that only cons, not pros, had a significant effect on self-efficacy. The negative effects of cons on SE suggested that the more individuals perceived the costs of CAM use the less self-efficacy they had in CAM use. This result would imply that cons had a more important role than pros did in determining the level of self-efficacy in CAM use. Further, it was possible that the perceived costs of CAM use would prevent students from considering CAM use by lowering their levels of self-efficacy.

However, there were at least two other potential explanations for this finding. First, the TTM assumed that, in the precontemplation stage, the pros of changing are low and the cons of changing always outweigh the pros. Pros of changing increase between precontemplation and contemplation stages. In contemplation, these two scales are approximately equal. After that, the cons of changing decrease from

contemplation to action. Since the majority of the students in this study (average of 70.1%, n=509) were in precontemplation in which cons were assumed to be high and pros to be low. This may be the reason why pros did not showed any significant effects on self-efficacy, but cons did. Therefore, stage-specific relations between pros and self-efficacy should be examined in the future research.

Secondly, the non-significant result might be due to the inadequate scale measure of pros. Compared to the cons, the construct measurement of pros was even weaker (internal reliability coefficient lower than .60). The construct had only two valid subscale measures. Future research should experiment with a larger number of items and attempt to develop more reliable measure of pros.

5.2.3. Effects of Self-efficacy

It was hypothesized that self-efficacy would be a significant predictor of stages of change based upon research literature (Prochaska, DiClemente, Velicer, Ginpil, Norcross, 1985; DiClemente et al., 1985). However, no significant effect of self-efficacy was found on the stages of CAM in this study. The path coefficient between self-efficacy and stages of change was actually extremely low (.054). There might be two reasons to explain it. First, the TTM assumes that, in the precontemplation stage, self-efficacy is generally low. With the movement to the later stages, self-efficacy would increase. Since the majority of students in this study were in precomtemplation, it might explain why self-efficacy did not showed any significant effects on stages of change. This might also be the reason why processes of change did not show significant impacts on self-efficacy, but on pros and cons.

Further studies are needed to explore the stage-specified relationships between self-efficacy and stages of change.

Another explanation of the non-significance is related to the definition and the categories of CAM practices. CAM therapies include a variety of practices. Some practices require skill training and time commitment, such as meditation, Tai Chi, and Yoga. Self-efficacy might be a critical factor for determining the stages of change in these cases. However, some practitioner-provided CAM use, such as megavitamin use and massage therapy, do not involve these requirements and are relatively convenient to use, and thus might not be influenced by self-efficacy. Further study should be carried out to examine the self-efficacy which is tailored to specific CAM practices.

This specific concern was also supported by the self-efficacy measurement model evaluation. The errors of se3 (I am sure I can find appropriate alternative medicine in a local health food shop) and se4 (I am sure I can find an alternative medicine practitioner) were found significantly correlated since they shared a common theme of the self-efficacy in the availability of the CAM practices. Some CAM practices might involve using health products which can be purchased from stores, such as megavitamin therapy and lifestyle diet. Other practices are practitioner-provided, such as acupuncture, which might need users to find health providers for the treatments. That might also imply the need to differentiate CAM practice categories.

5.2.4. Measurement Issues

Since the secondary data used in this study came from a newly established instrument in which the constructs specified to CAM use were operationalized for the first time, confirmatory factor analysis was performed to evaluate the reliability and validity of each scale. The research contributed to the literature by providing reliability and validity evaluations of CAM constructs that borrowed from the TTM.

The initial measurement model yielded unacceptable fit indices (CFI<.90 and AGFI<.90). After five error coefficient parameters were added into the model and seven problematic items were dropped, the parsimony and fit of the model were greatly improved. The final model obtained (CFI=.915, AGFI=.862, Chi-square/df=924/545) was considered a more accurate representation of the nature of the relationships between observed variables and latent constructs. All the decisions of model modification were grounded in theories or based on research literature. More details about construct measurement were discussed in the following sections.

Pros (See Figure 9). The construct showed a low reliability coefficient (.58) which drew the attention of researcher in interpretations related to pros. Of the three items of pros, pros1 and pros3 were found to be good items in measuring the construct of pros. Pros3 (the perceived benefits of alternative medicine are real) was found to be the strongest item that loaded on pros. This result was consistent with the literature in that perceived benefit was consistently reported as the most influential factor in people's decision to use CAM (Austin, 1998). The present study further confirmed the perceived benefits of CAM as a valid measure of the construct of pros of CAM.

Procl (Most alternative medicine is as effective as conventional medicine) was also found to be a good measure of the construct of pros. Several studies have reported the association between beliefs of the effectiveness and CAM use among university students (Hopper et al., 1998, Chaz et al., 2001). Hopper et al. (1998) reported that Australian medical students thought that complementary therapies included ideas and methods from which conventional medicine could benefit, that these therapies could provide a useful supplement to mainstream medicine. This study provided additional quantitative supports to this literature.

One item with low loading on pros, pros2 (Most alternative medicine practitioners care more about their clients than conventional medicine practitioners), was dropped from the measurement model. The low loading of pros2 implied that CAM user might not necessarily agree that alternative medicine services were better than conventional medicine. This result was consistent with Astin (1998) and Eisenberg et al. (2001) who claimed that users of CAM were no more dissatisfied with or distrustful of conventional care than nonusers were. This study further suggested that dissatisfaction with conventional medicine might not be a valid measure of the perceived benefits of CAM use. Another reason for dropping pros2 came from the Cronbach's alpha calculation. It showed that if pros2 were dropped, the construct reliability coefficient of pros would increase to from .583 to .591.

Cons (see Figure 10). This construct showed a low reliability coefficient (.68) which calls for cautions in interpretations related to cons. The three measures of the cons seemed loaded well on the construct. The high factor loading of cons1 (most

alternative medicine is quackery) on cons reflected the negative attitudes towards CAM practice. Con2 (there is little evidence to support alternative medicine) revealed another barrier that prevented people from CAM use. Cons3 (most alternative medicine is dangerous) reflected people's concerns of the safety of CAM products and practice. The construct measure of cons has support in the literature. Eisenberg et al. (2001) argued that a negative factor that prevented people from practicing CAM might be that most of therapies had not been satisfactorily evaluated for their relative effectiveness, safety, or mechanisms of action (Eisenberg et al., 2001). University students seemed unsure whether the effects of complementary therapies were real and why they work (Hopper & Cohen, 1998). Scientific evidence was thought to be important in students' decision to support an alternative therapy (Hopper & Cohen, 1998). They also agreed that non-medical practitioners of CAM should be registered and that physicians should receive training before practicing CAM (Hopper & Cohen, 1998).

Self-Efficacy (see Figure 11). All four items (se1 to se4) seemed to be good measures of the factor of self-efficacy. Errors of se3 (E9) and se4 (E10) were significantly correlated (.259). Since both se3 (I am sure I can find appropriate alternative medicine in a local health food shop) and se4 (I am sure I can find an alternative medicine practitioner) shared a common theme of self-efficacy that was related to the availability of the CAM practice. Some CAM practices are self-prescribed and involve using health products which can be purchased from stores, such as megavitamin therapy and lifestyle diet. Other practices are practitioner-

provided, such as acupuncture, which might need users to find health providers for the treatments. That might explain the correlation between the two items. It was reported that demand for CAM has been matched by supply and there are now substantial list of CAM practices available to western, metropolitan citizens (Ernst, 1997).

Processes of change (see Figure 12). Of the eight items of processes of change, proce6 (I have seen myself as a person who uses CAM) and proce7 (I have realized that using CAM is a better choice) were two strongest measures of PC. Self-reevaluation (proce6) comes when an individual realizes that the behavioral change is an important part of one's identify as a person. It was reported by Prochaska et al. (1985) as one of the most efficacious predictors of addictive behavioral changes (Prochaska, DiClemente, Welicer, Ginpil, Norcross, 1985). Counterconditioning (proce7) requires the learning of healthier alternative behaviors that can substitute for problem behaviors. This process might be used by those who find conventional medicine do not work for their health problems, such as chronic diseases and stress. Sometimes the side effects of the medications push patients to find a complementary or alternative way to alleviate the pain or discomfort. It might be the reason why proce7 were found to be a process related to CAM use.

Proce1 (I looked for information about CAM) and proce8 (I have kept things around me to remind me to use CAM) were also proved to be good indicators of PC measurement. Consciousness raising (proce1) prefers to the activities of finding and learning new facts, ideas, and tips that support the health behavioral change. Stimulus

control (proce8) adds cues or reminders to engage in the healthy behavior. Obviously, the two processes would be critical, necessary actions taken by CAM users or those who were considering use CAM.

The contributions of three items, proce3 (I was inspired by friends or family who use CAM), proce4 (People around me have encouraged me to use CAM), and proce5 (I have noticed that more people are using CAM), were relatively less on PC measurement. The three variables were significantly correlated with each other. The reason might be that the three processes shared a common component of social influences/impacts on the individual's decisional making of CAM use. The literature reports that social support is related to the CAM use. The greater the amount of perceived social support individuals had, the more likely they were to use CAM (Guarino, 2002). Resnick & Nigg (2003) tested a theoretical model of exercise behavior for older adults using SEM. Social support showed direct, significant effects on stages of change.

Stages of change (see Figure 13). Of 24 items of stages of change, megavitamin therapy and relaxation technique had the highest standard factor loadings (.652 and .620). Megavitamins may be popular among students due to its availability and affordability. It might also be convenient to use for students living on campus compared to some provider-based CAM practice. Using relaxation technique might specially meet students' need for reducing the pressures from study. Energy healing, herbal medicine, massage therapy, mental image, and yoga load on stages of change at the level between .50 and .60. Again, this group of practices might be commonly

practiced by students for relieving pressures and for relaxations purposes. These findings are congruent with Neill & Fogle's reports (2003) that the use of vitamin supplements, herbal medicine, relaxation/meditation and massage therapies were found to be the most popular CAM techniques used. Cooperating relaxation technique and massage therapy or yoga classes in college health centers are recommended for meeting students' health needs (Neil & Fogle, 2003).

Dance therapy, folk/home remedies, homeopathy, lifestyle diet, music therapy, self-help groups, spiritual healing, and Tai Chi had factor loadings between .40 and .50. Items that loaded under the level of .400 were acupuncture, aromatherapy, ayurvedic medicine, and meditation. Some of CAM practices in these two groups involved certain type of trainings and skill requirement which might lower their popularity among students. Other CAM practice, such as meditation, might be relatively time-consuming for college students. Additionally, practitioner-provided CAM, such as acupuncture and ayurvedic therapy, might less likely be used among students due to economic reasons because many CAM practices were not covered by health insurance in Australia.

An error coefficient, E27 (Folk/Home remedies) and E28 (Herbal Medicine), was added into the measurement model of CAM stages. Theoretically, folk/Home remedies usually involve herbal use, and herbal medicine at most time is an important component of home remedies.

5.2.5. General CAM Use versus Specific CAM Practice

It has been reported that the inconsistent definition and classification of CAM has led to difficulties in interpreting the results of surveys (Spence & Ribeaux, 2004). There are strong needs to differentiate between the CAM practices that included only practitioner visits and those which included non-practitioner-based activities, such as use over-the-counter (OTC) products and self-help activities (Spence & Ribeaux, 2004). This issue also posed difficulties in construct measurement in this study. For example, the study results showed no significant relationship between self-efficacy in general CAM use and CAM stages of change. It suggested that the self-efficacy scale might need to be tailored to specific types of CAM practice use. Because for practitioner-based CAM, self-efficacy might not be a critical determinant of the readiness of use, and income level might be one in this case. But for non-practitioner-based CAM use, especially for those self-cares involving skill trainings and time commitments, self-efficacy might become a critical factor. Further studies should be carried out to examine tailored self-efficacy effects on specific CAM practice.

Compared to self-efficacy scale, the general CAM use scales of processes of change, pros and cons seemed work well when assessing their relationships with CAM stages. PC significantly impacted pros and cons, as well as the stages of CAM use. The use of these general CAM measurements also has literature support. Furnham (2000), in a study of the relationship between general knowledge or interests in CAM and specific attitudes to homeopathy, argued that people tended to be in favor or against CAM practices in general. It showed that interests in and experiences with one particular CAM therapy always led to interests in exploring

other CAMs and an open mind to CAM use. Therefore attitudes to one specific CAM practice were predictive of attitudes to many other CAM therapies (Furnham 2000).

5.2.6. Subgroup Differences

The research question four failed to compare the subgroups in terms of the relationships between key constructs. Because the poor fit indices yielded from the Asian measurement model made it impossible to proceed to the structural model tests. The same problem occurred to the measurement model of male students. It implied that the measurement model of each gender or ethnicity subgroups might be very difference. However, the poor fit indices of the measurement models also might be due to the small sample size of the subgroups. There were 73 participants describing themselves as Asian descents (versus 308 European descents) and 120 male completed surveys (versus 375 female). Structural equation modeling is a large sample technique (Bentler, 1993; Kelloway, 1998). In general, a sample size of at least 200 observations would be an appropriate minimum.

Still the researcher listed the unstandard factor loadings of subgroups from the initial measurement models. However, these differences between two groups are inconclusive due to the unacceptable data-model fits of the measurement models. There were some obvious differences between the two ethnicity subgroups. For example, the Asian model has higher loadings on acupuncture (.720 vs. .245) and Tai Chi (.683 vs. .317), two practices that are originated from Chinese medicine. And the European model loaded higher on art therapy (1.087 vs. .005). These differences would obviously be explained by the culture background of the two groups.

In summary, CAM measurement should consider the breath of the CAM terms. Investigations that focus on the distinctions between different types of CAM practice may further understand the needs and motivations of CAM users. Since CAM practice among specific population gain different levels of popularities, construct measures should also consider the changing profile of CAM use of specific subgroups.

5.3. Limitations

There were several limitations of this study that needs to be discussed. Because cross-sectional data was used in this study, causal interpretations of findings will not be warranted. SEM, as a statistical tool, can only infer causality from cross-sectional data. It would be mistake to think causality was actually proven by SEM. Causation must not only be supported by the data but, more importantly, by the theoretical foundation of the model (Cliff, 1983).

Secondly, the generalizability of the study is limited in that the sample used in the study was not a random one. Therefore, the study results may not be generated to all Australian university students. Additionally, the study was based on self-report data with no objective information on actual CAM use behavior. Self-report surveys may be subject to responses of social desirability.

Using a newly developed instrument of CAM use has limitations. The reliability and validity of the instrument were not well established. Internal reliability coefficients of pros and cons scales were low. An alteration of the instrument should

experiment with a larger number of items which would more adequately capture the influences of pros and cons on the stages of CAM.

The hypothesized model did not encompass all of the possible antecedents of stages of CAM. A significant amount of variance of stages of CAM was not explained by the four factors. It might be because that the reasons of CAM practice could be multidimensional, and may not be explained solely by one theory. There were obviously unaccounted for variables such as holistic health beliefs that may need to be included into the model.

An indirect effect is the part of the effect of the independent variable that is mediated, or transmitted, by another variable or other variables. By assessing indirect effects as well as direct effects, the total effects of each construct on the dependent variable is more thoroughly evidenced. Unfortunately, the EQS does not provide indirect effect results. Further studies are needed to explore the indirect effects among key constructs.

5.4. Recommendations for Future Studies

Although the research results supported the use of TTM in studying CAM use, it must be emphasized that the present findings by no means represent a completed theoretical model of CAM use. Multiple tests of the model are still needed to examine whether the model can be useful in explaining and predicting behavioral changes in CAM use. This dissertation was only a first step in integrating and assessing the key

constructs of CAM use. More proved psychosocial factors which were associated with CAM use, such as health beliefs, should be included into the structural model.

Establishing CAM construct validity is a long process, with each test providing information and suggesting revisions that can aid the next empirical test. Findings from this study may be used to lay the ground work for future CAM construct examinations. Data collection on a new university sample is needed in order to further validate the structural and measurement model specified in this study. Longitudinal research design would help answer a number of questions including whether or not the construct relationships are causal in nature.

Though processes of change indicated the strongest effects on stages of change, each process variable was measured by only one item. The construct measurement should be further improved by using multiple subscales assessing each process use. The study did not find any direct impacts of pros and cons on stage of CAM. It might be due to the insufficient construct measurements. An alteration of the instrument of pros and cons with more subscale measures should be used to adequately examine the influences of the two factors in the future studies. Another way suggested to further explore the effects of pros and cons on stages of CAM is to combine the two construct into one factor for better construct reliability and validity. Additional research is needed to explore the stage-specific relationships between decisional balance and stages of change.

Since no direct relation was found between self-efficacy and stages of change, further studies are needed in which self-efficacy is tailored to specific CAM practice. Another way to explore the relationship between the two construct is to examine

stage-specific self-efficacy. In summary, CAM measurement should consider the breath of the CAM terms, the changing profile of CAM use of specific subgroups, as well as the theoretical framework of the study.

This study failed to compare the factor relationships across the subgroups of gender and ethnicity due to small sample size. Additional research is needed to examine and understand the influences of gender and ethnicity on the structural model. Additionally, the researcher did not provide indirect effects results among constructs due to the limitation of EQS software used.

5.5. Conclusions

This study took an important step in advancing the exploration of the application of TTM to CAM use. The hypothesized structural model of stages of CAM represented an integrated collection of constructs and hypotheses of their relationships. Cross-sectional confirmatory factor analysis provided supports that the modified measurement model had acceptable reliability and validity and accurately reflected the relationships between observed variables and latent factors. The overall structural model showed good data-model fit which implied the successful application of the TTM to CAM use. Processes of change were the strongest factor which directly influenced pros and cons as well as stages of CAM. However, the study did not find significant effects of self-efficacy, pros, and cons on the stages of change. Further studies were suggested to explore the effects of these factors, as well as the effects of gender and ethnicity on the stages of CAM use.

The contribution of this study is that it offered quantitative support to a well defined, theoretically sound structural model of CAM stages of change with multivariate measurements of the constructs. SEM provided support that the hypothesized structural model accurately reflected the effects of key factors on the movement along the stages. Although many studies have reported the increasing use of CAM, constructs that adequately capture whole picture of CAM use has rarely been developed. Results from this study provide the practical framework needed for the development of construct measures of CAM use.

Appendix 1: Survey Instrument of the CAM Use among Australian University Students

SURVEY OF COMPLEMENTARY & ALTERNATIVE MEDICINE PRACTICES

- I. This survey is about complementary & alternative healthcare and medical practices. *Complementary and Alternative Medicine practices* are defined as those healthcare and medical practices not currently an integral part of conventional medicine. For each of the Complementary & Alternative Medicine practices listed below, please circle the letter that best indicates YOUR level of use. [For definitions of these practices, please see the attached sheets.]

	NOT THINK ABOUT USING IT	THINKING ABOUT STARTING IN THE NEXT 6 MONTHS	DEFINITELY PLANNING TO START IN THE NEXT 30 DAYS	ALREADY DOING IT FOR LESS THAN 6 MONTHS	ALREADY DOING IT FOR 6 OR MORE MONTHS
Acupuncture	a	b	c	d	e
Ayurvedic Medicine	a	b	c	d	e
Aromatherapy	a	b	c	d	e
Art Therapy	a	b	c	d	e
Biofeedback	a	b	c	d	e
Chiropractic	a	b	c	d	e
Dance Therapy	a	b	c	d	e
Energy Healing	a	b	c	d	e
Folk/Home Remedies	a	b	c	d	e
Herbal Medicine	a	b	c	d	e
Homeopathy	a	b	c	d	e
Hypnosis	a	b	c	d	e
Lifestyle Diet (vegetarian, macrobiotic, etc.)	a	b	c	d	e
Massage	a	b	c	d	e
Megavitamin Therapy	a	b	c	d	e
Meditation	a	b	c	d	e
Mental Imagery	a	b	c	d	e
Music Therapy	a	b	c	d	e
Prayer	a	b	c	d	e
Relaxation Techniques	a	b	c	d	e
Self-Help Groups	a	b	c	d	e
Spiritual Healing	a	b	c	d	e
Tai Chi	a	b	c	d	e
Yoga	a	b	c	d	e

II. Please tick (✓) the following conditions for which **you use or might consider using** Complementary and Alternative Medicine:

- | | |
|---|--|
| <input type="checkbox"/> Allergies | <input type="checkbox"/> Headaches |
| <input type="checkbox"/> Anxiety | <input type="checkbox"/> High blood pressure |
| <input type="checkbox"/> Arthritis | <input type="checkbox"/> Insomnia |
| <input type="checkbox"/> Back problems | <input type="checkbox"/> Pain |
| <input type="checkbox"/> Colds and flu | <input type="checkbox"/> Sprains or strains |
| <input type="checkbox"/> Digestive problems | <input type="checkbox"/> Stop smoking |
| <input type="checkbox"/> Depression | <input type="checkbox"/> Stress |
| | <input type="checkbox"/> Other _____ |

III. **If you use** Complementary and Alternative Medicine, what are the main reasons you use it? (Please tick (✓) all that apply).

- | | |
|---|---|
| <input type="checkbox"/> Availability | <input type="checkbox"/> Holistic approach |
| <input type="checkbox"/> Belief system | <input type="checkbox"/> Lifestyle |
| <input type="checkbox"/> Curiosity | <input type="checkbox"/> Looking for better results |
| <input type="checkbox"/> Emphasis on prevention | <input type="checkbox"/> More caring health environment |
| <input type="checkbox"/> Family/traditional background | <input type="checkbox"/> More convenient |
| <input type="checkbox"/> Fewer side effects | <input type="checkbox"/> Sense of control |
| <input type="checkbox"/> Financial | <input type="checkbox"/> Referral from doctor |
| <input type="checkbox"/> Dissatisfaction with conventional doctors | <input type="checkbox"/> Referral or gift from someone else |
| <input type="checkbox"/> Dissatisfaction with conventional medicine | <input type="checkbox"/> Other _____ |

IV. **If you do not use** Complementary and alternative Medicine, what are the main reasons you do not use it? (Please tick (✓) all that apply).

- | | |
|---|--|
| <input type="checkbox"/> Distrust of alternative practitioner | <input type="checkbox"/> Lack of credibility |
| <input type="checkbox"/> Family/traditional background | <input type="checkbox"/> Lack of doctor's referral |
| <input type="checkbox"/> Fear of side effects | <input type="checkbox"/> Lack of research |
| <input type="checkbox"/> High cost | <input type="checkbox"/> Moral/religious |
| <input type="checkbox"/> Inconvenience | <input type="checkbox"/> Not covered by Medicare |
| <input type="checkbox"/> Lack of availability | <input type="checkbox"/> Other _____ |

V. For each item below, please circle the letter that best shows what you think.

	Strongly Disagree	Disagree	Unsure	Agree	Strongly Agree
15. Most alternative medicine is as effective as conventional medicine.	a	b	c	d	e
16. Meditation is a waste of time.	a	b	c	d	e
17. Most alternative medicine practitioners care more about their clients than conventional medicine practitioners.	a	b	c	d	e
18. Acupuncture is a worthwhile type of treatment.	a	b	c	d	e
19. Most alternative medicine is quackery.	a	b	c	d	e
20. Meditation helps a person feel less stressed.	a	b	c	d	e
21. Acupuncture is a risky procedure.	a	b	c	d	e
22. There is little evidence to support alternative medicine.	a	b	c	d	e
23. Many people gain from acupuncture.	a	b	c	d	e
24. The perceived benefits of alternative medicine are real.	a	b	c	d	e
25. Meditation is hard to do.	a	b	c	d	e
26. Acupuncture is a useless procedure.	a	b	c	d	e
27. Meditation makes a person feel better.	a	b	c	d	e
28. Alternative medicine is dangerous.	a	b	c	d	e

VI. For each item below, please circle the letter that best shows what you think.

	Strongly Disagree	Disagree	Unsure	Agree	Strongly Agree
11. I am sure I can practice meditation.	a	b	c	d	e
12. I am sure I can use complementary and alternative medicine.	a	b	c	d	e
13. I am sure I can obtain acupuncture treatments.	a	b	c	d	e
14. I am sure I can use alternative medicine, even if others are <u>not</u> using it.	a	b	c	d	e
15. I am sure I can meditate almost every day.	a	b	c	d	e
16. I am sure I can find an acupuncturist in my community.	a	b	c	d	e
17. I am sure I can find appropriate alternative medicine in a local health food shop.	a	b	c	d	e
18. I am sure I have the time for an acupuncture treatment.	a	b	c	d	e
19. I am sure I can find an alternative medicine practitioner.	a	b	c	d	e
20. I am sure I can find the time to meditate.	a	b	c	d	e

VII. For each item below, please circle the letter that best shows what you think.

	Strongly Disagree	Disagree	Unsure	Agree	Strongly Agree
8. Most people I know use complementary and alternative medicine.	a	b	c	d	e
9. People important to me feel I should use complementary and alternative medicine.	a	b	c	d	e
10. I have been encouraged to use complementary and alternative medicine.	a	b	c	d	e
11. Most people I know meditate.	a	b	c	d	e
12. I have been encouraged to meditate.	a	b	c	d	e
13. Most people I know have had an acupuncture treatment.	a	b	c	d	e
14. I have been encouraged to have an	a	b	c	d	e

acupuncture treatment.	a	b	c	d	e
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VIII. These items are about the things people do when thinking about or using complementary and alternative medicine. In the **past month**, how often have you done or experienced each of the following:

	Never	Rarely	Sometimes	Often	Very Often
9. I looked for information about complementary and alternative medicine.	a	b	c	d	e
10. I reminded myself that if I use complementary and alternative medicine I will be a good role model for other people.	a	b	c	d	e
11. I was inspired by friends or family who use complementary and alternative medicine.	a	b	c	d	e
12. People around me have encouraged me to use complementary and alternative medicine.	a	b	c	d	e
13. I have noticed that more people are using complementary and alternative medicine.	a	b	c	d	e
14. I have seen myself as a person who uses complementary and alternative medicine.	a	b	c	d	e
15. I have realised that using complementary and alternative medicine is a better choice.	a	b	c	d	e
16. I have kept things around me to remind me to use complementary and alternative medicine.	a	b	c	d	e

IX. How would you identify yourself?

A. Ethnicity or Race

1. European-Australian

- Northern European (e.g., British, Irish)
- Southern European (e.g., Italian, Greek)
- Eastern European (e.g., Polish, Russian)
- Other European, please specify _____

2. Asian-Australian

- Chinese (China, Taiwan, Hong Kong, Singapore, Malaysia)
- Japanese
- Korean
- Vietnamese
- Indian
- Other Asian, please specify _____

3. Aboriginal or Torres Strait Islander

4. Pacific Islander-Australian

5. International Student
Country _____

6. Other, please specify _____

B. Gender: Female Male

C. 1. How many years have you spent at the University? _____

2. Are you

- Undergraduate
- Honours student
- Masters/Ph.D. student
- Other, please specify _____

D. Age

- 18-22 years
- 23-29 years
- 30-35 years
- 36-40 years
- Over 40 years

E. Were you born in Australia?

- Yes No If no, how long have you lived here? _____

Appendix B: Definition of CAM Therapies

Complementary and Alternative Medicine Descriptive Terms
(Adapted from NCCAM* Web Page)

- Acupuncture: Purportedly used to balance the flow of energy (or *chi*) in the body, thin needles are inserted into specific points beneath the skin and gently stimulated. Studies on acupuncture have indicated some positive results in helping to reduce pain and nausea.
- Ayurvedic Medicine: Based on specific body types, this system of medicine practiced in India stresses lifestyle interventions and natural therapies to promote one's healing.
- Aromatherapy: Particular scents or aromas are used to allegedly stimulate a specific healing response on the part of the body.
- Art Therapy: As a means of expressing thoughts and feelings which otherwise might be repressed or unspoken, art therapy is said to be particularly therapeutic for children.
- Biofeedback: Through the use of monitoring systems, individuals can receive feedback on their bodily functions (blood pressure, temperature, brain waves, etc.) and supposedly can train themselves to exert control over these functions.
- Chiropractic: Manipulation and realignment of the spinal purportedly helps to reduce pain related to injuries and structural imbalances.
- Dance Therapy: Through the use of dance, individuals have supposedly have been able to achieve an increase in self-esteem and feelings of well-being, a decrease in body tension and depression, and a reduction in chronic pain.
- Energy Healing: Healing therapy is purported directed through one person to another by touching or moving one's hands over the person requiring healing. Also known as *the laying on of hands*, *Reiki*, and/or *therapeutic touch*.
- Folk/Home Remedies: Defined as practices that have not yet been proven to have medicinal value, but which have been passed down by word of mouth or family custom (e.g., "*Feed a cold; starve a fever*", or using *grandma's chicken soup* to battle the flu).
- Herbal Medicine: Utilising specific portions of plants (roots, bark or leaves), herbal medicine is purported to help strengthen the body's immune system and/or fight against specific diseases. Thought to be the precursor of many modern drugs (aspirin, cough medicines, etc.)
- Homeopathy: Using extremely dilute solutions of substances which cause specific reactions in the body, this therapy allegedly inoculates the body so that it can produce a strengthened response.
- Hypnosis: Therapeutic suggestions given to a client in a trance-like state are alleged to help individuals quit smoking; decrease their fear of flying, etc.; and exert increased control over particular bodily functions.
- Lifestyle Diet: Major changes in one's diet – toward vegetarianism or macrobiotics, for example – have supposedly shown some benefits for increased health and decreased incidence of heart disease, cancer, etc.
- Massage Therapy: Applying gentle pressure and manipulation of the skin and muscles supposedly helps to stimulate the body's circulation and reduce the tension held in muscle tissue.
- Megavitamin Therapy: The dose of a specific vitamin above its recommended daily requirement is purportedly used for the purpose of preventing or fighting a particular disease.

- **Meditation**: Focusing awareness and directing it to the breath, a repeated word or phrase or a mental image. This supposedly helps to reduce stress and promote health.
- **Mental Imagery**: Concentrating on a mental image and removing distractions from the mind. This supposedly helps to reduce stress.
- **Music Therapy**: Some studies purportedly indicate that listening to certain types of music helps to promote relaxation, reduce anxiety and promote pain relief.
- **Prayer**: By means of silent or spoken requests, prayer is purportedly a conscious effort on the part of the individual to put oneself in touch with a higher power (e.g., God). Requests for healing for oneself or others are often involved in this practice.
- **Relaxation Techniques**: Using progressive muscle relaxation, diaphragmatic breathing or other prescribed, practiced techniques, this supposedly promotes relaxation of the body and mind.
- **Self-Help Groups**: Individuals who get together to discuss and share information regarding a common health concern purportedly benefit both psychologically and physically. Examples include *alcoholics anonymous*, *heart-attach survivors*; *weight watchers*, etc.
- **Spiritual Healing**: Directed towards another person using spiritual intentions (calling on higher power/God); spiritual healing may include *the laying on of hands* or with hands held towards the individual's head or body.
- **Tai Chi**: A set of slow, fluid movements that emphasize breathing, balance and the intentioned flow of energy (*chi*) throughout one's body, tai chi may be done individually or with a group of other people, usually in the early morning.
- **Yoga (Hatha Yoga)**: Described as a series of prescribed physical postures and breathing exercises, hatha yoga, when practiced diligently, has purportedly shown to increase one's flexibility and improve one's respiratory function.

Disclaimers: The University of Newcastle does not endorse nor guarantee this information. The National Center for Complementary and Alternative Medicine (National Institutes of Health, US) cautions users not to seek the therapies described on these pages without the consultation of a licensed health care practitioner.

Web Sites for More Information on Complementary and Alternative Medicine

- The National Center for Complementary and Alternative Medicine*
<http://nccam.nih.gov/> [Click on "For Consumers and Practitioners," then "Fact Sheet," and then "Major Domains of Complementary & Alternative Medicine."]

To find out more about specific areas use the *search* function. [Click on "For Investigators," then "Complimentary & Alternative Medicine (CAM) Databases," and then "NCCAM's CAM Citation Index (CCI)" which consists of more than 175,000 bibliographic citations.]

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