MEASURING AND INVESTIGATING HEALTH MOTIVATION AMONG COLLEGE

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Measuring and Investigating Health Motivation among College Students in China

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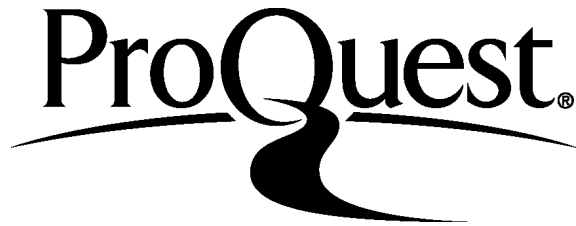
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ABSTRACT

Measuring and Investigating Health Motivation among College Students in China

by AN Min

for the degree of Doctor of Philosophy
The Hong Kong Institute of Education

Lifestyle has a profound impact on people's health. In China, emerging adults, typically college students, experience unhealthy lifestyles such as smoking, drinking, sleep disorders, and sedentary lifestyles, which are common risk factors for chronic diseases. Enhancing health motivation plays a key role in promoting them to want to adopt health-promoting lifestyles. The purpose of this study was to (i) explore and delineate college students' motivations for health-promoting lifestyles; and (ii) develop a measurement scale to measure health motivations. Study participants included college students in China.

To achieve the first objective, 93 undergraduate students (59 males and 34 females; mean age 21.2 years) were interviewed in the first stage of the study. Verbatim transcripts were analyzed using a theory-directed approach following the Self-determination Theory (SDT). Participants reported five types of health motivation that broadly fall under SDT: absence of motive, external, introjected, identified, and integrated. Sources of motivation identified included health literacy, the environment, and social relationships.

To achieve the second objective, an item pool for the College Students Health Motivation Questionnaire (CSHM-Q) was generated based on content coding results. A panel discussion comprising 7 experts was conducted to examine content validity. To examine the initial reliability and validity of the

measurement scale, 283 college students were surveyed. An initial five-domain solution was revealed from an exploratory factor analysis. The five factors explained 66.0% of the total variance.

To further confirm the internal structure and validate the questionnaire, 1023 college students were surveyed. Good model fit indices from confirmatory factor analysis suggested that a four-domain solution of the CSHM-Q has a more stable structure and was generally consistent with the theoretical model based on Self-determination Theory. Reliability and validity were further established in Stage 3 of the research. Cronbach's alphas for each domain were all above satisfactory level, ranging from .60 to .86. Test-retest reliability was demonstrated by administering the measurement scale to the same participants at two time points. Intraclass correlation coefficients were all above .8, indicating the CSHM-Q has a good consistency over time.

After internal structure was identified, Rasch analysis was performed to examine the unidimensionality and construct validity of each subscale of the measurement scale. Rasch person reliabilities for each domain were all greater than .6, indicating that the item's difficulty placement would be similar when another comparable survey was conducted using the CSHM-Q. Each subscale of CSHM-Q had satisfactory fit values. Unidimensionalities within each subscale were established since all of the fit values were located within the recommended range from .7 to 1.3. Through category functioning analysis, the step calibration advance monotonically. Differential items functioning analysis showed good invariance across different groups, indicating the CSHM-Q can be used for group comparison. Convergent validity was established through examining the relationship between health motivation and exercise motivation. Moderate to high correlations ranging from -.31 to .58 were observed, indicating medium to strong relationship between motivations to practice health-promoting lifestyles and motivations to exercise regularly. However, a weak relationship was observed between health motivation and health-promoting lifestyles; a similar result was also found between exercise motivation and health-promoting

lifestyles. These results implied that besides motivation, there might have been other potential determinants or barriers that affect college students' adoption of health-promoting lifestyles. Initial findings from this study show acceptable psychometric properties and CSHM-Q can be a promising instrument in measuring health motivation among college students in China.

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LIST of ABBREVIATIONS

AHP	the Adolescent Health Promotion scale
CFA	Confirmatory Factor Analysis
CSHM-Q	College Students' Health Motivation Questionnaire
CTT	Conventional Test Theory
DIF	Differential Item Functioning
EFA	Exploratory Factor Analysis
HELP	the Health Enhancement Lifestyle Profile
IRT	Item Response Theory
SDT	Self-determination Theory
SEM	Structural Equation Model
SCM	Self-concordance Model
SRAHP	Self Rated Abilities for Health Practices Scale

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CHAPTER 1

INTRODUCTION

1.1 Background

1.1.1 Unhealthy Lifestyles among Chinese College Students

Emerging adulthood, first described by Arnett (2000), is a developmental period of life span from 18 to 25, when those young individuals seek independence and experience different life possibilities. It is believed that college students at this developmental phase have reached the pinnacle of their health, at the same time, they will develop their own lifestyle and health behaviors which will enhance or threaten health status in their later life (Shifren, Furnham, & Bauserman, 2003). At this stage their physical development stops, but their development of mind, mental, or social relationship, will continue. Their individual lifestyles are gradually shaped and become relatively stable from this stage.

In China, due to the expansion of higher education and registration requirement for the college entrance examination, scores dropped for recent years, the overall average acceptance rate reached nearly 80% (Li, 2007; Morgan & Wu, 2011), and this number didn't include those students who pursue higher education abroad. Majority of the younger generation in China are spending their emerging adulthood period in colleges and universities.

Unhealthy lifestyles, such as smoking, poor eating habits, drinking or even drug abuse can be found among undergraduate and postgraduate students. Those behaviors are widely believed to have an adverse impact on health (WHO, 2012a, 2012b) and if college students choose to live in an unhealthy lifestyle, this will bring detriment to their health for the rest of their lives. Quite a number

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of unhealthy behaviors among adults can be avoided if they can be rectified and resolved at the early age (Megel, Wade, & Hawkins, 1994; Lee, Wun, & Chan, 1997). So it is crucial to help these young people to make a right choice and find their own personal healthy lifestyle for the rest of their lives.

Moreover, people start to have health-threatening lifestyles at emerging adulthood. According to the survey result administered by Zhang and Su (2007), .8% Chinese middle school students regularly drink, 1% middle school students regularly smoke and they take exercises 5 times every week on average, indicating that most of pre-emerging-adulthood people practice health-promoting lifestyles. However, for post-emerging-adulthood people, 25.1% urban adults are active smokers, 37.2% urban adults are passive smokers (Wu et al., 2009), and Chinese smokers start to smoke at the age of 20.4 ± 5.3 years (Wu et al., 2009). In other words, people start to smoke at the emerging adulthood phase; 22.2% male adults and 2.5% female adults drink alcohol every day; More than half of Chinese adults do not exercise regularly (General Administration of Sports of China, 2013).

Research conducted in Guangzhou revealed that, 92.90% male college students and 86.82% female college students were alcohol users, including 11.66% moderate drinking and 7.69% severe drinking (Ma & Fan, 2000). Those data were quite similar with the results of an investigation released in the United States (Perera, Torabi & Kay, 2011). According to Ma and Fan (2000), college students' drinking behavior, drinking situation and the variety of the alcohol were highly significantly different ($P <. 01$) between male and female. The Ma and Fan's (2000) study also indicated the first drinking behaviors in people's lives started at college level, and the reasons for doing so included their curiosity, urges from peers and mates and the approval from their families. Drinking was believed to be a kind of response to pressure, and it was considered as sometimes a symbol of friendship and a manly behavior. Another report (Wu et al., 2009) investigated college students in Beijing and has made a very similar conclusion. There were some severe car accidents caused by those

drunken college students that can be heard from time to time in recent years, and have caused too many attentions in China.

Wu et al. (2009) investigated 2014 Chinese college students, and found 19.5% of college students regularly smoke, and if comparing this number with the findings by Zhang (2007), that only 1% middle school students regularly smoke, it can be concluded that most smokers start smoking at the emerging adulthood period too. Social communication needs and amusement were the main reasons for smoking (Wu et al., 2009). Social environment and culture were the main factors to smoking and drinking. Other studies conducted from different parts of China could be found with a bit divergent smoking rate, but similar reasons for smoking (Wang, 2007; Yin, Zhang, He, & Wang, 2007; Xue, Zhang, & Chen, 2006; Li & Wang, 2006).

Sleep disorder becomes another health-threatening problem among Chinese college students (Brown & Buboltz, 2002). Research showed that 52.0% college students reported sleep disorders. There was no significant difference between different demographic groups such as gender, medicine versus non-medicine specialty, or family location (Qi et al., 2007). However, significant difference was observed among those in different college years. According to Qi et al. (2007), health status, pressure from their learning or working requirement, economic resources, amativeness problem, sleep environment, and sleep regularity could influence their sleep quality. Sleep disorder was quite a common problem among university students not only in China (Zou, Huang, Yang, & Liao, 2007), but also in other parts of the world such as the United States (Brown & Buboltz, 2002).

Bad living habits can harm one's health. As the General Administration of Sports of China (2010) indicated, college students' physical activity performance kept declining in terms of strength, explosiveness and endurance. Compared with the data released in 2005, average performance on standing long jump of male college students from both urban and countryside dropped

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1.29cm and .23cm respectively, average time for 1000 meters race has increased 3.37 seconds and 3.09 seconds; and for female college students, average performance on standing long jump dropped 2.72cm and .92cm, completion time for 800 meters race dropped 3.17 seconds and 1.87 seconds respectively.

In summary, university students are at a crucial dynamic transitional period from emerging adulthood to young adulthood. The results of several independent studies (Zhang & Su, 2007; Lin & Xu, 2005; Tao, Zhang, Xu & Zeng, 1999; Hong Kong Federation of Youth Group, 1999) also showed that Chinese college students were experiencing unhealthy behaviors or lifestyles such as smoking, drinking, sleep disorder, sedentary life, etc., and their physical activity performance has been declining in recent years, but unfortunately, very few studies concentrating on health promoting lifestyles could be found (Dong, Chun-Quan, Mei-Yen & Ni, 2009); therefore, it is necessary to study how to better promote them to want to adopt health-promoting lifestyles.

1.1.2 Health Education among Chinese Higher Education

At the national level, China is aiming for a long-term target: "Healthy China 2020", the medical care system now could cover most of the Chinese population (Education China, 2010). With the improvement of living conditions, health awareness and health demands among Chinese people have increased dramatically. The first conference of health education and health promotion in China was held in 2008, and is now becoming the most important conference in the area of health education in China.

If health education could be separated into two parts as physical health education and mental health education, it could be argued that, mental health education has been well developed and is highly valued compared with mental health education.

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Mental health education in China started in the late 1980s, and became more important with the development of Chinese people's accelerating pace of life and work, increasing pressure of competition, far-reaching changes of ways of thinking. After The "Central Committee of Communist Party of China's opinions on strengthening and improving schools' moral education" was issued, counseling centers or other similar agencies have been gradually set up within universities in China, and generally those centers were affiliated to the students' affairs office. Another official file issued by Chinese Ministry of Education in 2001 further indicated that, mental health education was a very important composition of moral education in higher education. This is the first official document which incorporates mental health education into moral education.

Many studies on mental health education can be easily found by searching the China Knowledge Resource Integrated Database (CNKI, the largest Chinese academic paper resource). College students' unhealthy behaviors, such as indulging in internet and computer games, are usually attributed to mental health problems. Very few studies focusing on college students' adoption of health-promoting lifestyles can be found.

Physical Education (PE) is a basic approach in higher education to transfer health literacy and improve students' physical health status. Usually it is compulsory for the first and second year college students to take PE courses. The content of PE courses is mainly about body movement techniques, and usually healthy lifestyle is not the main part of PE courses. Healthy lifestyle or habits are self-determined, personalized behaviors, and besides physical exercise, a healthy lifestyle has many more meanings, since health refers to a condition of complete physical, mental, and social well-being, PE courses cannot play a full role of promoting college students' healthy lifestyle.

In Chinese mainland universities, mental health education and consultation have received much more attentions and have been placed in a more important position in higher education. Health education has been conducted by different

departments separately within universities. Basically healthy lifestyle promotion is a new territory in Chinese higher education, not to mention those related research on it. At the national level, the author did not find any organization which is responsible for supporting and enhancing college health education.

Huang et al. (2008) claimed that their study was the first attempt to investigate health-promoting lifestyles among university students in mainland China. From that point, this research of studying health motivation behind health-promoting lifestyles among college students for health-promoting lifestyles, is a maiden voyage.

1.1.3 The Role of Motivation in Health Education

The PRECEDE-PROCEED MODEL, was first developed in the 1970s (Green, 1974; Green, Kreuter, Deeds, & Partridge, 1980), and has been revised several times. It was considered to be a fundamental model for designing heath intervention programs.

The PRECEDE-PROCEED MODEL can be applied to development of health education programs by following a few steps: first, identify the health-threatening problems and collect related data; next, plan and implement intervention programs in order to reduce these unhealthy factors; finally, assess or evaluate the effects of those intervention programs.

But as many studies have indicated, one of the biggest problems of current health intervention programs is, when those participants are taking part in the program, the expected effects (changes of health behavior) can be observed, but once those intervention programs stop, the changes will also decrease or stop, this means, it's not easy to make an enduring or permanent change for people's adoption of health-promoting lifestyles. Professor Michael P. O'Donnell (2012) put it like these:

"Three decades ago, we thought that education was enough. We thought all we had to do was help people understand the health risks of tobacco, junk food, stress management, and proactive medical self-care. We thought people would use this knowledge to transform their lives. Three decades of research and practical experience have shown us that education is not enough, in fact, it may not be very important at all."

Partly because of this, the theme of 22nd Annual Art & Science of Health Promotion Conference of the United States (2012) was, Making Healthy Choices the Easiest Choices: Increasing Awareness, Enhancing Motivation, Building Skills, and Creating Supportive Environments.

In fact, more and more researchers and health practitioners have been starting to rethink and redesign health promotion programs or models (Seifert, Chapman, Hart, & Perez, 2012; Terry, 2013), in order to make a genuine and lasting change of health-promoting lifestyles, from the perspective of increasing health awareness and enhancing health motivations. Studying health motivation is becoming popular, first from the United States and spreading to the rest of the world.

1.2 Research Objectives

The aim of this study is to investigate the underlying factors of health motivation among college students. Specific objectives are to: (i) explore and delineate college students' motivations for health-promoting lifestyles; and (ii) develop a measurement scale to measure health motivations.

1.3 Significance

This study provides new knowledge for understanding college students' health motivation, and add new knowledge to the discipline of health education. Findings of this research provide an original measurement scale to assess college student's health motivation, or to study the continuous change of health motivations among the emerging adulthood population.

Findings of college students' health motivation from this study could also improve the practice of health education at the emerging adulthood phase, help health promotion specialists design appropriate and more effective intervention and health education programs, which could in turn better motivate college students to take up health-promoting lifestyles in the future at the applied level.

1.4 Organization of Chapters

Chapter 1 of this study introduces a discussion of health threatening problems among Chinese college students and briefly describes the status quo of college health education in China. Objectives and significance of the present study are stated.

Chapter 2 provides a review of literature with regard to health motivation, health-promoting lifestyles, motivation theories including Self-determination Theory, and related instruments currently being used in measuring health motivation.

Chapter 3 contains descriptions of the research methods and procedures adopted for data collection and analysis.

Chapter 4 presents data analysis results, research findings, and the psychometric evidence of the college students' health motivation questionnaire in particular.

Chapter 5 summarizes and discusses research findings, weakness, limitations, as well as implications for future research and practice.

CHAPTER 2

LITERATURE REVIEW

2.1 Brief Introduction on Different Motivation Theories

The ideas of modern psychology are rooted from western philosophy. The great philosopher Aristotle had raised the Four Causes Theory (Zalta, 2014a). Epicurus has made the assumption that human beings tend to pursue happiness and avoid suffering, the pleasure principle, or hedonism (Zalta, 2014b), has had a profound impact on later motivational psychology, as upheld by philosopher Bentham, J. in the eighteenth-century, that all kinds of human behaviors come from the concern for their own interests, to seek for his or her own happiness (Zalta, 2014c).

The impact of Charles Darwin's theory of evolution on motivational psychology is huge. It can be said, his theory led directly to the establishment of theories about human instincts. Emphasizing the historical continuity of human and animals, Darwin's theory contradicted the past philosophy, which once believed that animal and human behavior follow different laws separately (Zalta, 2014d). People thus noticed the similarities of human behavior and animal behavior.

Representative psychologists in the first half of the twentieth century, William James, for instance, had classified human instincts into several different forms. But people soon discovered important shortcomings of these studies; that is, the behaviors in real life are attributed to some special instincts, eventually lost its interpretation of the behavior. Sigmund Freud is also an instinctive psychologist, but the difference between his theory and other instinct theories above is that he focused on the dynamic relationship between the various parts of people's

psychological structure (Zalta, 2014e). He had not only distinguished several basic forms of human instincts, but also discussed a range of issues in detail about how instincts work, and about the energetic role of instincts. His theory became the representative theory about human instincts.

On the basis of studies of instincts, psychologists had embarked on a series of studies of motivational problems. Driving force theory had attracted a lot attention from psychologists. The concept of "drive" stepped further than instinct theory because it stressed that driving forces activate behaviors, and driving forces cause an organism internal tension and individuals then doing certain behaviors in order to reduce those internal tensions. Clark Hull is a master of drive theory. In this development period there are incentive theories, including other studies from Pavlov and other behaviorists, and Skinner's reinforcement theory particularly (Zalta, 2014f). Also Hierarchy of Needs Theory expounded by humanistic psychologists Abraham Maslow is a very unique motivation theory and has profound impacts today.

In 1960s and 1970s, motivation studies from mechanical approach had gradually transited to the cognitive approach. From the cognitive approach, human being is considered as the main object of study, rather than through the study of animals to infer the motives of human behaviors, especially in this period many psychologists had turned to the study of achievement motivation, making a wide range of in-depth research on achievement motivation. Achievement motivation had a dominant position in this period, the most famous motivational psychologists includes David McClelland, John W. Atkinson, and Bernard Weiner.

Since 1980s, the cognitive concept has been established, unlike earlier studies focusing too much on natural motivation, or simple strengthening effect, cognitive theories value the role of an individual's cognitive intermediary regulation. Most of these cognitive theories involve the basic psychological processes, and extended motivation study to different aspects of human

psychology. Basic psychological needs usually is the theoretical basis of these cognitive theories, for instance, the Self-determination Theory developed by Deci and Ryan (1985) was built on three basic human psychological needs: autonomy, relatedness and competence. J.W. Atkinson's achievement motivation theory was built on basic human need for achievement. Weiner's attribution theory had further deepened achievement pursuit studies. In addition, the new cognitive approaches always include "self", combined with a variety of cognitive variables to study, like Bandura's Self-Efficacy Theory. In Deci and Ryan's Self-determination Theory, self-motivational factors are considered to be the most dominant factors from these theories.

A number of terms, for instance, belief, intentions, incentive, goal, value, and volition, often appear in motivation studies. It is important to clarify their meanings, as there are huge and complicated concepts and findings behind each term. At this point, the author simply reviewed their basic notions and relationship with motivation within the health education context in particular.

A goal is the objective that one aims to achieve. A goal has impacts on one's choices, concentration and may aid one's modification of their effort and adherence towards the attainment. External goals have been described as conscious and can be measured through introspection; however, internal motivation used to be treated as a subconscious process (McClelland, Atkinson, Clark, & Lowell, 1953). Therefore, this sub-consciousness of motivation was not believed measurable until Ryan (1970) claimed its consciousness and its immediate impact on human behaviors (Locke & Latham, 2002).

Characteristics of goals, such as specification and difficulty, have an impact on goal achievement (Klein, Wesson, Hollenbeck, Wright, & DeShon, 2001). For example, it is widely recognized that moderately difficult goals were found to be associated with the highest effort levels, and easier or harder goals were associated with lower effort levels. Although specification of goals does not influence one's performance levels, it plays a role as an external reference and,

therefore, reduces the ambiguity of goals (Lock, Chah, Harrison, & Lustgarten, 1989). When specific details are incorporated into goal descriptions, goals become more concrete and operationalized, and specific goals are more likely to promote one's effort levels in goal attainment. In contrast, simply encouraging people to do their best (consider it as general goals) does not lead to highest effort levels.

Self-efficacy is an important concept in goal setting theories. It refers to one's self-perceived or self-rated strength specific to goal achievement (Ormrod, 2006). It reflects the extent of confidence when one is facing a specific task and can be assessed through a variety of outcomes (Locke, Motowidlo, & Bobko, 1986).

There are different types of goals such as proximal or distal goals and performance, learning goals, task oriented or ego oriented goals. Their different impact on performance has been well studied, for example, learning goals have more positive impact on one's effort levels than performance goals (Locke & Latham, 1990; 2002).

Task oriented goals are found to be related to intrinsic motivations whereas ego oriented goals are identified to be related to extrinsic motivations. Proximal goals, i.e., short term goals, predict higher motivation levels in goal achievement than distal or long term goals. Therefore, goal achievement is more desirable when goals are learning, task oriented, and proximal goals.

A recent study (Elliot et al., 2000) revealed that internal motivation, such as perceived competence, has a considerable influence in goal settings and intrinsic motivation in particular, for example, higher competence-perceived students were less performance-oriented and were more interested in PE classes than those less competence perceived, older students had more intrinsic motivations and their goals for PE classes were more ego-oriented than younger students (Barić, Vlašić, & Erpič, 2014) , because they have higher levels of

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self-awareness. Development of internal motivation and focus on its promotion becomes important.

Incentives encourage people to achieve their goals. Explanation of its structure has been the key subject in incentive studies. It is interesting to point out that, similar to the impact of goal difficulty on performance levels, one of the basic conclusions found from incentive studies is that moderate challenge incentive has the most significant impact on one's performance, and lower levels of performance are associated with easier or harder incentives (McClelland, 1985).

According to McClelland (1985), when excluding environment factors from the multiple regression equation, incentive, along with motivation and self-rated competence, accounted for up to 84% of the explained variance. Incentive, such as reward with money, was proved as having moderate effect on students' academic achievement (Berridge, 2000; Bettinger, 2010; Fryer, 2010). In fact, from the perspective of Self-determination Theory, those material rewards could promote one's performance in short term, but they can hardly affect one's long term performance because they play a role as external reasons, in other words, when one is externally motivated to act, one's performance usually does not last once the goal is achieved. Although incentive was argued as a basic part of individuals' daily planned behaviors, it is a term that is frequently cited in marketing or consumer behavior studies rather than in educations.

Intention refers to a degree of determination of achieving what one plans to do. It is believed that intention plays a role as a goal during the goal-directed process, and is seen as a part of motivation (Nuttin, 1987), incentive is an important variable in goal achievement studies. Ajzen and Madden (1986) advocated that intentions of actions are determined by the perceive-behavioral control, and eventually predict observed behaviors by using hierarchical regression analysis. Finally, values is an integrated concept including one's needs, judgment or desire internally, and rules, demands, or social norms externally (Emmons, 1986a, 1989b). The definition of the structure of values has become the focus of

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value-oriented motivation studies. Wigfield and Eccles (2000) used the term expectancy to refer to the subjective values and the term value in their studies referred to objective values only. As argued, they are determined by one's specific goal beliefs, and the interactions between expectation and value were found to be able to predict one's performance, adherence as well as goal achievement. In the next section, the author will further discuss Self-determination Theory, especially the self-concordance model and propose the theoretical framework based on them.

2.2 Self-determination Theory

2.2.1 Introduction

Self-determination Theory (SDT) was first proposed and developed by Edward L. Deci and Richard M. Ryan. Its main concern is to what extent human behaviors are self-determined. SDT is based on humanism, it holds a hypothesis that human being is positive, and it's a nature for human being to maintain and satisfy psychological development, to strive to react with constant challenge, and combine the external experience with the internal sense of self. But this natural tendency could not happen automatically, unless it could get support from the social environment, that is, the social environment can play a positive or negative role on this natural tendency.

Self-determination Theory claims that individual development relies on the satisfaction of three kinds of basic psychological needs: autonomy, competence and relatedness. These needs are seen as universal necessities that are innate, not learned or acquired, but rooted in humanity across time, gender and culture (Chirkov, Ryan, Kim, & Kaplan, 2003). When those needs are satisfied, individual can develop well, but if it is unsatisfied, individual could have some

discordant problems. The psychological consequences of human behaviors and experience can be explained by this psychological dissatisfaction.

Originally, SDT had three mini theories. Later it became four, now it has five. Each different mini-theory explains different research questions from different areas. Organismic Integration Theory is used to describe the transmission process from extrinsic motivation to intrinsic motivation. Basic Needs Theory tries to summarize the three innate psychological needs, and its relationship between mental health and wellness. Cognitive Evaluation Theory focuses on explaining the influence on intrinsic motivation from social environment. Causality Orientations Theory describes individual difference on three psychological needs, and how those differences affect individual selection and adaption to the environment.

Those mini theories have developed with particular emphasis, the first three theories seek to answer most of the research questions, for instance, how different motivations affect behaviors, how different social factors affect different psychological needs, and how those psychological satisfactions affect self-determined behaviors.

These mini theories have some difficulties of explaining health-promoting lifestyles. Taking physical exercise for example, one of the main purposes for those students have the motivation to take exercises probably is, maintain their physical fitness. Some people like to take a walk every day, some of them consider it as a habit, and they may not have a feeling of competence in their mind to express their capacities. Taking healthy diet for example, when people make a choice to take balanced diet, they may not have a sense of relatedness to be connected to others. Perhaps because of those arguments, a fifth mini-theory, the Goal Contents Theory (GCT) (Ryan, & Deci, 2002), was added finally, in order to explain intrinsic and extrinsic goals and their impact on motivation and wellness. This research adopted a more comprehensive goal motivation theory from motivation psychology to help understand health motivation.

2.2.2 Different Motivation Levels Based on SDT

Self-determination Theory is a theory about motivation and personality (Deci & Ryan, 1985; Pervin, 2003) and one of its biggest contributions perhaps is its classification and integration of different motives. Traditional theories regard motive as a single or bipolar structure, Self-determination Theory believes the motives of the people's behavior can be seen as a continuum ranging from internal motivation to external motivation, and can be divided into different forms such as integrated motivation, identified motivation, introjected motivation and external motivation (Deci & Ryan, 1985; 1990).

Type of Motivation	Amotivation		Extrinsic Motivation				Intrinsic Motivation
Type of Regulation	Non-regulation		External Regulation	Introjected Regulation	Identified Regulation	Integrated Regulation	Intrinsic Regulation
Quality of Behavior	Nonself-determined						Self-determined
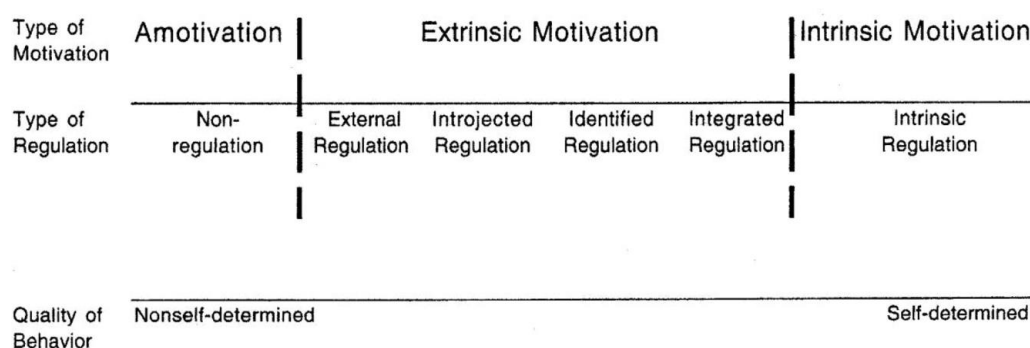
Figure 1 The Self-determination Continuum

(1)   Intrinsic motivation

Behaviors are originated because of the individual interest in the behavior itself, curiosity, learning and spirit of exploring, etc., reflecting the positive nature of the human mind (Deci & Ryan, 1990). Self-determination Theory began in the laboratory study of internal motivation. Deci (1975) believed that the key factors that affect internal motivation are whether individuals could experience "autonomy" or "control" from the environment. The impact of external factors such as incentives, competition and pressure is not always undermining internal motivation. If used appropriately, they will increase individual's ability or

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self-efficacy. Only when they are applied to control individual's behavior or performance, will it undermine internal motivation. However, there is still a lot of controversy over the influence those external factors might have on internal motivation. A meta-analysis conducted by Lepper and Malone (1999) found that, overall, external rewards would undermine internal motivation. Material or visible reward would undermine internal motivation, and the verbal rewards would enhance internal motivation.

(2) Identified Motivation

At this level, individuals experience the sense of value when they are doing certain kinds of behavior, that is, individuals integrate external task within "self", and have a sense of identity. Identified motivated behavior has fully internalized with self, for individuals' those behaviors are considered to be real and/or autonomous, although sometimes, behaviors are not always pleasant. When individuals are engaged in certain type of behaviors, and those behaviors are not always so interesting, then, identified motives are better than internal motives for predicting persistence of behaviors (Ryan, 1995; Vallerand, 2001).

(3) Introjected Motivation

At this level, behaviors are motivated from internal pressure, such as feelings of guilt and anxiety (Baard, Deci, & Ryan, 2004). This sort of motivation is from inside, but for "self". People usually do not act with a sense of autonomy, instead they experience the feeling of "control" brought by these unfavorable emotions or tensions inside. The typical introjected motive for individuals is behind these behaviors. It is an attempt to prove their abilities (or stay away from failure) (DeCharms, 1968; Ryan, 1982). Introjected motivation is generally accompanied by tension or conflict between have to interact and identified to do it.

(4) External motivation

External motivation refers to motivations resulting from the reasons such as social pressure, external reward or punishment. Externally motivated regulation would result in a lower level of effort and poor behavior performance.

Within these four motives above, external motivation, introjected motivation and identified motivation are collectively redefined as extrinsic motivation, because they represent different degrees of internalization. However, since identified motivation has organically integrated with "self", so combined with intrinsic motivation, it referred to as autonomous motivation. Introjected motivation and extrinsic motivation together are redefined as controlled motivation (Sheldon & Elliot, 1999).

From the attribution point of view, SDT operationalized those four types of motivation as Perceived Locus of Causality (PLOC) (Deci & Ryan, 2002). PLOC was first proposed by Heider (1958), pertaining to causal attribution of interpersonal relationship. Attribution is the observer's understanding to causes of others behaviors. Within SDT study, attribution is relative to "self", as actors themselves, explanations for their own conduct (DeCharms, 1968), that is, the awareness of individual's own motivation for behaviors. Through the study of PLOC, Ryan and Connell (1989) proved the presence of the above four motivations as a continuum.

Ryan and Deci (2000) believed that, compared with controlled motivated behavior, autonomy motive is more durable and always associated with good psychological experience. Ryan and Connell (1989) proved the relationship between the different types of motives from college students in terms of failure handling skills, anxiety, effort and joy. For example, the stronger the extrinsic motivation students have, the more they exhibited lower level of interest, values and efforts on achievement goals, when they face failure, they usually show a

negative approach. Although introjected motivation is associated with efforts, but is also associated with anxiety and bad handling skills when they face failure, identified motivation and intrinsic motivation has positive impact on the outcome variable above.

In some other educational psychological studies, autonomous motivation is linked with commitment (Connell & Wellborn, 1991), good performance (Miserandino, 1996), efficient learning (Grolnick & Ryan, 1987). Ryan, Rigby, and King (1993) found that religious believers agreed introjected motivation led to more religious piety and psychological adaptation.

2.2.3 Internalization of Motivation

Internalization of motivation refers to individual's reception and recognition of external goals or values, attitudes and norms, so it is a formation process of autonomous motivation. Deci and Ryan (2002) believed that both environmental factors and personal characteristics could affect motivation. Studies on personal characteristics mainly focused on causality orientation. Internal causality orientation refers to a person's tendency of attribution to their own behavior (Deci & Ryan, 2002). It includes two dimensions as self-directed orientation (autonomous orientation) and control orientation. Individuals with autonomous orientation are more inclined to believe that goals and behaviors are from the bottom of his heart and will, whereas those with control orientation tend to be more prone to believe that goals and behavior, is derived from environment or pressure.
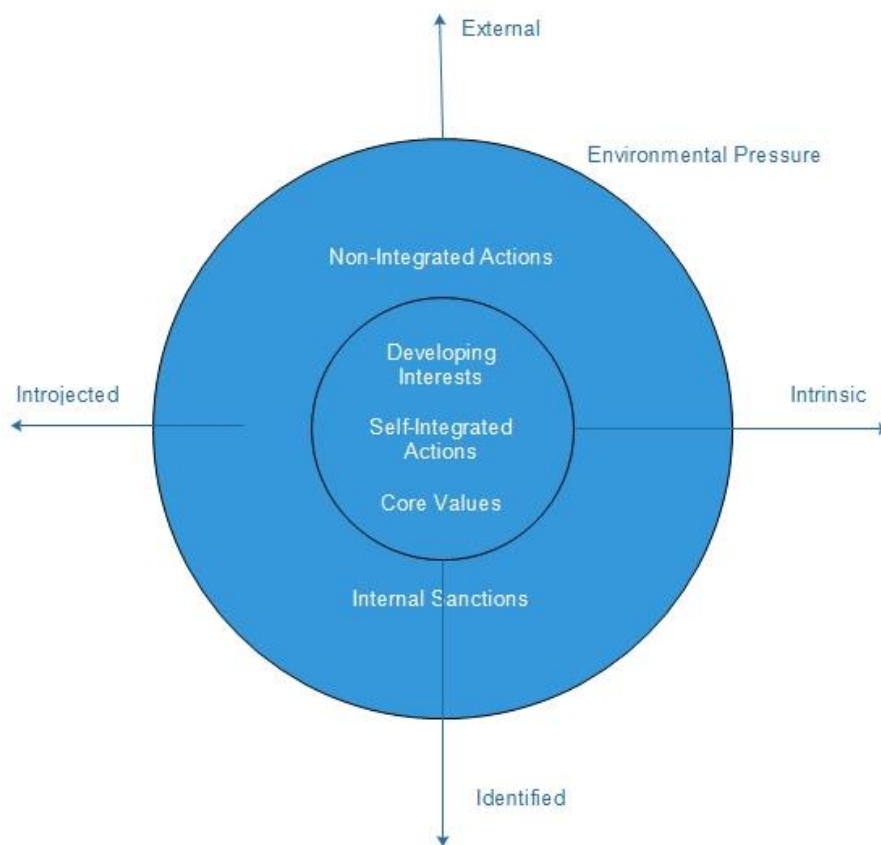
Figure 2 A Diagrammatic Representation of Self-Integrated and Non-Integrated Action

Self-directed orientation is associated with individual's happiness, compassion, drive, self-development autonomous motivation, whereas control orientation is linked with Type A behavior, competition, power demand, self-monitoring (Deci & Ryan, 2002). Studies on the environment factors, mainly concentrated on such factors like feedback, communication, social support, external threat, task deadline, order or other imposition purposes. Internalization of motivation is produced by perceived need that environment provide to people. There are three innate needs, namely: need for competence (White, 1959); need for autonomy (DeCharms,1968；Deci, 1975), and need for relatedness. Sheldon and Kasser (2001) studied ten types of need and proved the importance and prevalence of those three types of need. In their study, the first four important needs are self-esteem, autonomy, competence and relatedness. These needs also showed

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significant positive correlation with positive emotions and negative correlation with negative emotions.

Motivation is internalized through environment's impact on three basic needs, in particular, the support for autonomous need, according to Deci and Ryan (2000), environment simply only provide support for autonomy need, it's enough to make people experience three types of needs as autonomy, relatedness and competence. It is believed that environment support for autonomous need includes these aspects as follows (Reeve & Deci, 1996; Reeve, 2002): (1) Promote individual's recognition for significance of their engaged behaviors; (2) Reduce the external control; (3) Provide opportunities to select and participate; (4) When task is difficult, understand individual's negative emotions. Many empirical studies support those suggestions. For example, Strahan (1995) found that if parents could provide more autonomous support for child's religious belief that contributes to formation of identified motivation rather than introjected motivation. In a laboratory studies, Deci, Eghrari, Patrick, and Leone (1994) (1994) found that provision of reasonable explanations for an uninteresting task, and with autonomy support, would help motivation internalized. Grolnick, Deci, and Ryan (1997) found that autonomy support from parents could help improve identified motivation, and eventually promote their kids' acceptance and recognition of values in school.

2.2.4 The Self-Concordance Model

On the basis of Self-determination Theory, Sheldon and Elliot (1999) proposed the concept of goal self-concordance. So-called goal self-concordance means the degree of integration between goals set by "others" and goals that come out of individual's personal intrinsic interests and values, those intrinsic values or interests is the integral component of "self". A higher degree of goal self-concordance represents that the goals set by individuals are from

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self-interest, values, hobbies or sense of recognition of the goal itself. Those self-driven individuals have strong autonomous motivation. Lower self-concordance level indicates that the goals set by individuals are more from outside pressure or negative emotions rather than from "self", which also means they have a strong controlling motivation.
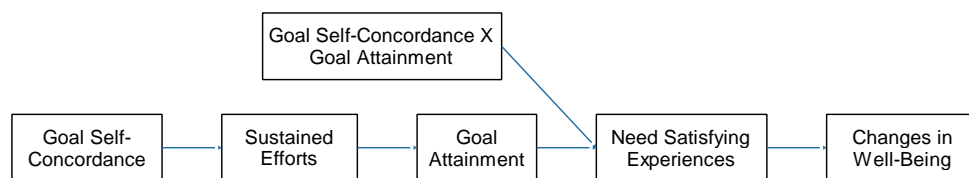
Figure 3 The Self-Concordance Model

Self-concordance goals are those inspired by a person's lifelong evolving interests (Gruber & Wallace, 1999) and deeply felt core values (Little, 2000; Lydon & Zanna, 1990); they are goals underlaid by intrinsic and/or identified motivation.

Operationalized definition of goal self-concordance is individual's autonomy motivation minus controlled motivation, because it also takes the role of autonomous motivation and controlled motivation into account, so it reflects integration level of individuals motivation on the PLOC, thereby personality, reflecting the level of integration between "self" and the goals set by the individual.

Unlike previous studies of SDT theory, self-concordance model focuses on personal verbalized goals in methodology, it adopts the evaluation method called Personal Action Constructs (PAC). PAC unit includes such current concerns (Klinger, 1975), individual plans (Palys & Little, 1983; Little, 2000), life tasks (Cantor, 2000) as well as personal strivings (Emmons, 1986, 1989b; Sandberg, 2002). Similarly, it is called this approach is called "idiographic goal methodology" within motivation research methods (Sheldon & Elliot, 1998).

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The typical procedure of PAC is as follows: (1) Ask the individuals to express PAC unit (goals, plans, struggle, etc.) in their own language. A written or oral language list is then generated. (2) Select basic dimensions of the evaluation based on particular theories for this study, and based on that, participants assess their level of each PAC unit.

The extent of individuals' goal self-concordance reflects the individual level of motivation. As discussed under the Self-determination Theory, there is close relationship between self-concordance level and well-being (Sheldon & Elliot, 1999). High self-concordance goal individuals with higher levels of autonomous motivation will have higher levels of psychological well-being correspondingly, and individuals with lower self-concordance level will have lower level of psychological well-being. For instance, Sheldon and Kasser (1995) found that individuals with higher level of goal self-concordance usually have better mental health status, such as openness, compassion, self-actualization positive emotions, vitality and role - system integration. In a cross-cultural study, Sheldon (2004) found that, there was no significant difference on goal self-concordance level between collectivist culture countries and regions (such as South Korea, China and Taiwan) and individualistic culture countries (the United States). The level of goal self-concordance has strong predictive power on subjective well-being and sub-dimensions of subjective well-being across different cultures (Sheldon, 2004).

In addition, the pursuit process of self-concordant target can lead to a series of positive psychological outcomes. Through the study of goal self-concordance model, Sheldon and Elliot (1999) found individuals with higher score of goal self-concordance (dominated by autonomous motivation) would spend more effort during goal pursuit process and, accordingly, it would be easier for them to achieve goals, and they would experience more positive emotions and satisfaction during the process.

2.2.5 Application of Self-Concordance Model

There are two processes called "inception-to-attainment" and "attainment-to-well-being" according to self-concordance model (Sheldon & Elliot, 1999), as illustrated in Figure 2. The present study will focus on "inception-to-attainment" process, and test the relationship between self-concordance level and goal achievement.

Self-concordance model has been widely tested within the context of education. For example, Vasalampi, Salmela-Aro, and Nurmi (2009) have investigated 614 adolescents in Finland, and found that, when those students were chasing achievement goals because of autonomous reasons, those students will spend more effort, and eventually high level of goals will be attained.

The evidence of self-concordance model could also be found from the area of health studies. Crane, Goddard, and Pring (2009) have studied the relationship between general and specific autobiographical knowledge in adults with autism spectrum disorders (ASD), and demonstrated that, when specific and general autobiographical knowledge were organized around "self" goals of adults with ASD, strong relationships between "self" and general event knowledge can be observed. Self-concordance was also regarded as a key predictor for job or life satisfaction (Judge, Bono, Erez, & Locke, 2005)

2.3 Theoretical Framework

Based on Self-determination Theory, especially the Self-Concordance Model, and related empirical studies on health motivation, the author has proposed the theoretical framework as follows:
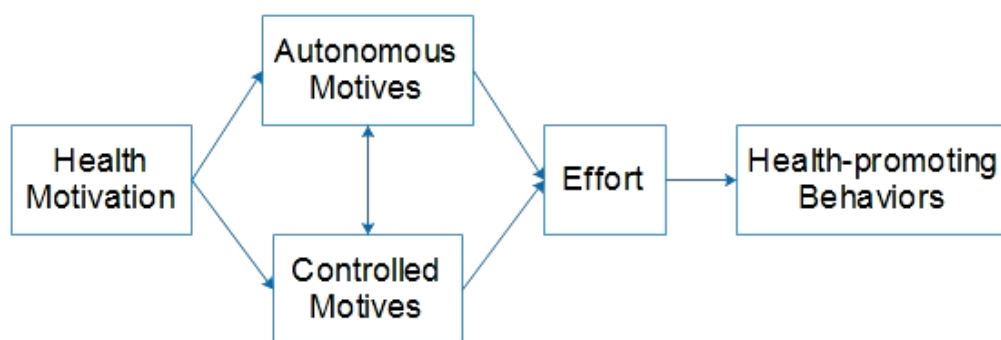
Figure 4 Proposed Theoretical Framework

2.4 Health Motivation

People have their own intuitional feeling about motivation, but it's hard to find a standard definition on it. Kleinginna and Kleinginna (1981) once collected and classified 102 definitions and critiques on motivation. In fact, when there is a kind of strength or force, whether it's internal or external, that initialize and drive people to certain kinds of behavior, then that is called motivation (Petri & Govern, 2004).

It's important that, with the concept of motivation, we can understand and explain why certain behaviors would happen in certain context, and why those would not happen in other context. It can be inferred, when people exhibit behaviors, or for this study, when people are undertaking health-promoting lifestyles in order to maintain their fitness, there is motivation behind those behaviors.

Activation is the first property of motivation. If we can observe people are doing health-promoting lifestyles, they might have health motivation behind than. In contrast, if we cannot observe obvious certain sorts of health behaviors, this probably means that, the level of health motivation is not strong enough to drive people to undertake health-promoting lifestyles. Although not every driven behavior can be observed, agreement has been reached among psychologists that,

for many situations, the change of motivations can lead to the change of behaviors. Directionality is another property of motivation. For instance, when people feel hungry, they will find food to eat, but when people are facing many possibilities, directionality is not that clear. Preference test can be used to judge which kind of motivations are stronger.

There are different types of motivation according different perspective. A popular view believes different states of motives can be defined as different needs, and when those different needs take into effort, actions are driven to reduce the level of those needs. Generally, need is considered to be internal resource of motivation, for instance, the Self-determination Theory (SDT) considers competence, relatedness, and autonomy as three main basic innate needs (Deci & Ryan, 2002). In contrast to need theories, other scholars emphasize the goal to be the external resources of motivation, the drive effect between the objects and social relationships are commonly studied, for example, the Achievement Goal Theory is quite important and popular in many different contexts, especially with the context of education. From the cognitive perspective, motivation can be divided by mechanic and cognitive. And finally, there are different motive at biological, psychological and social or environmental level.

Here, it should be noted that, motivation is not like, the higher the better, in fact, too much motivation could bring pressure, anxiety and other negative effects, the Yerkes-Dodson law (Gorbatkov, 2008) with its basic concept that moderate levels of arousal will produce best performance, should not be ignored in motivation studies (Curtin, 1984).

2.5 Instruments

2.5.1 Instruments Measuring Health Motivation

In health motivation studies, previous measures focused upon development of health motivation measurement scales for physical activities. The Health Self-Determinism Index (HSDI; Cox, 1985) for adults includes 16 items rating a number of motivations for acting health behavior. With 202 persons randomly selected on a telephone directory list, four dimensions accounted for 56% of the total explained variance. Internal consistencies for four subscales were acceptable (αs＝.75, .75, .67, and .69, respectively); The reliability for overall scale was good (α＝ .84). Reliability and validity were later implied by identifying the relationship between the level of self-determinism and health-promoting lifestyles (Cox, Miller, & Mull, 1987; Calkins, 1996; Loeb, 2004). A HSDI for Children (HSDI-C) was further developed based on HSDI (Cox, Cowell, Marion, & Miller, 1990).

Based on Health Belief Model (HBM), McEwen (1993) developed the Health Motivation Assessment Inventory (HMAI), 285 industrial employees were investigated, internal consistencies were reported as good (α= .89 for Part 1; α= .63, .71 before and after revision, for Part 2). Six factors (previous knowledge; internal aids/hindrances; external aids/hindrances; perceived value of action; perceived susceptibility; and perceived severity) compromised the concept of health motivation. Thomas, Hathaway, and Arheart (1993) also developed a General Health Motivation Scale (GHMS) based on HBM, but did not report its reliability and validity.

More recently, Downes (2008) investigated motivators and barriers of healthy lifestyle behaviors (MABS) among African Americans. Exploratory factor analysis suggested a two-factor solution (e.g., motivators and barriers.), a 14-item measurement scale was yielded. Content validity was examined and the measurement scale was found to be consistent internally (α= .88 and .90, respectively). Construct validity and test-retest reliability of a revised MABS

were further examined with 209 African Americans (Downes, 2010).

Tucker et al. (2011) further developed a Motivators of and Barriers to Health-Smart Behaviors Inventory (MB-HSBI) for African Americans with a more diversified sample size (n=926). Multidimensionality was supported by factor analyses and internal consistency. Health self-efficacy and health-promoting behavioral goals were found to be correlated with the scores of MB-HSBI, as expected. A youth version of MB-HSBI was then developed (Tucker et al., 2012).

Pascucci (1992) also developed an Incentive-Health Promotion scale (IHPS) aiming to assess incentives among elders for health-promoting lifestyles among elderly people. Internal consistency (α= .67, Spearman-Brown (.75, P=.05) and Guttman split-half (.96, P=.05) were reported as acceptable.

In Xu's (2009) doctoral dissertation, she proposed a new theoretical model of health motivation that consists of four stages: development of health motivation tendency; formation of health intention; initiation of health-promoting action; and persistence in actions to achieve goals developed at the first stage. Based upon this model, two health motivation scales – the Health Motivation Scale in Physical Activities (HMS-PA) and Health Motivation Scale in Healthy Eating (HMS-HE) were developed. Two studies were conducted to validate these two measurement scales. The main limitation of this study is, health motivations were divided into two types, physical activities and eating behaviors, which means, there are only two types of health motivation according to this study.

2.5.2 Other Relevant Instruments

The considerations for selecting the following instruments to help create items for the College Students' Health Motivation Questionnaire are: first, they were

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all developed based on the framework of Self-determination Theory; second, they were all trying to measure motivations for practicing a facet of a health-promoting lifestyles; and third, participants recruited for the questionnaire development were all from an emerging adulthood or adolescent population.

Adolescent Prosocial Behavior Motivation Questionnaire (APBMQ) (Wentzel, Looney, & Filisetti, 2007), was adapted and developed from the Prosocial Self-Regulation Questionnaire (SRQ–P) (Ryan & Connell, 1989), motivation in this study referred to the reasons for prosocial behaviors. A sample of 339 students (11-14 years) with responses to 17 items was obtained, and four regulation types were identified. Every motivation type was found associated with a self-process and a contextual cues set. Adolescent students' social and academic goals can be predicted by their peers' social and academic expectations (Wentzel, Baker, & Russell, 2012).

The Goal Content for Exercise Questionnaire (GCEQ) (Sebire, Standage, & Vansteenkiste, 2008) was also developed based on SDT. A two-higher-factor and five-lower-factor structure was identified through exploratory factor analysis (n=354) and confirmatory factor analysis (n=312). Psychometric properties were examined. Group invariance across gender was demonstrated by examining configural invariance (same items load on same factors across groups), metric invariance (factor loadings are similar across groups) and invariance of population covariances structure (entire covariance matrix is consistent across groups). Internal consistencies for each subscale were all acceptable (Cronbach's $\alpha \geq .75$).

Ryan and Connel (1989) developed a Self-regulation Questionnaire (SRQ) for the purpose of measuring academic achievement motivation based on SDT framework and several previous interviews. A structure with two meaningful factors (external and internal) was supported by factor analysis result. The External factor included five external category items and one introjected item. The Internal subscale included four intrinsic items, three identified items, and

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one introjected item. Internal consistencies, the disattenuated correlations between the two subscales were calculated.

The Academic Motivation Scale (AMS) (Vallerand et al., 1992) was translated from a French version into English. AMS consisted of seven sub-scales with a total of 28 items. Acceptable levels of test-retest reliability between one month (average test-retest correlation = .79) and internal consistencies (average Cronbach's alpha = .81) were reported. The finalized scale with seven dimensions was identified through confirmatory factor analysis. Gender invariance was also examined by using LISREL. Findings supported its use on educational motivation research.

The Adolescent Self-regulatory Inventory (ASRI) (Moilanen, 2007) was developed to measure adolescents' short term and long term self-regulation. 169 students and 80 parents have participated in the survey. The internal consistencies of the long-term and short-term subscales were acceptable by conducting confirmatory factor analysis. Concurrent and construct validity were satisfactory. The proportion of explained variance in adolescent-reported behaviors increased significantly with the long term subscale and a comparison measurement scale together; therefore, incremental validity was demonstrated. The ASRI consists of 37 items.

In order to assess individual regulation differences of withholding negative emotions, the Self-Regulation of Withholding Negative Emotions (SRWNE) (Kim, Deci, & Zuckerman, 2002) was developed with 28 items based on SDT. Three studies were conducted and showed acceptable test-test reliability and discriminate validity. A group comparison between a U.S. sample population and a Korean sample population was implemented, culture and gender invariance were demonstrated.

2.6 College Students' Health-Promoting lifestyles

Health-promoting lifestyles can be seen as the focus of present study. The main purpose of Health Education in higher education is to help university students to have self-motivated health-promoting lifestyles (or live in healthy lifestyles) for the rest of their lives. So in this research, health-promoting lifestyles refer to those behaviors taken by university students for the purpose of maintaining health.

Practicing health-promoting lifestyles can bring the following benefits: first, it can help increase the quality of life so that people can better enjoy their life journey; second, it can help decrease or prevent lifestyle related diseases, and therefore extend the general life expectancy; third, practicing health behavior can help reduce medical care expenditures which is now becoming a great burden because China is going to be an aging society in the near future (James, 2002). When people try to take actions to practice healthy lifestyles in order to maintain their health, there might have health motivation behind (Heckhausen & Kulh, 1985; Heckhausen, 1991).

The term, health-promoting lifestyles or behaviors, has been given various definitions by different scholars. The word lifestyle can be used in various conditions, and was given different meanings in terms of living condition, television program and even the brand names of product (Davison, Frankel, & Smith, 1992). It is often used in the area of health education, nursing and health research (Backett & Davison, 1995).

The underlying structure of health-promoting lifestyles can be defined by the Adolescent Health Promotion scale (AHP scale), originally developed by Chen, Wang, Yang, and Liou (2003), and later validated by Dong, Chun-Quan, Mei-Yen, and Ni, (2009). According to AHP scale, health-promoting lifestyles mainly

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have six domains; namely, nutrition behaviors; social support; health responsibility; life appreciation; exercise; and stress management. It is believed that the AHP scale is an instrument with acceptable reliability and validity for evaluating health behaviors among Chinese post-secondary students. Considering Chinese college students as the target population of the proposed research, this study adopted this definition. The underlying structure of health-promoting lifestyles could help providing some hints to participants when implementing focus-group interviews.

It should be noted that this study did not set any prerequisite or confine about the meaning of health-promoting lifestyles, because the purpose of this study was to find out the underlying health motivation, regardless of what specific health-promoting behaviors the participants were having in practice.

Based on these arguments, health motivation in this study refers to factors that drive undergraduate students' to want to adopt health-promoting lifestyles or practice health-promoting lifestyles.

2.7 Instruments Measuring Health-Promoting Lifestyles

2.7.1 The Health Enhancement Lifestyle Profile

The Health Enhancement Lifestyle Profile (HELP) was developed as a self-report instrument for measuring health-promoting lifestyles among elderly people (Hwang, 2010a, 2010b). It is comprised of seven sub-scales or seven types of health-promoting lifestyles, and these lifestyles or behaviors include exercise, diet, work, education, social participation, leisure, activities of daily living, psychological wellness and spiritual participation, other health promotion and risk behaviors. It was analyzed and validated through the

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adoption of both Item Response Theory and Classical Test Theory. A focus-group interview and a pilot test were administered at the beginning of its development. On the one hand, unidimensional requirement of the Rasch model was satisfied: person separation and reliability was acceptable; and 5 point responsive categories were confirmed. On the other hand, classical test results showed acceptable reliability and validity as Cronbach's alphas for each sub-scale ranged from .75 to .92. Correlations between sub-scale scores and total score of the HELP ranged from .60 to .80. Significant correlation was found between health enhancement lifestyles measured by HELP and global health status among elderly people.

2.7.2 The Adolescent Health Promotion Scale (AHP)

The Adolescent Health Promotion scale (AHP) was developed based on adolescent subjects from Taiwan (Chen, Wang, Yang, & Liou, 2003). The original 58 items of the AHP were generated primarily from the Health Promotion Lifestyle Profile (Walker, Sechrist, & Pender, 1987), and the Adolescent Lifestyle Questionnaire (Gillis, 1997). The finalized version of the AHP has 40 items, and responses were measured on a 5 point scale. 14 panel members examined items' content validity. Factor analysis was conducted and six domains were finally identified which accounted for 51.14% of the explained variance. The internal consistencies were good (Cronbach's alpha = .93 for the overall AHP, and the coefficients were all > .70 for each domain). AHP is applicable to measurement of adolescent health-promoting lifestyles in the school context. AHP has been adapted for university students in Mainland China (Wang, Ou, Chen, & Duan, 2009; Dong, Xing, & Wu, 2012). AHP was also used for examining the relationship between health-promoting lifestyles and health-related outcomes (Hsiao, Chien, Wu, Chiang, & Huang, 2010; Chen, Chen, Chen, Chiang, & Chen, 2012), health-promoting lifestyles are usually found to be associated with better health related outcomes. Associations

between health-promoting lifestyles and other related factors such as health literacy was also examined with the AHP instrument (Tsai, Cheng, Chang, Yang, & Wang, 2014).

2.7.3 The Self Rated Abilities for Health Practices Scale

The Self Rated Abilities for Health Practices Scale (SRAHP) is a 5 point instrument consisting of four domains: Exercise, Nutrition, Responsible Health Practice, and Psychological Well Being with 28 items (Becker, Stuifbergen, Oh, & Hall, 1993). Each domain contains 7 items. The SRAHP was developed to assess self-efficacy of practicing health-promoting lifestyles. A panel discussion and a pilot test were conducted to ensure its content validity. The instrument was administered to three sample groups: health fair attendees (n=188); college students (n=111); and adults with disabilities (n=117). The General Self-Efficacy Scale (Sherer et al., 1982) and the Health-promoting Lifestyle Profile (Walker, Sechrist, & Pender, 1987) were used to examine their correlations with the SRAHP. Cronbach's alphas were acceptable throughout subscales in the sample groups. The SRAHP also has been widely used in many studies (Stuifbergen et al., 2010; Callaghan, 2006; Stuifbergen, Seraphine, Harrison, & Adachi, 2005; Stuifbergen, Becker, Blozis, Timmerman, & Kullberg, 2003; Warms, Belza, Whitney, Mitchell, & Stiens, 2004). Recently, the SRAHP has been translated into Chinese and psychometrically validated (Hu & Zhou, 2012).

2.7.4 The Health-Promoting Lifestyle Profile

The Health-Promoting Lifestyle Profile (HPLP) is perhaps the most widely used instrument of the health practice regulation in health promotion or education studies. The original HPLP (Walker, Sechrist, & Pender, 1987;

Walker, Volkan, Sechrist, & Pender, 1988) was developed to assess six sets of health-benefit elements: Self-Actualization, Health Responsibility, Exercise, Nutrition Interpersonal Support, and Stress Management based on Health Promotion Model. 47.1% of the variance of the HPLP can be explained by these six factors. The initial HPLP had 42 items (Walker, Sechrist & Pender, 1987) aiming at assessing individuals' healthy lifestyles engagement. A second version of HPLP was developed based on the first version in 1995. Since then, the HPLP-II has been translated into many languages (Raj, Senjam, & Singh, 2013; Wei, Harada, Ueda, Fukumoto, Minamoto, & Ueda, 2012; Pérez-Fortis, Ulla Díez, & Padilla, 2012; Mohamadian, Ghannaee, Kortdzanganeh, & Meihan, 2013; Pinar, Celik & Bahcecik, 2009; Cao, Chen, Hua, Li, Xu, & Hua, 2012). The psychometric properties of its Chinese version have been examined by Teng, Yen, and Fetzer (2010). The HLPL-II has been used to measure healthy-lifestyle engagement, and examine the effectiveness of health promotion programs.

2.8 Classical Test Theory

Classical Test Theory (CTT) has been applied dominantly in measurement development studies for nearly a hundred years, CTT can also be called the true score theory. As the name implies, it is based on the true and error scores.

2.8.1 Measurement Reliability

Reliability of a measurement scale, as its name implies, refers to the extent to which a measurement scale is reliable. It reflects the entire precision of a measurement scale. It tells us if a scale is error-free and can be relied on.   A scale is not dependable when measuring the same subject, but with different outcomes. For example, a measure is aimed to test the height of a person, that person's height should be consistent with no significant difference when the scale is

repeatedly administered. This consistency can be indicated in a number of formats:

Test-retest Reliability.

The Test-retest reliability is used to estimate the stability of a measurement scale over time. It is based on the assumption that no significant change happens in the measured objective across time, generally speaking, the shorter duration the test is conducted between two time points, the higher the test-retest reliability might be. Test-retest reliability can be analyzed by using correlation statistics or paired t-test. The results between the two time points should be highly related or no significant difference can be observed. In this study, test-retest reliability was examined by correlation analysis. As Yen and Lo (2002) have argued, intra-class correlation statistic should be adopted rather than Pearson correlation approach since ICC takes systematic error into account.

Inter-rater Reliability.

Inter-rater reliability is used to estimate the consistency of a test when measured by two or more raters for the responses from the same group of examinees. The purpose of this form of reliability is to ensure the stability of a test across raters.

When the same responses are judged by more than two raters, inconsistency happens when different raters assign different scores on a same measurement item. Rating results will not be reliable if scores from raters are too different. In other words, the gap between different scores should not be too wide. Inter-rater reliability can be gauged by observing the correlation coefficients between the ratings from different raters.

Internal Consistency.

Internal consistency helps identify the agreement of the test result across items

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that measure a construct. All items in a measurement scale are expected to correlate with each other and to measure a same construct (Cronbach, 1951). For example, when a test is aimed to measure history, all items are indicators of history knowledge, items to measure knowledge in other areas, for instance, the area of computer science, should not be included in the test, since they are not correlated with those items with regard to history. Putting irrelevant items in the same test would harm the level of internal consistency, and conversely, higher internal consistency can be obtained when items in a test are highly correlated with each other. Cronbach's Alpha coefficient is the most typical measure of internal consistency, it ranges from 0 to 1, $\alpha > .9$ = Excellent, $.8 < \alpha < .9$ = Good, $.7 < \alpha < .8$ = Acceptable, $.6 < \alpha < .7$ = questionable, $.5 < \alpha < .6$ = Poor, and $\alpha < .5$ = Unacceptable (Bland & Altman, 1997; George & Mallery, 2003).

2.8.2 Measurement Validity

Validity reflects to what extent a measurement scale measures what is aimed to measure, therefore it represents how accurate a test is. It is very important for determining to what extent the results of a test is imposed or interpreted accurately. Establishment of validity is not as straightforward as testing reliability, and it is a developing process over time as the measurement scale is validated by other studies.

Content Validity.

Suppose there is a large item pool that aims to measure a specific construct; it's impossible and unnecessary to display all items in a test. Therefore, items developed for a measurement scale to measure this construct must be a sample drawn from the same item pool, and content validity reflects the extent of representativeness of this item set (Portney & Watkins, 2000). In other words, each item in a measurement scale must be strongly relevant to the topic or

construct that it is going to measure. Usually, the assessment of items' relevance is judged by a group of experts from the same research field. The judgment of content validity is usually finished before conducting quantitative data analysis. The content validity for each item can be determined by evaluating the extent of judgment agreement between different experts, i.e., averaging the number of judgments as "relevant" by total number of panel experts on a particular item. This is called the item's content validity indices (Pilot & Beck, 2006).

Convergent Validity.

If a newly developed measure and other existing measures are highly related, or converged, the measure is demonstrated to have convergent validity. For example, different scales have been developed to measure temperature. One can adopt the Celsius system or Fahrenheit system to calibrate the temperature. Different results are produced based on each different scaling system. However, they are measuring a same objective thing, the temperature. When different valid measures aim to test the same construct, no matter how different they appear to be, when they accurately measure the same construct, their results must be strongly correlated with each other regardless of how different their test results appear to be.

Criterion Validity.

Criterion validity of a measurement scale can be gauged by calibrating the scale to an established standard. It refers to the extent to which a measurement scale predicts well-established criteria. The criterion and the latent construct to be measured must be related theoretically. Concurrent validity and predictive validity are two approaches of criterion validity, both of them aims to examine the relationship between a newly developed measurement scale and an established criterion. In concurrent validity studies, data collection for the new measure and criterion is conducted at the same time, or concurrently, while in predictive validity studies, data collection is conducted at different time points.

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For example, if college students' learning performance is highly correlated with their self-regulated learning level theoretically, when a new measurement scale is designed to assess students self-regulated learning level, and the scores are found to be correlated with students' learning performance where data is collected at the same time, then concurrent validity can be established. On the other hand, one could test students' self-regulated learning level at the beginning of a semester, and examine correlate it with learning performance at the end of a semester in order to gauge predictive validity of the self-regulated measurement scale.

Discriminant Validity.

This form of validity indicates the extent to which a measure diverges from other measures that are supposed to be dissimilar. If a measure is designed to test promoting factors of taking exercises regularly, low correlation with barriers of taking exercises regularly is desired as the evidence of discriminant validity.

Construct Validity.

Construct validity is defined as the extent to which a measurement scale reflects an intended theoretical structure. A measurement scale tested with good construct validity means that it has been designed successfully to measure a particular theoretical phenomenon that it is intended to measure. Construct validity can be demonstrated through conducting Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA), for instance by examining the consistency between the identified internal structure of a measurement scale by EFA and CFA analysis and the structure proposed by theory (Marsh, Liem, Martin, Morin, & Nagengast, 2011). Identification of internal structure is a painstaking procedure involving subtle adjustments throughout the process. Methods of determining factor number include: Kaiser Criterion, which requires Eigenvalue greater than 1 (Velicer, Eaton, & Fava, 2000), the Likelihood Ratio Test (LRT), Parallel Analysis (Horn, 1965), the Minimum Average Partial analysis (MAP), and

bootstrap methods (Lambert, Wildt, & Durand, 1990). Parallel Analysis has been advocated by many journal editors as the most accurate approach to determine factor numbers.

2.9 Item Response Theory

The validation method of a measurement scale can also be based on the paradigm of Item Response Theory (IRT), as the opposite of True-Score Theory, IRT has been used to represent a set of methods consider person and item attributes together. Rasch and IRT are interrelated, but philosophically different. IRT aims to fit the model to the data whereas Rasch tries to fit the data into the model. In other words, IRT tries to fit the reality and the Rasch seeks for "simplicity" (Yu, 2008).

The item calibrations in IRT paradigm are independent of the sample and the test-takers' ability estimates are independent of the tests. That is, more proficient examinees will always have a higher probability of better performance than those less proficient examinees regardless of the items in a test they have. On the other hand, less difficult items in a test will always have a higher pass rate than those more difficult items regardless of the sample of test-takers to whom they are being administered. This is quite distinctive from the classical test theory paradigm, in which the scores of a test-taker might be very different when they have tests with different difficulties. In this regard, the Item Response Theory has advantages over the conventional test theory.

There are several parameters that IRT models take into account, namely, person ability, item difficulty or threshold, discrimination, and guessing parameter. The value of person ability tells us how proficient an examinee is. The item difficulty or threshold parameter refers to the difficulty level of an item. The discrimination parameter refers to the extent to which an item could "discern"

highly-capable examinees or less-capable examinees effectively. The guessing parameter refers to the extent to which the examinees are "guessing" the answer correctly. Different models are designed based on considerations of parameters. Different IRT models consider different numbers of parameters; however, all models take person ability into account. In addition, the one parameter model, like the Rasch measurement model, further considers item difficulty parameter. The two-parameter model also includes discrimination parameter and the three-parameter model further includes guessing parameter.

Two basic requirements should be satisfied before conducting Rasch analysis. The first one is the unidimensionality, which means a test and its items should only measure one latent trait at a time. A Principal Components Analysis (PCA) was proposed to examine whether an instrument, or its subscale (Linacre, 1998), is unidimensional or not. An eigenvalue of the first component less than 2.0 is considered as the evidence of unidimensionality. (Linacre, 2006). The second requirement is called local independence (Wright, 1996), which refers to the responsive independence of an item; in other words, response to an item is free from response to the rest of other items. The Q3 correlation, i.e., the correlation of residuals, was proposed to check items' local independence. An ideal value of Q3 is -1(L-1) where L is the number of the items. For example, - .1 is the ideal value for a 10-item instrument. The correlations of residuals should not deviate too much from the ideal value. Furthermore, the point-biserial coefficient was proposed to examine the extent to which every item discrimination is similar to each other as one of the requirements when using Rasch analysis.

In the context of the Rasch measurement paradigm, an instrument should target a single construct or structure. Items are said to be fit when they successfully reflect the construct. Conversely, those "outliers" that cannot fit into the structure are considered misfit, indicating the fitness is in question. The infit mean-squared (MNSQ) is the weighted Chi-squared/df, and the outfit mean-squared is the unweighted Chi-squared/df (Yu, 2008). The fit index is a ratio reflecting undesirable "noise" in a test. The ideal MNSQ is 1.0, which

indicates the observed variance is exactly the same as predicted. A MNSQ of 1.2 can be interpreted that the item has 20% unexpected variance from the model expected. MNSQs greater than 0.5 and less than 1.5 are suggested as the acceptable range (Linacare, 2006), while other researchers have advocated stricter ranges, for instance, .6<MNSQ<1.6 (Wright, Linacre, Gustafson, & Martin-Lof), and .8<MNSQ<1.4 (Wolfe & Chiu, 1999). Researchers (Mok, Cheong, Moore, & Kennedy, 2006; Wang, Yao, Tsai, Wang, & Hsieh, 2006) further suggested a range from 0.7 to 1.3 for rating scale measurement. The standardized residual (ZSTD) is the t statistics for MNSQ. The acceptable range is from -2.0 to 2.0 (p<0.5). Those ZSTDs greater than 2.0 are considered misfitting whereas those less than -2.0 are considered overfitting. The ZSTD is more influenced by outliers. The judgement on the goodness or badness of the model-data fit should be based on the ZSTDs and MNSQs.

The following is a proposed procedure for validating an instrument in Rasch analysis (Linacre, 2010; Tennant, & Conaghan, 2007):

(1) Check the original person measures. The sample size matters because omitting a small portion of a large sample (>1000) would not make a big difference; however, omitting subjects from a small sample should be careful. Re-run the analysis to compare the significant changes on person measures before and after omitting misfit persons is recommended. Stop the removal when significant changes cannot be observed.

(2) After suspicious subjects have been omitted, check the summary of the overall model fit. Infit values are more reliable when the majority of the subjects' proficiencies or performance is at average level.

(3) Next, omit misfit items based on infit and outfit measures. There are two strategies of deciding an item is fit or misfit. On the one hand, decision can be based on cut-off values. Different ranges have been suggested by different scholars, .5-1.5 (ideal fit value of 1.0 indicates perfect model-data fit as

discussed) was suggested as acceptable (Linacre, 2006). While Wright, Linacre, Gustafson, and Martin-Lof (1994) proposed a .6-1.4 range. Wang et al. (2006) further suggested a range of .7-1.3 as suitable for rating scales. On the other hand, instead of using a fixed range, another approach is to examine the distribution of the fit indices for items and identify those that deviate from the majority (Wang & Chen, 2005). Misfit items do not behave in the same way as most other items in a measurement scale according to its definition. In this sense, the second approach is a more rational option.

(4) The person reliability and the item reliability should be examined in order to check whether the subjects' performances are independent of tests and the test is independent of subjects' performance.

(5) The optimal number of categories can be decided by analyzing the category function. One could first examine the counts and the average measures for each category. Higher traits must be represented by higher measures, in other words, item measures must advance monotonously (Linacre, 2002), and the monotonousness can be checked by step calibrations. Furthermore, the distance (adjacent adjoining points of category probability curves) between category measures should be greater than 1.4 logits for three-category rating scales, and shorter distances are acceptable for scales with four or five categories.

(6) Differential Items Functioning (DIF) can be used to check if there is any invariance of item hierarchy across demographic groups. (e.g. age, gender, race, family residence, family income, etc.). DIF occurs when item difficulty performs significantly differently between groups. The difference less than .5 logits are acceptable (Shih & Wang, 2009). A DIF-free measurement scale is an essential precondition for group comparisons to ensure observed difference is not caused by the measurement scale. Conversely, DIF items indicate different perceptions by different groups, which also means difference has already existed before comparison. Thus, those items should be revised or omitted before conducting further analysis.

For a new instrument to be developed in this study, the principles of classical test theory and item response theory will be used to develop the instrument for assessing its psychometric properties. Specifically, content validation, inter-rater reliability, internal consistency, and convergent and discriminant validities will be investigated in this study.

2.10 Factor Analysis and Rasch Analysis

Factor analysis and Rasch analysis can be employed as complementary approaches (Smith & Miao, 1994). However, since Rasch measurement takes the basic assumption that a test must measure a single latent structure, it is necessary to identify a latent variable among a set of items before conducting Rasch diagnosis for subscales. Prior to Rasch diagnosis, Factor Analysis, or other related approaches such as TETRAD analysis or parallel analysis, can be performed in advance to explore latent variables.

The exploration and identification of measurement of internal structure or dimensionality is an important process in order to establish validity when developing a measurement scale. The component model and common factor model are two basic models for exploratory factor analysis (Kaplan, 2009). Several extraction methods have been developed for them. Perhaps the most popular and widely employed method is principal component analysis (PCA).

A number of techniques have been developed (Hayton, Allen, & Scarpello, 2004) to help identify the number of domains including the most commonly-used Kaiser criterion, which requires eigenvalue greater than 1 (Velicer, Eaton, & Fava, 2000), the Likelihood Ratio Test (LRT), Parallel Analysis (Horn, 1965), the Minimum Average Partial analysis (MAP), and bootstrap methods (Lambert, Wildt, & Durand, 1990). Parallel Analysis is based on the logic that "eigenvalues generated from the real data will be larger than the randomly generated eigenvalues." (Schmitt, 2011), and is becoming popular

and is advocated by many scholars as the optimal method for the identification of dimensionality. It should be noted that parallel analysis requires normal distribution of the dataset (Liu & Rijmen, 2008). The tetrad test, conceptualized by Glymour (1982), has gained more attention in recent years as a potential approach with a promising future (Bollen & Ting, 2000; Yu, Popp, DiGangi, & Jannascb-Pennell, 2007). Among those, Rasch analysis and Factor Analysis (a blanket term for exploratory factor analysis and confirmatory factor analysis), have been widely adopted for dimensionality analysis.

A review of existing technique found that most of them work reasonably well (Tate, 2003). Researchers should not ignore the prerequisite for their employment in terms of sample size and distribution of the dataset in particular when selecting appropriate methods.

In essence, the difference between confirmatory factor analysis and exploratory factor analysis is the involvement of cross-loadings, in confirmatory factor analysis, cross-loadings are set to zero which is not realistic, and in this sense, confirmatory factor analysis is treated as a more restrictive approach and is not suitable for exploratory studies (Asparouhov & Muthe'n, 2009).

Good model fit statistics include comparative fit index (CFI) greater than .95 (Hu & Bentler, 1999) or 0.96 (Yu, 2002); Tucker-Lewis index (TLI) greater than 0.96, standardized root mean square residual (SRMR) no greater than .08, and root mean square error of approximation (RMSEA) less than .06 (Hu & Bentler, 1999). In spite of this, according to Marsh, Wen, and Hau (2004), the model fit indices should not be regarded as fixed cut-off values, a broader range of fit statistics was suggested by Marsh, Hau, and Wen (2004) as displayed in Table 12.

2.11 Measurement Invariance

Researchers often examine four types of measurement invariance, namely, configural, metric, intercept, and error variance invariance. Next, the author will unpack them one by one.

Configural invariance is the baseline model for the following analysis, and it refers to the invariant structure across different groups. An instrument established with configural invariance means that its internal structure is consistently perceived by participants from different groups. It can be examined by imposing the same structure across different groups, and conducting confirmatory factor analysis for each group separately.

After configural invariance is established, one can proceed to test Metric Invariance (MI). MI expects the relationship between items of an instrument and internal structure across different groups to be the same. In other words, it concerns factor loadings to be equivalent. The establishment of metric invariance indicates that ratings from different groups can be compared and any tested differences are caused by group differences not by measurement variance. Vandenberg and Lance (2000) proposed that partial metric invariance is the minimum requirement that should be obtained.

The third type of measurement invariance is intercept invariance (It is also called scalar invariance). Intercept refers to items' origins on the y-axis. Establishment of intercept invariance indicates that test-takers would have equivalent latent and observed scores no matter which group they belong. Intercept invariance can be tested by imposing items intercept to be equal across different groups and its establishment indicates that groups means can be compared.

The tests for these three types of measurement invariance above are rudimentary for most measurement scales. There is another type of measurement invariance

concerning measurement errors to be equivalent across different groups, it is called error variance invariance, and can be tested by imposing error variances to be the same across groups.

CHAPTER 3

METHODOLOGY

3.1 Study Design

The purpose of Phase One of this study was to generate original items for questionnaire development. To do so, it is crucial to find out potential health motivations as much as possible. In order to achieve this, to maximize and capture all possible reasons for practicing health-promoting lifestyles possessed by college students, the following factors should be taken into consideration during the participant recruitment process: gender difference; age between 19 and 24 years old (within the range of emerging adulthood (Arnett, 2000); their college year, e.g., whether they are at their first, second or third year; family residence (urban, suburban or countryside); and more importantly, they should already have set personal health goals and possess a variety of reasons for practicing health-promoting lifestyles, ranging from external motivation to integrated motivation.

For recruiting and screening, posters and e-mail advertisements were circulated within two universities. Potential participants were asked to leave their e-mail address. A mini-questionnaire was administered to those potential participants by simply asking them their reasons for their health-promoting lifestyles, and according to described operational definitions, their health motivation levels were roughly identified by examining their responses to the mini-questionnaire.

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Within the mini-questionnaire, students were also asked to provide their demographic information in terms of their age, gender, family location, and specifically what kinds of behaviors they were practicing. Researchers decided whether those college students who were willing to participant were eligible based on the foregoing inclusion criterion.

The second phase of the study started with the original item pool, which was generated from the content analysis result based on focus group interview. An initial measurement scale was then formed after a panel discussion on these original items. In order to examine the initial reliability and validity of the questionnaire, and to explore its internal structure, 283 college students were invited mainly from Guangdong Province.

For the last phase of this study, a larger sample size was needed to further confirm the internal structure and validate the measurement scale by performing Rasch analysis, 1023 participants were recruited using a convenience sampling method from 12 Chinese universities and higher institutions located in the east, middle and west parts of China.

3.2 Participants

In summary, college student recruited in this study were aged from 18-25 years, which is the typical group of emerging adulthood population. Maximization of those with different motivation levels was realized by recruiting participants with various demographic backgrounds. Participants' information can be found from Table 1 to Table 3.

Table 1 Participants Information: Group Interview (N=93)

	Urban	Suburban	Countryside	All participants
Percentage (%) or Mean (SD)				
Nationwide distribution	30 (32.26%)	28 (30.11%)	35 (37.63%)	93 (100.00%)
Shantou, Guangdong	8 (8.60%)	4 (4.30%)	9 (9.68%)	21 (22.58%)
Guangzhou, Guangdong	9 (9.68%)	6 (6.45%)	5 (5.38%)	20 (21.51%)
Chongqing	13 (13.98%)	18 (19.35%)	21 (22.58%)	52 (55.91%)
Average age	20.76 (SD=1.38)	21.63(SD=1.44)	21.27(SD=1.51)	21.22 (SD=1.44)
College year				
Year one	11 (11.83%)	13 (13.98%)	19 (20.43%)	43 (46.24%)
Year two	12 (12.90%)	10 (10.75%)	12 (12.90%)	34 (36.56%)
Year three	6 (6.45%)	3 (3.23%)	2 (2.15%)	11 (11.83%)
Year four	1 (1.08%)	2 (2.15%)	2 (2.15%)	5 (5.38%)
Gender				
Male	18 (19.35%)	15 (16.13%)	23 (24.73)	56 (60.22%)
Female	12 (12.90%)	13 (13.98%)	12 (12.90%)	37 (39.78%)

Table 2 Participants Information: Exploratory Study (N=205)

	Urban	Suburban	Countryside	All participants
Percentage (%) or Mean (SD)				
Nationwide distribution	83 (40.49%)	59 (28.78%)	63 (30.73%)	205
Shantou, Guangdong	22 (10.73%)	29 (14.15%)	20 (9.76%)	71 (34.63%)
Guangzhou, Guangdong	14 (6.83%)	8 (3.90%)	10 (4.88%)	32 (15.61%)
Chongqing	47 (22.93%)	22 (10.73)	33 (16.10%)	102 (49.76%)
Average age	19.15 (SD=1.22)	19.23 (SD=1.26)	19.49 (SD=1.52)	19.29 (SD=1.33)
Gender				
Male	20 (9.76%)	27 (13.17%)	32 (15.61%)	79 (38.54%)
Female	63 (30.73%)	32 (15.61%)	31 (15.12%)	126 (61.46%)
College year				
Year one	53 (25.85%)	44 (21.46%)	43 (20.96%)	140 (28.29%)
Year two	19 (9.27%)	21 (10.24%)	16 (7.80%)	56 (27.32%)
Year three	10 (9.76%)	1 (.49%)	2 (9.76%)	13 (6.34%)
Year four	1 (.49%)	3 (1.46%)	2 (9.76%)	6 (2.93%)

Table 3 Participants Information: Validation Study (N=1023)

	Urban	Suburban	Countryside	All participants
Percentage (%) or Mean (SD)				
Nationwide distribution	444 (43.40%)	236 (23.07%)	343 (33.53%)	1023
Shantou, Guangdong	117 (11.44%)	76 (7.43%)	69 (6.75%)	262 (25.61%)
Jinan, Rizhao, Shandong	228 (22.29%)	62 (6.06%)	167 (16.32%)	457 (44.67%)
Harbin, Heilongjiang	8 (.78%)	4 (.39%)	17 (1.66%)	29 (2.83%)
Shenyang, Liaoning	26 (2.54%)	31 (3.03%)	16 (1.56%)	73 (7.14%)
Zhengzhou, Henan	14 (1.37%)	26 (2.54%)	22 (2.15%)	62 (6.06%)
Shanghai	8 (.78%)	3 (.29%)	2 (.19%)	13 (1.27%)
Changsha, Hunan	17 (1.66%)	6 (.59%)	18 (1.76%)	41 (4.01%)
Beijing	5 (.49%)	4 (.39%)	6 (.59%)	15 (1.47%)
Chongqing	21 (2.05%)	24 (2.35%)	26 (2.54%)	71 (6.94%)
Average age	20.36 (SD=1.32)	20.50 (SD=1.20)	20.58 (SD=1.27)	20.47 (SD=1.28)
Gender				
Male	171 (16.71%)	104 (10.17%)	223 (21.80%)	498 (48.68%)
Female	273 (26.69%)	132 (12.90%)	120 (11.73%)	525 (51.32%)
College year				
Year one	152 (14.86%)	84 (8.21%)	171 (16.72%)	407 (39.78%)
Year two	116 (11.34%)	75 (7.33%)	112 (10.95%)	303 (29.62%)
Year three	153 (14.96%)	71 (6.94%)	54 (5.28%)	278 (27.17%)
Year four	20 (1.96%)	6 (.59%)	6 (.59%)	32 (3.13%)
Year five	3 (.29%)	0 (0%)	0 (0%)	3 (.29%)

3.3 Instrumentation

The initial version of this measurement scale, the College Students Health Motivation Questionnaire (CSHM-Q) with 40 items, was generated from the content analysis of the transcript of the focus group interviews, and a review of several existing instruments. These instruments include: Self-regulation Questionnaire (Ryan & Connell, 1989); Academic Motivation Scale (Vallerand et al., 1992); Adolescent Self-Regulatory Inventory (Moilanen, 2007); Self-regulation of Withholding Negative Emotions Questionnaire (Kim, Deci, & Zuckerman, 2002); Adolescent Prosocial Behavior Motivation Questionnaire (Wentzel, Looney, & Filisetti, 2007); and Friendship Motivation Scale (Okada, 2005). The reason for choosing these instruments as a part of the research is because: first, they were all developed based on the framework of Self-determination Theory; second, since the current CSHM-Q was designed to measure motivations for practicing health-promoting lifestyles, it is necessary to reflect the "things" in common between related existing instruments that were aimed to measure motivations on one aspect of health-promoting lifestyles; third, these instruments can be used among the emerging adulthood population. The CSHM-Q, along with several existing instrument scales, were all developed based on the framework of the Self-determination Theory that can be illustrated in Figure 2. The first section of the CSHM-Q includes the clarification of the purpose and ethical issues of the survey, participants' right and approval, demographic and background information. The second section consists of items measuring health motivation. These items have been generated from focus group discussions, revised through pilot testing and finalized survey. The items were rated on a Likert scale ranging from 1 to 5, where

1 = Strongly Disagree

2 = Disagree

3 = Neutral

4 = Agree

5 = Strongly Agree

The third section of the scale includes the accompanying instrument, the Chinese version of Behavioral Regulation in Exercise Questionnaire-2 (BREQ-2), in order to examine the relationship between health motivation and exercise motivation. The Chinese version of BREQ-2 (Chung & Liu, 2012) includes 19 items measuring amotivation, external regulation, introjected regulation, identified regulation and intrinsic regulation. 5 points Likert scale was used ranging from not true for me (0) to true for me (4). The BREQ-2 is used to differentiate various types of exercise motivation among Chinese college students. Internal consistency was reported as acceptable. Related but distinct relationships were found between factors. Gender invariance was established through confirmatory factor analysis. The BREQ-2 (Chinese version) is a validated instrument of exercise motivation and can be used among college students in China.

The last section of the instrument includes the Self Rated Abilities for Health Practices Scale (SRAHP) comprised of four domains of health-promoting lifestyles with 7 items in each domain. The Chinese version of SRAHP has been validated and has been widely applied in many studies. The SRAHP was adopted to measure health-promoting lifestyles based on considerations that, three measurement scales were used in the third study phase and 28 items of SRAHP in total would lower the burden for participants.

3.4 Procedure

Before formally conducting the research project, ethical approval was obtained from the Human Research Ethics Committee (HREC) of the Hong Kong Institute of Education (Appendix A). The nature, purpose and ethical issues of

the study were explained to every participant and consent forms were obtained. A flowchart of the research process was illustrated in Figure 6.

Phase 1 of this research involved generating an original item pool for the CSHM-Q by reviewing and synthesizing several currently used instruments and analyzing transcripts from focus group interviews. 10 groups with a total of 93 participants were established, interviews were audiotaped and transcribed. The current study adopted the theory directed approach (Hsieh & Shannon, 2005) to content analysis. Before getting started, two student helpers were recruited and trained with operational definitions of motivational levels. For the first coding stage, two student helpers independently coded or identified raw data themes (or items) line by line, and assigned conceptual labels to each of those lines. An inductive analysis was then undertaken to identify more general themes (dimensions or categories) for the second coding phase. Each of these themes (regardless of whether themes were raw data or more general) was considered to be distinct. Consensus was reached and disagreements were resolved through further discussions with the author.

During Phase 2, a pilot study with the original version of CSHM-Q was implemented by distributing questionnaires to 283 college students within two universities. The purpose of the pilot study was to explore the internal structure of CSHM-Q and to conduct an initial test on its reliability and validity, as well as questionnaire length. Revisions were made to the first version as needed.

In Phase 3 of the study, data collection was performed with a revised version of CSHM-Q. Participants were recruited based on convenience sampling method. CSHM-Q along with BREQ-2 and SRAHP were distributed. Internal structure was identified at this phase. Rasch analysis was conducted and misfit items were eliminated.
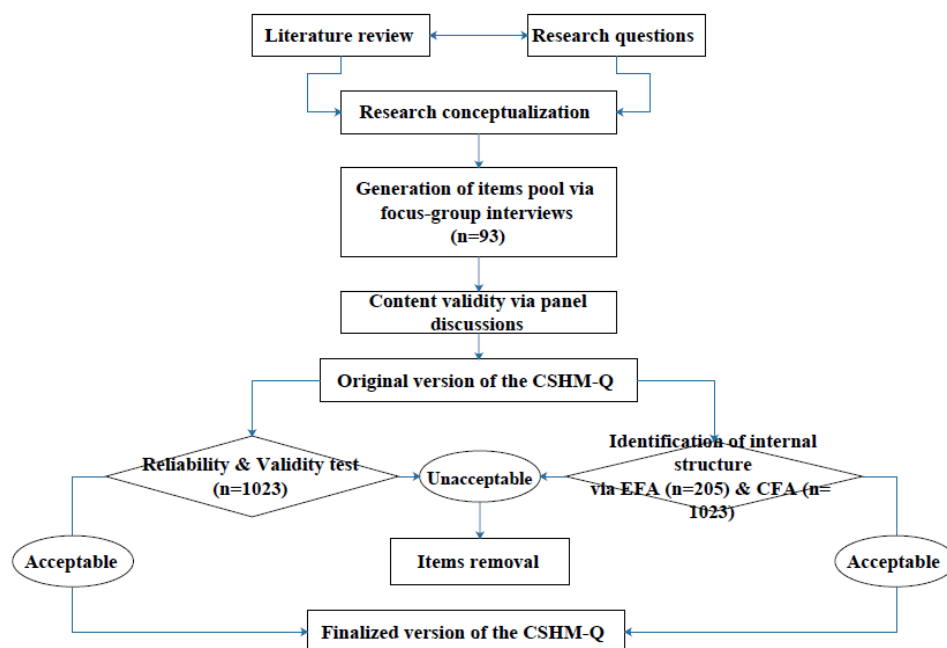
Figure 5 Flowchart of the General Research Process

3.5 Analytical Strategy

3.5.1 Content Analysis of Focus Group Interview

In this study, the author performed content analysis by following a theory-directed approach (Hsieh & Shannon, 2005). Before starting the analysis, two student helpers with health education background were recruited and trained with the operational definitions of motivational levels. In the first coding stage, student helpers independently coded or identified raw-data themes (items) line by line, and assigned conceptual labels to each of those lines. In the second coding stage, an inductive analysis was performed in order to identify general themes (dimensions or categories). Each of these themes (regardless of whether the theme was a raw-data theme or a general theme) was considered to be distinct from other themes. Raw-data themes with similar meanings were collected, and only one theme was kept in order to produce an original item for the

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measurement scale. Consensus was reached and disagreements were resolved through discussions with the author of this thesis. Before conducting the real coding process, a pilot coding session was conducted first. Student reviewers were asked to code a small transcript independently, followed by discussions in order to find out disagreements between their coding results. The purposes of doing this were: to examine the consistency of understanding of operational definitions across student reviewers and to make student reviewers familiar with the coding process.

3.5.2 Data Cleansing

Once data collection was finished, the author conducted data cleansing immediately. Data redundancy was examined first; some cases or responses were found identical, duplicates were removed, but only one row of data was kept in the dataset for analysis. Second, missing value analysis was conducted at the beginning. The percentage of missing data was a .24% (less than 5%), and data appeared to be missing randomly. Therefore, item means were used to calculate and replace missing values.

3.5.3 Content Validity

Content validity is defined as the extent to which a measurement scale reflects all parts of the given domain that is being measured. In this study, content validity was ensured in two ways.

Content validity was first ensured by maximizing all possibilities when recruiting participates. In order to maximize the chance of identifying all possible reasons that motivate college students to practice health-promoting lifestyles, the author considered the following factors when selecting

participants for this study: gender; age (between 19 and 24 years old, the age range of emerging adulthood); college year (first, second, or third year); and family residence (urban, suburban, or rural). More importantly, the author determined whether the students had already set personal health goals and whether they identified various motivations for practicing health-promoting lifestyles, ranging from external motivation to integrated motivation.

To recruit and screen participants, posters and e-mail advertisements were circulated at two universities, and potential participants were asked to provide their e-mail address. A preliminary questionnaire was also sent to them in order to understand their reasons for adopting health-promoting lifestyles, and based on described operational definitions, health-motivation levels of these potential participants were roughly identified. In this 'mini-questionnaire', potential participants were also asked to provide their demographic information (i.e., age, gender, college year, and family residence), and specific health-promoting lifestyles they were practicing. Based on these aforementioned inclusion criteria, the author decided whether one was eligible for the study or not.

Throughout the interview process, participants were encouraged to respect different perspectives and opinions. In order to warm up the interview and to establish focus on the study topic, the first few questions were related to the interviewee's health goals for the entire semester, such as 'What are the specific health-behavior goals that you have already established in your mind for the coming semester?' The topics were focused on various reasons in relation to the students' choice of health-promoting lifestyles, and the factors associated with those reasons. Moderators promoted the participants to talk freely and spontaneously in order to facilitate the interview process. The extent to which each topic was explored depended on interviewee's active responses and performance.

Furthermore, content validity was also ensured by panel discussions. Panel members were asked to review the CSHM-Q item by item. The minutes of the

panel discussions (Appendix C) along with the revised version of the item pool were sent back to each of the panel members for checking. Item Content Validation Index (ICVI), the degree each item was rated as relevant and clear, was computed.

3.5.4 Test-retest Reliability.

Adopting a repeated measure has been defined as the consistency of a measurement scale. It can be established if the scores between test and retest after a period of time are found to be correlated. In this study, test-retest reliability of CSHM-Q was tested by examining the relationship between the two administrations during an interval of three weeks. Intra-class Correlation Coefficients were computed.

3.5.5 Internal Consistency

Internal consistency can be established through examining Cronbach Alpha, Split-half Coefficient or Kuder Richardson Formula. Cronbach Alpha was used in this study because it had several advantages over the others: first, Kuder Richardson can only be used for dichotomous responses (yes or no, 0 or 1), whereas Cronbach's Alpha can be applied to both dichotomous and polytomous responses (i.e., 5-point or 10 point Likert scale); second, split-half is the correlation between the two divided subsets within a single test, therefore, the split-half coefficient is strongly affected by the grouping strategy, for instance, a dataset is divided into a first half and a second half in SPSS by default. In fact, it is more practical to decide it by the odd-even numbers. Finally, Cronbach Alpha has been proved as the mean of all possible split-half coefficients (Warrens, 2015). Therefore, Cronbach Alpha has become the most popular applied coefficient when checking internal consistency. It should be noted that there are

two forms of Cronbach Coefficient Alpha. The unstandardized form of it is based on item correlations and the standardized form is based on item covariance matrix, and they cannot be replaced by one another in most cases (Falk & Savalei, 2011).

3.5.6 Construct Validity

Construct validity was examined by several methods and approaches. In order to first explore and identify the structure of CSHM-Q. Exploratory Factor Analysis and Confirmatory Factor Analysis were adopted to check the structure of CSHM-Q by using IBM SPSS 19.0 and Mplus program version 7.11. A number of model fit indices were used to help assess model data fit. Tuck-Lewis index (TLI), comparative fit index (CFI), standardized root mean square residual (SRMR), root mean square error of approximation (RMSEA), Chi-square Standardized Residuals and parameter estimates were inspected in order to check the overall model fit.

After the identification of internal structure, Rasch analysis was adopted to investigate the model-data fit and DIF assessment within each subscale. First, the author examined whether items of each subscale of the CSHM-Q met the unidimensional requirements of the Rasch rating scale model. Items with infit and outfit mean square errors (MNSQs) within .7-1.3 were considered acceptable, items with MNSQs beyond this range were regarded as poor fitting, and were removed from the questionnaire.

Differential Item Functioning analysis was used to evaluate group invariance of item difficulty hierarchy. In this study, we have gender, age, college year, and family residence groups. It should be noted that multidimensional Rasch analysis could also be conducted to validate the CSHM-Q. It has the advantage over unidimensional approach in terms of considering correlations between

sub-scales simultaneously (Wang, Yao, Tsai, Wang, & Hsieh, 2006). However, it can hardly improve the measurement precision when low correlations are identified between sub-scales (Wang, Chen, & Cheng, 2004). In this study, moderate to low correlations were found among subscales by EFA and CFA analysis, therefore the author decided to adopt the unidimensional approach.

3.5.7 Convergent Validity

In this study, convergent validity was established through examining the relationship between motivation for practicing health-promoting lifestyles and motivation for exercising. Chinese version of Behavioral Regulation in Exercise Questionnaire-2 (Chung & Liu, 2012) was used to measure college students' exercise motivation.

The rationale of using the Chinese version of BREQ-2 to establish the convergent validity of the CSHM-Q was based on the identified relationship between health outcomes and exercise: exercise is the crucial and major component of health-promoting lifestyles. Individuals who were more physically active were less likely to have smoking habits or sleeping problems than those who were less physically active (Garcia, Archer, Moradi, & Andersson-Arntén, 2012). They were more likely to have a balanced diet and less likely to smoke (Romaguera et al., 2011). Moreover, psychological well-being was identified to be associated with the regularity of physical exercise (Garcia, Archer, Moradi, & Andersson-Arntén, 2012), negative associations were found between depression or anxiety and exercise behaviors (Shepherd, Krägeloh, Ryan, & Schofield, 2012), and exercise behaviors could also produce positive outcomes such as social interaction, interest and enjoyment (Withall, Jago, & Fox, 2011).

Chapter 4

RESULTS

4.1 Findings on Focus Group Discussions

4.1.1 Absence of Health Motivation

Bandura (1986) explained that 'amotivation' affects people who engage in an activity. In this case of absence of health motivation, the participants did not consider themselves to be competent in their practice of health-promoting lifestyles. A lack of motivation has been determined to yield negative results, for example the stopping of activities (Bandura, 1986).

In our study, 16 college students did not accept that practicing health-promoting lifestyles could improve their health status (i.e., they were unable to perceive the connection between a health-promoting lifestyle and health outcome).
'I think it is unnecessary to live for a very long time. In my case, for example, I occasionally play basketball; but, frankly speaking, I currently do not wish to take any actions specifically for my health'. (Second-year student, male)
Some of the participants did not think about healthy behavior in their daily life except when they faced health problems.
'I will think of it (health-promoting lifestyles) only when I have health problems. I never consider practicing it (health-promoting lifestyles) in my daily life, and I make a plan for my health only after I get a stomach ache or headache, for example'. (Second-year student, female)
'I do not have any particular plan, and of course no procedures to achieve it. Because I am in university, my capability of self-control is not strong. I realize it (the importance of health) after I have health problems, but usually I do not

have any intentions of taking actions'. (Second-year student, male)

Certain students stated that they understood the importance of health-promoting lifestyles, but that they had other more important goals in their lives.
'I believe that we 20-something people do not have much health motivation. There is a popular saying: "Young people sacrifice their health to make money, old people spend their money to gain good health", competition is intense everywhere, when talking about health, I think every adults knows that it is really important and what is means to them and their family, but when it comes to practice, it is a different story '. (Second-year student, male)
'Of course, it is good to practice health-promoting lifestyles, but as young people, we have to face numerous challenges, and various choices and pressures from the environment surrounding us, school, life, and the job market; so, I think it is really hard to think about endorsing health-promoting lifestyles'. (Second-year student, female)

Some of the students considered health-promoting lifestyles to be burden.
'It depends on how I feel. I do not like following the same procedures every day, and I only wish to be happy. I am not a rigid and disciplined person, and I do not like an inflexible life'. (Third-year student, female)
'To me, health-promoting lifestyles means you have to go to sleep at 10 and should wake up at 7 o'clock in the morning and then run for a couple of minutes, you must do this routines day by day, frankly speaking, I do believe that health-promoting lifestyles like this could help keep me healthy, but it is going to be very boring if this is your everyday life. I am still young, I want to explore different possibilities, I cannot imagine that I will choose a rigid calendar every day and persist it for the rest of my life'. (First-year student, female)
'I am already 22 years old and I have a right to choose a life that I want to live. The best time of a life is just few years, I do not want to wake up, exercise at the same venue, live in a same flat and see the same people every day. It's like a prison of repetitiveness. I have a plan, go and have a journey in a different place

each year'. (Second-year student, male)

These statements indicate that a lack of health motivation exists among some college students. Evidence suggests that a large proportion of college students do not have any intention to practice health-promoting lifestyles; this is probably because the students are in their early adulthood, a stage at which some of them are not aware of the importance of health in their lives.

4.1.2 External Health Motivation

When people engage in a specific behavior because they are pressured into doing so by people who are important in their lives ('significant others'), such as family members, friends, or doctors, or because they wish to avoid the negative consequences of inaction (such as the disapproval of others), the behavior is considered to be externally regulated (Deci & Ryan, 2000). Although college students typically do not receive rewards or face any punishment if they do not practice healthy behavior during their college life, evidence indicated that health motivation in the participants in this study was instilled or influenced by significant others (family members, teachers, friends, or peers). If the pressure applied by others was removed, these students, whose health motivations were 'external', were unlikely to persist engaging in their health-promoting lifestyles.

Assignments, learning performance, and, in particular, final examinations at the end of semesters were among the most critical external reasons because of which the participants wished to stay healthy.
'The other side of health-promoting lifestyles is that it can bring some good changes to your body, and so the efficiency of the learning process might increase, and you might not get tired easily. I often fall asleep in the classroom, and so living in a healthy manner could be helpful for my learning'. (Third-year

student, female)

Parents and teachers also urged these college students to practice
health-promoting lifestyles.

'Every time I call my parents, they remind me to eat well and exercise and not
sleep too late, and their words make me realize I should do it; but, frankly
speaking, it is really hard to persist. Without these reminders from my parents,
it is hard for me to think about it (health-promoting lifestyles)'. (Second-year
student, female)

'Normally, I unconsciously practice health-promoting lifestyles; I do not have a
plan, but sometimes my teacher says I should do it like this, and I simply follow
his instructions.' (Second-year student, male)

Significant others (friends, partners, and roommates in particular) often
influenced these college students' choice of health-promoting lifestyles. Others
sometimes could promote one to practice health-promoting lifestyles,
sometimes play a role as barriers.

'I think my health motivation comes from the ones next to me, my friends,
classmates, or roommates. As far as I know, many students do not want to go
out and exercise, and they prefer to stay in their dorms, but when they can find
someone to accompany them, exercising might be enjoyable for them (which
mean that they will not exercise unless they can find company). I think this is
the only way that could influence you (in terms of health motivation)'.
(Second-year student, female)

'I often binge drink when I am with friends. We do have friends, right? As a
man, if you go out having a party with your friends but refuse to drink, others
would despise me. I myself do like drinking, and I don't drink when I am alone,
but sometimes I drink a lot when I have a party with my friends. That's a part of
our culture, and there is a culture of wine here in China. I know it seems
ridiculous, but the more your drink, the better the friendship you have. I do not
want to let them down'. (Second-year student, male)

Some of the students were conscious of the impression they created in others, and these students stated that staying healthy helps present a positive image to others.

'I will not be confident (when I communicate with others) unless I am in perfect shape. I want to present a good physical impression to the others, we are in world that others judge you by impressions, the first impression is very important when people do not have time to know you well, so a good shape could give me confidence'. (Second-year student, male)

One participant practiced health-promoting lifestyles in order to avoid expensive medical treatment.

'I am from a small town. I have seen several cases in which a family member contracted a severe illness, and the treatment was extremely expensive and it consumed all the family's savings and affected their future life. That is really bad, and I cannot afford to become seriously ill. I have to be healthy'. (Second-year student, male)

4.1.3 Introjected Health Motivation

When people harbor introjected motivations, external control and the influence of other people start to internalize and integrate with the sense of self (Deci & Ryan, 1985). A 'guilty feeling' is commonly treated as an introjected reason (Deci & Ryan, 1990).

Feelings of guilt were expressed by the college students when they failed to practice health-promoting lifestyles.

'Sometimes I go to sleep in the morning. I know it is really bad for my health, and so for the next few days, I make an effort to sleep regularly, because when I do not do that, I feel uncomfortable. I feel guilty'. (Third-year student, female)

The students' egos were negatively affected in the aforementioned cases.

Ego-orientated behaviors are considered to be associated with extrinsic motivations (Duda & Whitehead, 1998).

'I have been busy studying. The other day, I made up my mind that I will live a healthy life from now on, and at the beginning, I held to my plan very well. However, I failed to exercise on rainy days, for example, and subsequently, I failed to continue exercising. I really despise myself'. (Second-year student, male)

'When I engage in unhealthy lifestyles, I treat it as a failure of self-control. I will say to myself, look, you have a very good plan, and you made it by yourself, why don't you stick to your plan from the beginning to the end. At first, I am regretful, but later, because I have several other things to take care, I do not give it too much consideration'. (Second-year student, female)

4.1.4 Identified Health Motivation

Some of the participants in this study were identified to have already understood the value of practicing health-promoting lifestyles. These participants appeared to be highly self-determined and independent, and their orientation towards and involvement in health-promoting behavior reflected their identity, which led them to feel satisfied with themselves (Ryan & Deci, 2000). The participants could identify the origin of their healthy actions.

Firstly, in the case of some participants, health was a fundamental concern, and they considered good health to be a critical asset in their lives.

'I practice health-promoting lifestyles because of a very simple reason: I want to avoid diseases and have a long live. When we make a toast to older people in my family, we wish them both health and longevity, this is what older people want to hear and this is also what I want have. Good health is one of the biggest assets in my life'. (First-year student, male)

The students sought to improve the quality of their life in order to experience various possibilities.

'If I am healthy, I can enjoy my life in the future. I have a long way ahead. I want my life to be full of pleasure and joy, health is the basis of it. I want to do exciting stuff while I am still young, go abroad and see many different things, the best time of my life is slipping away when I am aging'. (Third-year student, male)

'As a woman, I want to stay in good physical condition and be mentally fit, and I want healthy skin. If my body is not in a good state, my menstrual periods become irregular. So, I must stay healthy to maintain a good quality of life'. (Third-year student, female)

'Of course, health is crucial, and without it, we can do nothing. In my case, I plan to be a doctor in the future and be responsible for other people's health. What am I going to do if I myself am not healthy? Besides, I have personal life goals to achieve, and all of these are based on my being healthy'. (Second-year student, female)

Secondly, certain participants considered health-promoting lifestyles to be positively related to a person's health.

'I believe there is strong association between health-promoting lifestyles and a person's health status. Good health and healthy lifestyles cannot be separated'. (Second-year student, male)

Thirdly, some of the participants described an experience of illness, their own, that of other people (especially someone close), or something that they had learnt about in a new medium, which had made them decide to adopt health-promoting lifestyles.

'The reason I do it is because I had a very severe illness, and I had suffered a lot because of it; so, I know I cannot get sick again'! (Second-year student, male)

'I had a very good friend who already had late-stage stomach cancer when he was a year-one student. I was horrified, and his illness great influenced his classmates. I could remember that he was extremely thin, and he always

skipped breakfast. After this experience, I tell everyone who skips breakfast that you should eat it, and that it is really bad for your health if you skip it. I am now studying medical science and I know there is something called cancer. Before that (i.e., before her friend developed the cancer), I did not care too much about my health and, frankly speaking, I did not sense any particular feeling when I heard the word "cancer", but the death of my friend completely changed me, I am really scared that the same thing will happen to me in the future (if I continue to disregard my health)'. (Second-year student, female)

Finally, the following case clearly illustrated the transformation of external health motivation to internal health motivation.
'At first, I did not really understand why my parents regularly complained about my lifestyle. I considered them to be interfering with my life, but now I realize that my parents have great expectations for me. It was not easy for them to raise me and support my university studies, and so (to stay healthy) is a part of my responsibility towards them'. (Second-year student, female)

These participants appeared to act in this manner because of the influence of 'significant others' such as parents and friends. Filial piety has traditionally played a crucial role in Chinese society, and, in the last aforementioned case, the participant perceived filial piety as a part of her core values, and considered being healthy to be a means of realizing her core values. Therefore, the identification of a sense of 'self' was clearly exhibited.

4.1.5 Integrated Health Motivation

Integrated regulation represents the highest level of autonomous motivation (Ryan & Deci, 2000). The participants who exhibited this level of motivation clearly demonstrated that they maintained health-promoting lifestyles because, to them, it was a matter of pleasure, happiness, personal interest, satisfaction,

and aesthetic appreciation. Health-promoting lifestyles was considered a part of their sense of 'self'.

Some of the participants practiced health-promoting lifestyles because they enjoyed doing so, which means that they savored the process of engaging in health-promoting lifestyles.

'I maintain health-promoting lifestyles because I want to be happy and satisfied. I eat healthy, I have a good shape, I do not smoke and seldom drink. It is fun and full of pleasure'. (Second-year student, female)

'I feel I need to be happy, and not always wear a long face. To be healthy means to be strong both physically and mentally. If there is inconsistency between what I am doing and what I want to do, I am not happy. Living a healthy life makes me happy, because it is what I really want to do'. (Third-year student, female)

Three participants stated that health-promoting lifestyles were one of their 'habits'. Autonomous motivations interact with past behaviors and together they predict the strength of a habit, and autonomous motivations also independently exert a direct effect on the strength of a habit (Gardner & Lally, 2013); therefore, we consider health-promoting lifestyles to be a crucial symbol of the sense of 'self'.

Certain participants stated that maintaining health-promoting lifestyles was a personal interest.

'To live in a healthy manner is a hobby for me. It is an interesting process which allows me to explore various possibilities'. (Second-year student, female)

Aesthetic pleasure was also identified by certain students as a reason for wanting to adopt health-promoting lifestyles.

'I want to be sunny and bright because of being healthy on the inside, to me, I want to be physically healthy, and more important, mentally healthy. I want to have a healthy mind which keeps me strong. '. (Second-year student, female)

4.1.6 Sources of the Setting of Healthy Lifestyle Goals

Satisfaction of physical and psychological requirements. Health-promoting lifestyles satisfied the physical requirements of some of the participants ('Practicing health-promoting lifestyles makes me feel physically comfortable': second-year student, female). However, unlike the urgent sensations of thirst or hunger, a feeling of physical discomfort is typically not a direct and irresistible sensation.

Competence, autonomy, and relatedness were identified as three basic and universal psychological requirements (Deci & Ryan, 2000), and satisfaction of autonomy was the requirement that was most clearly mentioned by one of the participants: 'Comparing my college life and high school life, I think my college life is more healthy because it provides me a feeling of autonomy which comes from living a life in which I make my own choices; I can live life as I want' (third-year student, male). Limited evidence indicated that competence was satisfied while health-promoting lifestyles were being practiced; some of the participants reported that they felt competent when they practiced health-promoting lifestyles as planned. In this study, the role of the satisfaction of relatedness was determined to be complex; whereas certain participants did not experience the satisfaction of relatedness while they practiced health-promoting lifestyles (some of the students described maintaining health-promoting lifestyles as a 'lonely and personal process'), other participants indicated that the sense of relatedness appeared to potentially impede their practice of health-promoting lifestyles. One participant said, 'I do not exercise when my classmates and roommates do not'; and a third-year female said, 'It is weird when other people in your room go to sleep at midnight but you sleep at 10 o'clock'.

Health literacy. Studies on health literacy can be traced back to the 1970s (Sorensen et al., 2012). The concept of health literacy has evolved. The original

emphasis on a person's knowledge or education level being adequate for reading and understanding health-promoting information has been replaced with a considerably broader definition (Nutbeam, 2000). Numerous pieces of evidence have strongly indicated that the level health literacy is not only a key factor that might influence healthy-lifestyle decisions and motivation, but also a critical determinant to health (Berkman, Sheridan, Donahue, Halpern, & Crotty, 2011). Although statistically significant evidence was not obtained in this case, in the interviews, the college students repeatedly indicated that their health motivation was affected by health literacy. Therefore, health literacy can be considered to be a major source of health motivation.

The role of environment. Goals can be set based on the environment (Deckers, 2010). An advertisement that a person chances upon might trigger rent-payment behavior (Markman & Brendl, 2000). Health motivation can also be affected by the environment, by social media, and, in particular, by the internet.

Information gathered from various media sources (especially the internet) played a key role in affecting the health motivation among the college students in this study.

'In modern society, diabetes, high blood pressure, and other related chronic diseases are becoming widespread. You can see this if you switch the television on or surf the internet, and I think that this information has affected me and my behaviors'. (Third-year student, male)

'Nowadays, we can find substantial amounts of health information in blogs and various websites; for example, we can learn how to release pressure and build up confidence. I always find this useful'. (Second-year student, female)

The college environment also influenced the college students' health motivations.

'I want to exercise because our university has very good exercise facilities and environment, when I was in high school, I was focusing on study. Being accepted by a college is all I was seeking for at that time. After being a college student, study is also important, but the concept of study is much more broaden.

I get to know how to use different equipment in the gym, and the gym is quite good. It has a very good environment, and its service is open to our students for free. I go to the gym every 2 or 3 times a week. But without a gym or other related facilities, I am not sure whether I could keep exercising like I am doing now'. (Second-year student, female)

Social relationship. The goals set by people are affected by their relationships with others (Hollenbeck & Klein, 1987; Hollenbeck, Williams, & Klein, 1989). Friendship is a major part of the social relationship of emerging adults. As argued in previous subsections, students' health motivations are strongly influenced by the people with whom they share a close relationship.

'It had been a long time since the last time I went home. It shocked me when I went home for the holidays and heard that one of my relatives had passed away because of cancer. I was scared and, at that moment, I had a feeling that death was not far from me. I must admit that it was horrifying for me to hear that someone who was very close to me had died'. (Third-year student, female)

'Friendship certainly plays a key role; for example, if I go out to exercise after class, I will probably find no one to join me for supper (because others would have already finished eating), and will I find myself in limbo, girls are always like to do things together, it is going to be very strange if you are the only one to do this thing while the rest of the others do that thing'. (Second-year student, female)

Table 4 Original Item pool Extracted from Focus Group Interviews

No	Original items	English version of original items	Concise items
1	我從不考慮堅持健康生活方式	I never think of practicing health-promoting lifestyles	Never think of it
2	我是在朋友的影響下堅持健康生活方式	I practice health-promoting lifestyles because of the influence of my friends	Influence of friends
3	我想展現給他人一個健康的形象	I practice health-promoting lifestyles because I want to project a healthy image to the others	A healthy image to other people
4	我想通過堅持健康生活方式來提高生活質量	I want to improve my life quality by practicing health-promoting lifestyles	Improve life quality
5	堅持健康生活方式的過程很有趣	Practicing health-promoting lifestyles is fun	It's fun
6	老師說我應該堅持健康生活方式	My teachers told me I should have health-promoting lifestyles	Teachers told me to do so
7	我學校的環境設施讓我想堅持健康生活方式	The facilities and environment that my school provides make me want to practice health-promoting lifestyles	Facilities and environment
8	我理解健康對自己生活的重要性	I practice health-promoting lifestyles because I understand the importance of health to my life	Understand the importance of health
9	如果沒有堅持健康生活方式，我會感到不安	I feel upset if I don't practice health-promoting lifestyles	Be upset if fail to do so.
10	我享受堅持健康生活方式的過程	I enjoy the process of practicing health-promoting lifestyles	Enjoy the process
11	除非遇到健康問題，我通常不會考慮健康生活方式	I don't think of health-promoting lifestyles unless I have health problems	Don't think of it unless having health problems
12	我希望通過堅持健康生活方式，在學業上取	I practice health-promoting lifestyles in order to improve my	Improve learning performance

		learning performance	
13	我覺得健康生活方式是釋放壓力的一個方法	I practice health-promoting lifestyles because I consider it as a way of pressure relief	Pressure relief
14	如果沒有堅持健康生活方式，我認為是自我控制能力的失敗	I feel like a failure of self-control when I don't practice health-promoting lifestyles	Self-control
15	堅持健康生活方式對我來說是孝順父母的一種形式	Practicing health-promoting lifestyles is another form of filial piety to my parents	Filial piety
16	我的生活方式健康與否並不重要	It doesn't matter whether my lifestyle is healthy or not.	It doesn't matter
17	父母督促我堅持健康生活方式	My parents urge me to practice health-promoting lifestyles	Urges from parents
18	我堅持健康生活方式是因為，我曾有過健康方面的問題	I practice health-promoting lifestyles because I had health problems in the past	Personal health problems
19	如果沒有堅持健康生活方式，我會感到后悔	I fell regretful when I don't practice health-promoting lifestyles	Regret if fail to do so
20	我想堅持健康生活方式，避免生病	I practice health-promoting lifestyles because I don't want to get sick	Avoid sickness
21	我認為健康也是一種美	I practice health-promoting lifestyles because I believe health is another form of beauty	Health is a form of beauty
22	我不堅持健康生活方式，是因為生活中有許多更重要的事情	There are other more important things to do rather than health-promoting lifestyles in my life.	Other more important things
23	我想堅持健康生活方式避免昂貴的疾病治療費用	I practice health-promoting lifestyles because I cannot afford medical cost	Cannot afford medical cost
24	我認為我需要遵從一些有助健康的生活小貼士	I think I have to follow some tips to practice health-promoting lifestyles	Follow some tips

25	我想通過堅持健康生活方式來保持好身材	I practice health-promoting lifestyles because I want to maintain a good body figure	Maintain a good body figure
26	假如我沒有堅持健康生活方式，其他人可能會因此不高興	I practice health-promoting lifestyles because others will not be pleased with me if I don't	Please other people
27	我熟悉的人過往有過健康問題，讓我想堅持健康生活方式	I practice health-promoting lifestyles because other people I am familiar with have health problems in the past	Other people's health problems
28	如果沒有堅持健康生活方式，我會感到內疚	I feel guilty when I don't practice health-promoting lifestyles	Feel guilty if fail to do so
29	我相信健康與生活方式之間存在密切聯系	I practice health-promoting lifestyles because I believe there are strong connections between health and lifestyle	Believe connections between health and lifestyle
30	通過堅持健康的生活方式，我得到愉悅和滿足	I feel pleasure and satisfaction from practicing health-promoting lifestyles	Pleasure and satisfaction
31	我不考慮堅持健康生活方式是因為我不喜歡一成不變的生活	I don't think of practicing health-promoting lifestyles because I don't like routine schedules in my life.	Do not like routine schedules
32	如果沒有堅持健康生活方式，我會鄙視自己	I despise myself if I fail to practice health-promoting lifestyles	Despise myself if I fail to do so
33	健康生活方式是我的習慣	Practicing health-promoting lifestyles is a habit	A habit
34	其他人說我應該堅持健康生活方式	I practice health-promoting lifestyles because other people say I should.	Other people say I should
35	如果身邊其他人沒有堅持健康生活方式，我也不會	If other people don't practice health-promoting lifestyles, I don't either	I won't do so unless others do it.

4.2 Content Validity

As stated, content validity refers to the extent to which a measurement scale covers the content what it aims to measure. Given the situation in this research that the items of this measurement scale were generated mainly from the transcripts of focus-group discussions, content validity was a crucial issue at the very early stage of questionnaire development. For the content validity of a measurement scale developed from scratch, it is essential to capture every aspect of a conceptual construct that is aimed to measure.

First, in order to explore and exhaust every possible motivation for health-promoting lifestyles college students were having, the author tried to diversify participants with heterogeneous demographic information on the one hand, gender, age, college year, and family residence were taken into account when recruiting them (Table 1). On the other hand, by examining initial responses to the mini-questionnaire from those who were willing to participate, the author tried to gauge motivation levels they had based on proposed theoretical framework. By doing this, the author tried to recruit participants with heterogeneous health motivations.

Second, to tap all possible health motivations for practicing health-promoting lifestyles, participants were encouraged to express different and distinctive views and opinions during the focus group discussions. The author tried to build a congenial and relaxed atmosphere when performing the interview. Participants were encouraged to respect each other.

Moreover, six existing measurement scales were analyzed for common and unique aspects. These instruments were: Self-regulation Questionnaire (Ryan & Connell, 1989), Academic Motivation Scale (Vallerand et al., 1992), Adolescent Self-Regulatory Inventory (Moilanen, 2007), Self-regulation of Withholding Negative

Emotions Questionnaire (Kim, Deci, & Zuckerman, 2002), Adolescent Prosocial Behavior Motivation Questionnaire (Wentzel, Filisetti, & Looney, 2007), and Friendship Motivation Scale (Okada, 2005). As discussed before, these measurement scales were developed under the framework of Self-determination Theory, they were all aiming to measure motivations on a specific type of health-promoting lifestyles, and they all could be used among emerging adulthood population.

Original items were generated based on the synthesis of coding results on focus-group interviews and reviews of several strongly related measurement scales.

Finally, a panel of 7 expert reviewers was invited to review the wording and relevance item by item. Panel members have various academic grounds, including one professor in psychology studies, one professor in public health studies, one senior research fellow focusing on education studies, two students at doctoral level in health education studies, and one doctoral student in Chinese language studies. Panel members were asked to evaluate wording and relevance of each item, and were encouraged to provide other items which they believed to be important but were absent in the original item pool. A traditional four point Likert scale was used to measure items' relevance and wording.

After panel discussion, 28 comments, 13 concerns and 18 suggestions were provided by the panel members. Of the 28 comments, 26 were related to the content of the items, Of the 18 suggestions, 21 were related to the content of the items and 5 suggestions were related to the operation of the questionnaire, 6 new items were suggested to add into the original item list, 2 items were suggested to eliminate due to their poor quality (Table 5). 4 concerns were related to the length of measurement scale. Original CSHM-Q was then revised according to these comments and suggestions (Appendix C).

Table 5 Content Analysis: Summary of Panel Discussion

	Item content	Administration	Total
Comments	26	2	28
Concerns	7	5	13
Suggestions	14	4	18
Actions	21	4	25

Table 6 Content Validity Indices for Original Items

No.	Origial items	English version	ICVI
1	我從不考慮堅持健康的生活方式	I never think of practicing health-promoting lifestyles	.29
2	在朋友的影響下，我才會堅持健康的生活方式	I practice health-promoting lifestyles because of the influence of my friends	.71
3	為了留給他人一個健康的印象，我才會堅持健康的生活方式	I practice health-promoting lifestyles because I want to project a healthy image to the others	.71
4	我想通過堅持健康的生活方式以提高生活品質	I want to improve my life quality by practicing health-promoting lifestyles	.71
5	堅持健康的生活方式很有趣	Practicing health-promoting lifestyles is fun	.71
6	在老師建議下，我才會堅持健康的生活方式	My teachers told me I should have health-promoting lifestyles	.29
7	身邊有良好的環境設施，我才會堅持健康的生活方式	The facilities and environment that my school provides make me want to practice health-promoting lifestyles	1.0
8	我想堅持健康的生活方式，是因為我覺得這樣做很重要	I practice health-promoting lifestyles because I understand the importance of health to my life	.86
9	如果沒有堅持健康的生活方式，我會感到不安	I feel upset if I don't practice health-promoting lifestyles	1.0
10	我享受堅持健康的生活方式的過程	I enjoy the process of practicing health-promoting lifestyles	1.0
11	除非遇到健康問題，我通常不會考慮健康的生活方式	I don't think of health-promoting lifestyles unless I have health problems	1.0
12	我希望通過堅持健康的生活方式，提高學習效率，取得好成績	I practice health-promoting lifestyles in order to improve my learning performance	1.0

13	健康的生活方式是應對外在壓力的方法之一	I practice health-promoting lifestyles because I consider it as a way of pressure relief	1.0
14	如果沒有堅持健康的生活方式，我是因為缺乏自我控制能力	I feel like a failure of self-control when I don't practice health-promoting lifestyles	1.0
15	堅持健康的生活方式對我來說是孝順父母的一種形式	Practicing health-promoting lifestyles is another form of filial piety to my parents	1.0
16	健康的生活方式對我而言並不重要	It doesn't matter whether my lifestyle is healthy or not.	1.0
17	在父母督促下，我才會堅持健康的生活方式	My parents urge me to practice health-promoting lifestyles	1.0
18	自己曾有過健康方面的問題，我才會堅持健康的生活方式	I practice health-promoting lifestyles because I had health problems in the past	1.0
19	如果沒有堅持健康的生活方式，我會感到后悔	I fell regretful when I don't practice health-promoting lifestyles	1.0
20	我想堅持健康的生活方式以避免生病	I practice health-promoting lifestyles because I don't want to get sick	1.0
21	健康的生活方式本身就是一種美	I practice health-promoting lifestyles because I believe health is another form of beauty	.86
22	沒有堅持健康的生活方式，是因為我生活中有許多更重要的事情	There are other more important things to do rather than health-promoting lifestyles in my life.	1.0
23	我想堅持健康的生活方式以避免昂貴的疾病治療費用	I practice health-promoting lifestyles because I cannot afford medical cost	.71
24	我認為我需要遵從一些有助健康的生活小秘方	I think I have to follow some tips to practice health-promoting lifestyles	.14
25	我想通過堅持健康的生活方式以保持好身材	I practice health-promoting lifestyles because I want to maintain a good body figure	.86
26	為了讓他人高興，我才會堅持健康的生活方式	I practice health-promoting lifestyles because others will not be pleased with me if I don't	.57
27	身邊的人出現過健康問題，我才會堅持健康的生活方式	I practice health-promoting lifestyles because other people I am familiar with have health problems in the past	.71
28	如果沒有堅持健康的生活方式，我會感到內疚	I feel guilty when I don't practice health-promoting lifestyles	.57
29	我想堅持健康的生活方式，是因為我相信生活方式會影響健康	I practice health-promoting lifestyles because I believe there are strong connections between health and lifestyle	.71
30	堅持健康的生活方式讓我得到愉悅和滿足	I feel pleasure and satisfaction from practicing health-promoting lifestyles	1.00
31	沒有堅持健康的生活方式，是因為我不喜	I don't think of practicing health-promoting lifestyles because I don't like routine schedules in my life.	1.00

	歡一成不變的生活		
32	如果沒有堅持健康的生活方式，我會鄙視自己	I despise myself if I fail to practice health-promoting lifestyles	1.00
33	堅持健康的生活方式是我的習慣	Practicing health-promoting lifestyles is a habit	1.00
34	沒有堅持健康的生活方式，是因為我覺得應及時行樂，活在當下	I do not practice health-promoting lifestyles because I just want to enjoy the pleasures of life at present	1.00
35	在公眾人士的影響下，我才會堅持健康的生活方式	I practice health-promoting lifestyles because of the influence from people in public life	1.00
36	我想通過堅持健康的生活方式對身邊的人產生積極影響	I practice health-promoting lifestyles in order to affect other people positively	.71
37	堅持健康的生活方式是我的一種人生觀	Practicing health-promoting lifestyles is a philosophy of life	.86
38	在伴侶的影響下，我才會堅持健康的生活方式	I practice health-promoting lifestyles because of the influence from my partner	.43
39	沒有堅持健康的生活方式，是因為我相信生死有命，富貴在天	I don't practice health-promoting lifestyles because life and death are decreed by fate	.43
40	在傳媒的影響下，我才會堅持健康的生活方式	I practice it because my choice was influenced by media	.29

4.3 Pilot Test

Original version of College Students Health Motivation Questionnaire
(CSHM-Q) for pilot test was attached in Appendix D.

4.3.1 Descriptive Statistics

The internal structure of CSHM-Q was determined by exploratory factor
analysis and confirmatory factor analysis. Prior to performing exploratory
factor analysis, score distributions on each item of the CSHM-Q were examined
to make sure that the statistical assumptions of conducting further psychometric
evaluation were satisfied.

Generally, these items on the CSHM-Q performed well as presented in Table 7.
Mean scores ranged from 1.76 to 4.19 on a 5 point Likert scale (1 represented
"Strongly disagree", 3 represented "Neither disagree nor agree" and 5
represented "Strongly agree"). The standard deviations on the majority of items
were close to or greater than 1.00, indicating good dispersions around the mean,
on the other hand, the values of all items were less than three standard
deviations from the mean. Therefore, good dispersions throughout items were
demonstrated. Limited dispersions were observed on a small number of items
with standard deviations less than 1.00. Those items were item 09 "I practice
health-promoting lifestyles because I understand the importance of health to my
life", item 10 "I get upset if I don't practice health-promoting lifestyles", item
13 "I practice health-promoting lifestyles because of the influence from people
in public life", item 20 "My parents urge me to practice health-promoting
lifestyles", item 22 "I regret when I don't practice health-promoting lifestyles",
item 25 "There are other more important things to do rather than

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health-promoting lifestyles in my life." and item 37 "I practice it because my choice was influenced by media".

Table 7 Descriptive Statistics of the Dataset

| | Range | Minimum | Maximum | Mean | SD | Mode | Skewness | | Kurtosis | |
							Statistic	SE	Statistic	SE
ITEM07	1-5	1.00	5.00	2.39	1.07	3	.51	.17	- .13	.34
ITEM08	1-5	1.00	5.00	2.56	1.04	2	.39	.17	- .33	.34
ITEM09	1-5	1.00	5.00	4.19	.94	5	-1.42	.17	2.29	.34
ITEM10	1-5	1.00	5.00	2.99	.94	3	.19	.17	- .06	.34
ITEM11	1-5	1.00	5.00	3.76	1.06	4	- .74	.17	- .05	.34
ITEM12	1-5	1.00	5.00	2.14	1.04	2	1.06	.17	.67	.34
ITEM13	1-5	1.00	5.00	2.08	.87	2	.75	.17	.53	.34
ITEM14	1-5	1.00	5.00	3.65	1.09	4	- .74	.17	.03	.34
ITEM15	1-5	1.00	5.00	3.95	1.02	4	- .99	.17	.73	.34
ITEM16	1-5	1.00	5.00	3.43	1.02	3	- .24	.17	- .41	.34
ITEM17	1-5	1.00	5.00	3.44	1.08	4	- .63	.17	.09	.34
ITEM18	1-5	1.00	5.00	3.42	1.01	3	- .14	.17	- .59	.34
ITEM19	1-5	1.00	5.00	1.76	1.04	1	1.57	.17	1.94	.34
ITEM20	1-5	1.00	5.00	2.38	.94	2	.35	.17	- .09	.34
ITEM21	1-5	1.00	5.00	2.46	1.09	2	.41	.17	- .54	.34
ITEM22	1-5	1.00	5.00	2.50	.87	3	.22	.17	.17	.34
ITEM25	1-5	1.00	5.00	2.58	.98	3	.27	.17	- .09	.34
ITEM30	1-5	1.00	5.00	2.11	1.13	2	1.09	.17	.71	.34
ITEM31	1-5	1.00	5.00	1.99	1.07	1	1.24	.17	1.21	.34
ITEM32	1-5	1.00	5.00	2.32	1.05	2	.48	.17	- .44	.34
ITEM33	1-5	1.00	5.00	2.66	.97	3	.08	.17	- .40	.34
ITEM34	1-5	1.00	5.00	3.91	1.03	4	-1.16	.17	1.33	.34
ITEM35	1-5	1.00	5.00	3.83	1.02	4	-1.01	.17	.97	.34
ITEM37	1-5	1.00	5.00	2.18	.90	2	.46	.17	- .12	.34

Kurtosis measures whether the data are peaked or flat relative to a normal distribution and skewness measures the extent of asymmetry of a distribution (Mardia, 1970). Extreme skewness and kurtosis happens when absolute values are greater than 2.00 (Chou & Bentler, 1995). Skewness and kurtosis were not found among these items as showed in Table 7.

The value of mode was used here to interpret the responses to the CSHM-Q. The participants frequently admitted the importance of practicing health-promoting lifestyles (Mode = 5), the most popular reasons of doing health-promoting lifestyles included, they enjoyed the process of practicing health-promoting lifestyles (Mode = 4) and having fun (Mode = 4), improved their learning performance (Mode = 4), considered it as a way of releasing their

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pressure (Mode = 4), and expected to positively affect other people (Mode = 4). Participants in the study frequently believed that the practice of health-promoting lifestyles could affect their health eventually (Mode = 4), they did not believe practicing health-promoting lifestyles is not important (Mode = 1) and was a way of pleasing the others (Mode = 1).

4.3.2 Exploratory Factor Analysis

Based on exploratory factor analysis, these items were retained if they displayed: (1) their kurtosis and skewness value greater than -2.00 and less than 2.00; (2) item's correlation with the rest of other items neither too high nor too low ($.30 < r < .80$ in correlation matrix); (3) Diagonal value less than .5 in anti-image Correlation Matrix; (Tabachnick & Fidell, 2001); (4) they have communalities greater than .40 (MacCallum, Widaman, Zhang, & Hong. 1999); (5) factor loadings greater than .50 (Costello & Osborne, 2005); (6) each item load only on one factor, i.e., they have cross loadings below .40 (Fabrigar, Wegener, MacCallum, & Strahan, 1999)

Principal component analysis was used in order to explore the structure of the CSHM-Q. First, Bartlett's sphericity test rejected the hypothesis (at p< .001 level) that the correlation matrix was an identity matrix without significant correlations between variables. The KMO index (Kaiser-Mayer-Olkin) was .84 (> .70), showing the adequacy of sample size. Both Bartlett's sphericity test and KMO index (Kaiser-Mayer-Olkin) indicated the dataset was suitable for conducting factor analysis. Second, low correlations between factors were found by using promax rotation method (Table 9). Therefore, factor analysis was finally conducted with varimax rotation method. Factors were retained with eigenvalues above .10 on scree plot (Figure 6).

Table 8 Bartlett's Sphericity Test and KMO Measure

	Approx Chi-square	3409.54
Bartlett's sphericity test	Df	630
	Sig	.00
Kaiser-Mayer-Olkin Measure of Sampling Adequacy	.84	

Table 9 Component Correlation Matrix

Component	1	2	3	4	5
1	1.00				
2	.55	1.00			
3	- .22	- .24	1.00		
4	.15	.27	.06	1.00	
5	- .22	- .19	.20	.05	1.00

Table 10 Total Variance Explained by Factors

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.90	30.63	30.63	4.90	30.63	30.63	2.81	17.58	17.58
2	2.06	12.88	43.51	2.06	12.88	43.51	2.76	17.27	34.86
3	1.45	9.05	52.57	1.44	9.05	52.57	1.85	11.57	46.44
4	1.12	6.98	59.55	1.11	6.98	59.55	1.66	10.38	56.83
5	1.03	6.41	65.97	1.02	6.41	65.97	1.46	9.14	65.97
6	.84	5.24	71.21						
7	.74	4.63	75.84						
8	.64	3.98	79.83						
9	.59	3.61	83.44						
10	.53	3.33	86.77						

As Table 10 displayed, five factors explained 65.97% of the variance in how the participants described their motivations for practicing health-promoting lifestyles. The first factor included four items, accounted for 17.58% of the explained variance. The second factor included five items, accounted for 17.27% of the explained variance. The third factor included three items, accounted for 11.57% of the explained variance. The fourth factor included 2 items, accounted for 10.38 % of the explained variance. The last factor also included 2 items, accounted for 9.14% of the explained variance.

Table 11 Factor Loadings from the Exploratory Factor Analysis for the Original CSHM-Q

	Factor loadings					h^2
	1	2	3	4	5	
ITEM34	**.82**	.27	-.018	.04	.01	.75
ITEM35	**.74**	.38	-.072	.14	.03	.75
ITEM30	**- .72**	- .32	.35	.00	.12	.77
ITEM31	**- .75**	- .11	-.049	.00	.36	.71
ITEM15	.10	**.82**	-.091	- .08	.11	.72
ITEM18	.23	**.59**	.02	.26	.04	.49
ITEM09	.35	**.70**	- .14	.02	- .07	.65
ITEM11	.22	**.57**	.02	.29	- .39	.64
ITEM14	.23	**.57**	-.090	.09	- .09	.41
ITEM12	- .02	- .35	**.66**	- .04	.18	.61
ITEM25	.08	.05	**.73**	- .02	.17	.60
ITEM07	- .29	- .05	**.79**	.08	- .05	.72
ITEM22	- .07	.12	- .06	**.85**	.07	.76
ITEM33	.16	.06	.08	**.84**	.13	.75
ITEM21	.00	.19	.12	.12	**.77**	.76
ITEM37	- .23	- .29	.08	.14	**.64**	.59

Note. Factor loadings > ｜ .5 ｜ in bold, h^2 = item communalities.
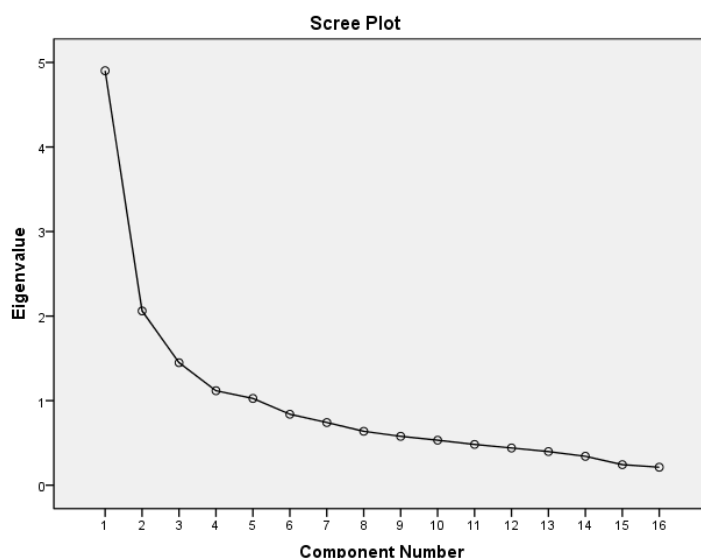
Figure 6 Scree Plot for the Original Version of CSHM-Q

An initial solution of a five factor solution was first identified by exploratory factor analysis. The names of each factor were introduced after confirmatory factor analysis. Eight items were removed because of the failure to meet the criterion aforementioned. Thesis items were: item08 "The facilities and environment that my school provides make me want to practice health-promoting lifestyles", item10 "I get upset if I don't practice health-promoting lifestyles", item13 "I practice health-promoting lifestyles because of the influence from people in public life", item16 "I feel like a failure of self-control when I don't practice health-promoting lifestyles", item17 "I practice health-promoting lifestyles in order to affect other people positively", item19 "It doesn't matter whether my lifestyle is healthy or not", item20 "My parents urge me to practice health-promoting lifestyles", and item32 "I practice health-promoting lifestyles because someone of whom I am familiar with had health problems in the past".

Findings from the exploratory factor analysis provided a preliminary framework for the following confirmatory factor analysis.

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4.4 Construct Validity

4.4.1 Evidence of Internal Structure

The purpose of confirmatory factor analysis was to evaluate the extent to which the dataset fit with the theoretical model. Based on the result of exploratory factor analysis, a five factor CFA was fit to the 17 items of CSHM-Q (Figure 17, Model A). The initial model fit was not acceptable as showed in Table 12. Based on Self-determination Theory and the content of the items, revisions were made to the structure of CSHM-Q: item 18 (I don't practice health-promoting lifestyles because life and death are decreed by fate) was moved from factor one to factor 3, item19 (I practice health-promoting lifestyles so other people would be happy) was moved from factor one to factor two, item 05 (I enjoy the process of practicing health-promoting lifestyles) was moved from factor two to factor one. After revision, model fit neither improved nor decreased significantly. In order to achieve a better acceptable fit, further revisions were implemented according to modification indices: item 03 (Practicing health-promoting lifestyles is important) was be moved from the second factor to the first factor, item 19 (I practice health-promoting lifestyles so other people would be happy) was removed (Figure 7).

Cronbach's Alphas for each factor or subscale are presented in Table 23. Item 15 and item 24 were removed from the CSHM-Q based on several reasons: first, they cannot improve the internal consistency (Cronbach's alpha= .37); second, they seemed to be unrelated from the literal sense of their meaning, and third, they made the model data fit drop when they were assigned to any other subscales. Therefore, factor 5 was removed and a four-factor CSHM-Q was identified (Model D, Figure 7).

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Finally, item03, item18 were removed from the CSHM-Q because they were found to exhibit DIF (Figure 15 and Figure 16), and internal structure was identified by Model E (Figure 7).

Table 12 Fit Indices from the Confirmatory Factor Analysis

	Chi-Square	df	X^2/df	p	CFI	TLI	SRMR	RMSEA (90% CI)
Good Fit Criteria				P< .05	≥ .96	≥ .95	≤ .08	≤ .06 (not wide)
(Hu & Bentler, 1999)								
Satisfactory Fit Criteria			≤5.00	P< .05	≥ .90	≥ .90	≤ .10	≤ .08
(Marsh, Hau, & Wen, 2004)								
Model A	676.91	136	4.98	.0000	.85	.81	.06	.07 (.07 .08)
Model B	682.87	109	6.26	.0000	.85	.81	.06	.07 (.07 .08)
Model C	292.51	94	3.11	.0000	.94	.92	.04	.05 (.04 .05)
Model D	249.95	71	3.51	.0000	.94	.93	.03	.05 (.04 .05)
Model E	166.91	48	3.48	.0000	.95	.93	.03	.05 (.04 .05)

Note. CFI = comparative fit index; TLI = Tucker-Lewis Index; CI = confidence interval; SRMR = standardized root-mean-square residual; RMSEA = root-mean-square error of approximation.

Model A: CSHM-Q with Five Domains and 17 Items Specified Based on EFA
Results
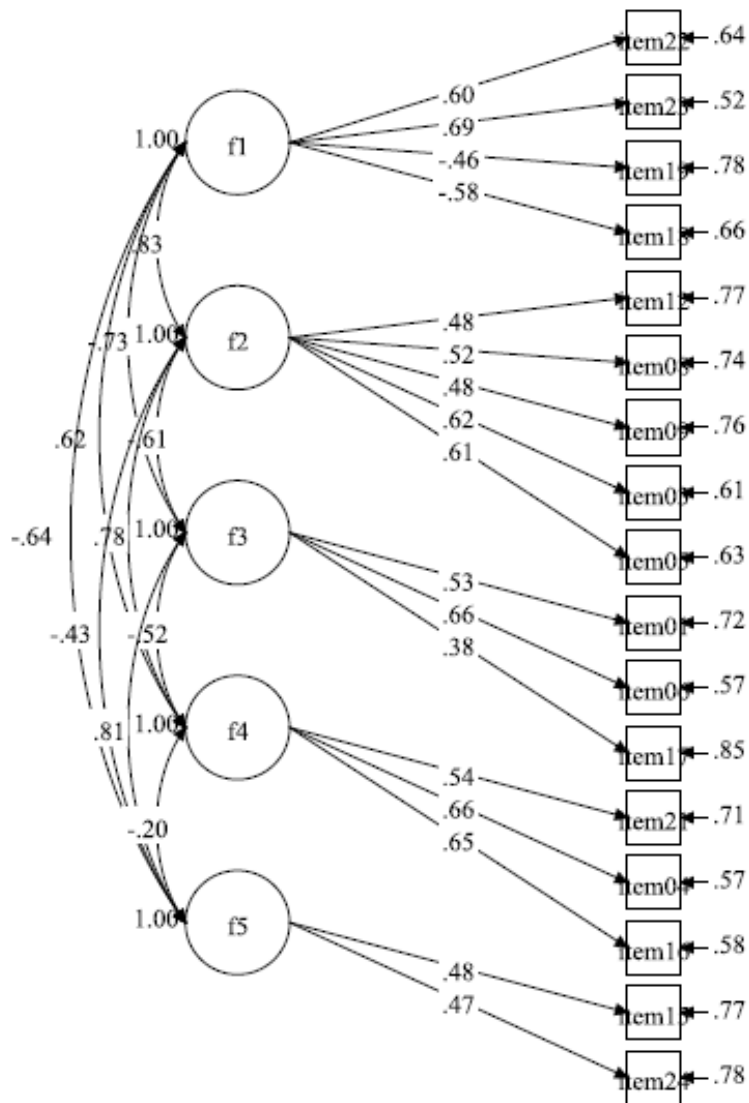
Model B: Revision Based on Theoretical Basis and Model A
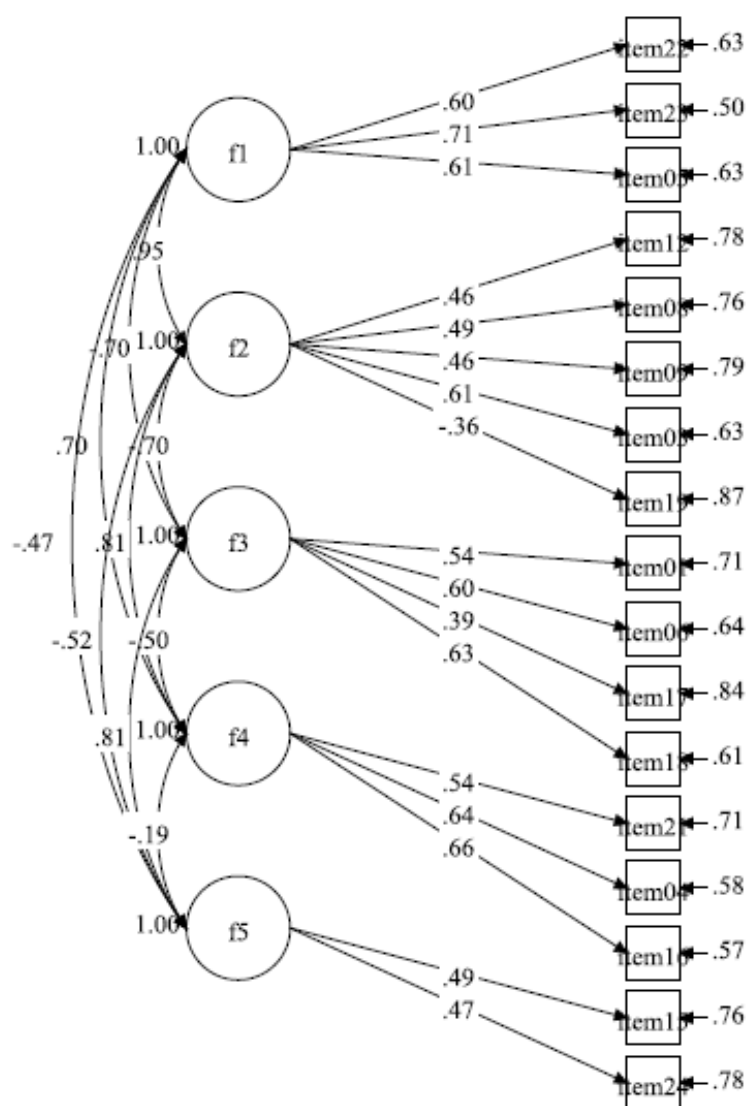
Model C: Further Revision Based on Modification Indices
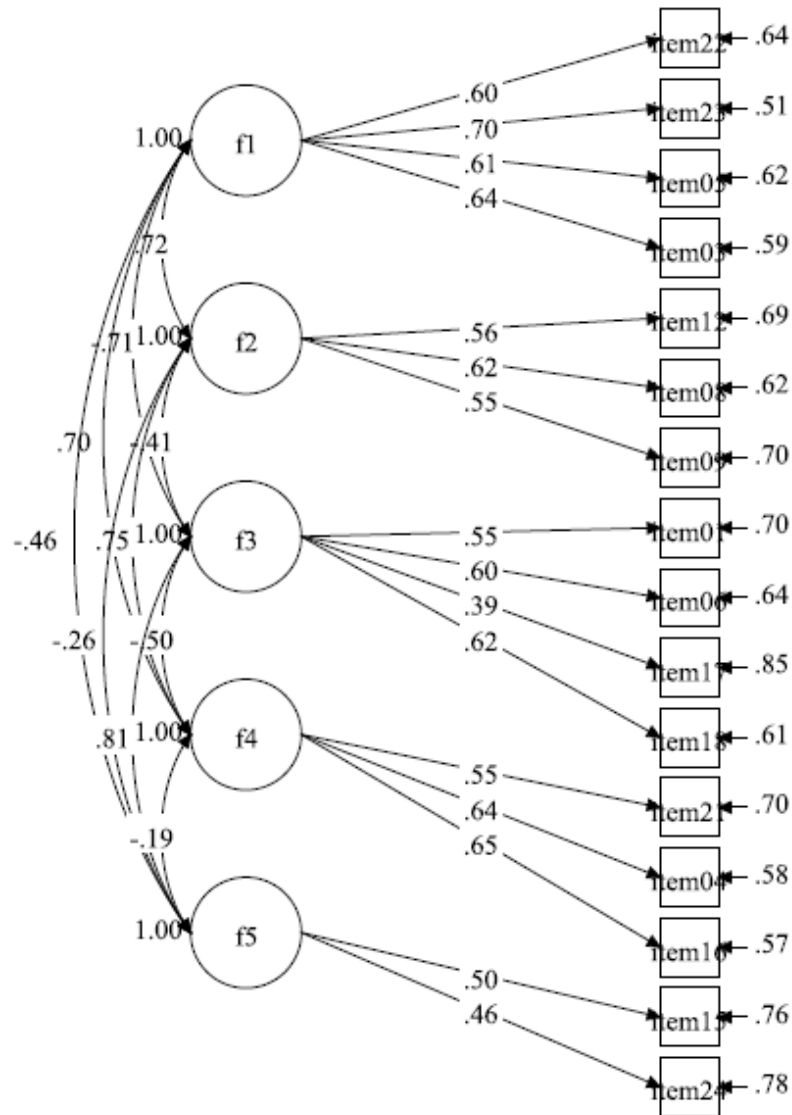
Model D: Domain Elimination due to Poor Internal Consistency
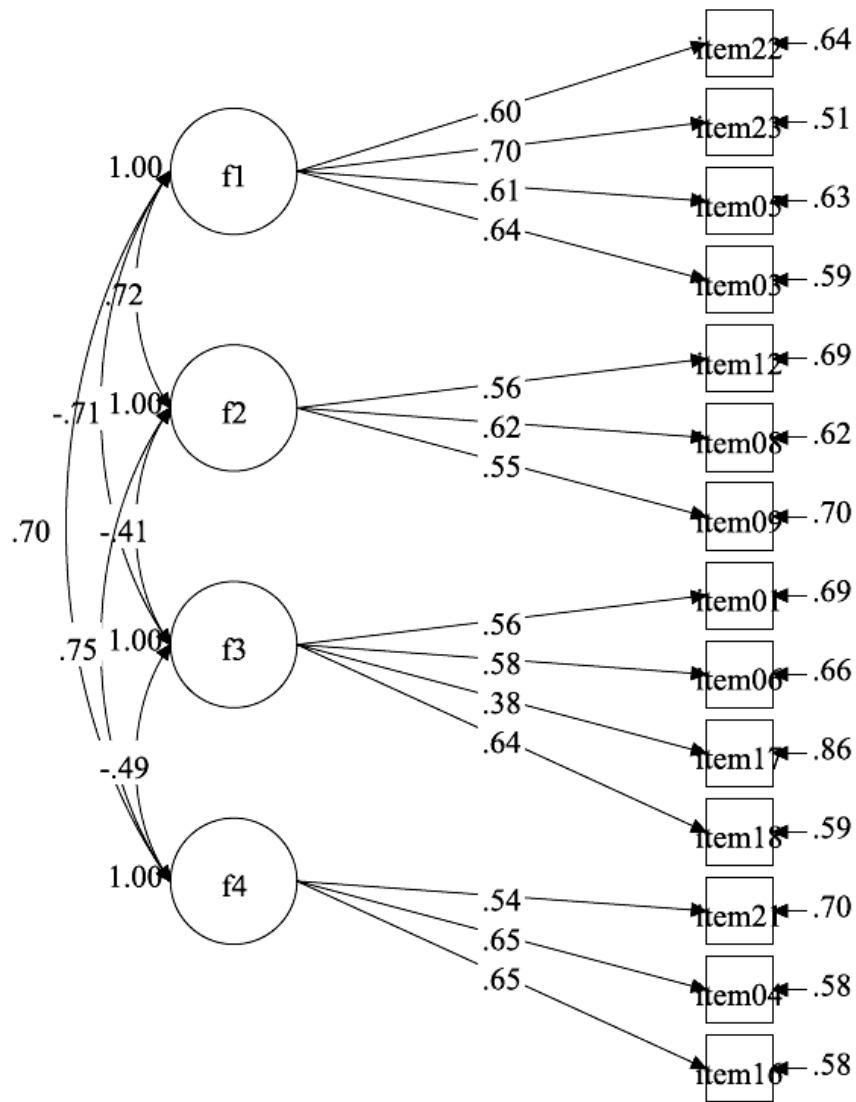
Model E: Finalized CSHM-Q after Removing DIF items
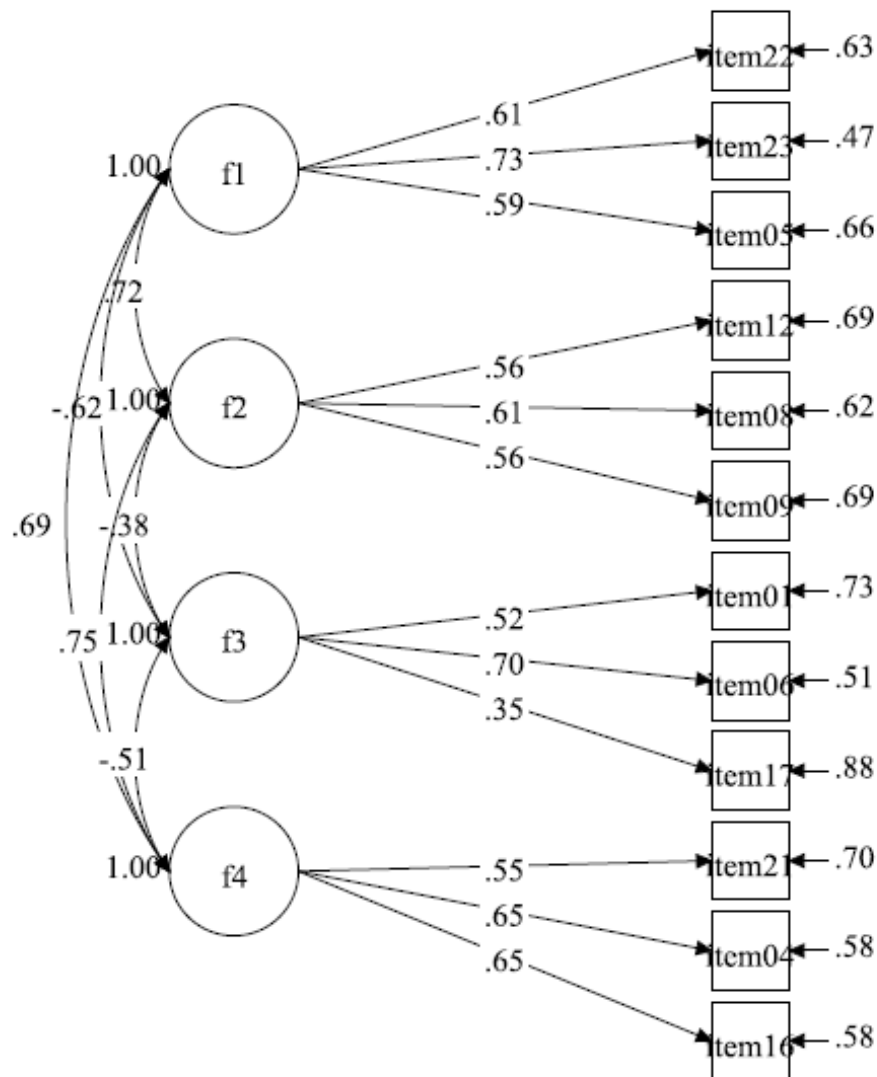
Figure 7 Model Specifications for CSHM-Q Confirmatory Factor Analysis
Results

Table 13 Finalized Structure of College Students' Health Motivation Questionnaire

Domains	Items	English version of items
Self-focused HM Domain	我想堅持健康的生活方式，是因為我相信生活方式會影響健康 (item 22)	I practice health-promoting lifestyles because I believe there are strong connections between health and lifestyle (item 22)
	堅持健康的生活方式讓我得到愉悅和滿足 (item 23)	I get pleasure and satisfaction from practicing health-promoting lifestyles (item 23)
	我享受堅持健康的生活方式的過程 (item 05)	I enjoy the process of practicing health-promoting lifestyles (item 05)
Other-focused HM Domain	我希望通過堅持健康的生活方式，提高學習效率，取得好成績 (item 08)	I practice health-promoting lifestyles in order to keep up a good performance on my study (item 08)
	堅持健康的生活方式對我來說是孝順父母的一種形式 (item 12)	Practicing health-promoting lifestyles is another form of filial piety to my parents (item 12)
	健康的生活方式是應對外在壓力的方法之一 (item 09)	I practice health-promoting lifestyles because I consider it as a way of pressure relief (item 09)
Absence of HM Domain	沒有堅持健康的生活方式，是因為我覺得應及時行樂，活在當下 (item 01)	I do not practice health-promoting lifestyles because I just want to enjoy the pleasures of life at present (item 01)
	除非遇到健康問題，我通常不會考慮健康的生活方式 (item 06)	I don't think of health-promoting lifestyles unless I have health problems (item 06)
	沒有堅持健康的生活方式，是因為我生活中有許多更重要的事情 (item 17)	There are other more important things to do rather than health-promoting lifestyles in my life (item 17)
Introjected HM Domain	如果沒有堅持健康的生活方式，我會感到內疚 (item 21)	I feel guilty when I don't practice health-promoting lifestyles (item 21)
	如果沒有堅持健康的生活方式，我會感到不安 (item 04)	I fell upset if I don't practice health-promoting lifestyles (item 04)
	如果沒有堅持健康的生活方式，我會感到后悔 (item 16)	I fell regretful when I don't practice health-promoting lifestyles (item 16)

4.4.2 Findings from Rasch Analysis

Results of the final Rasch analysis for the four domains of College Students Health Motivation Questionnaire were displayed in Table 14, Table 15, Table 16, and Table 17. The hierarchical structure of the items and were shown in in item person map (Figure 8). There were three items in each domain. Each item was rated on a five-point rating scale.

Fit indices for the four domains in Table 14 indicated all items have acceptable infit and outfit MNSQ values.

Table 14 Item Measure, Infit and Outfit Table for Domains of Finalized Version of CSHM-Q

	Item Number	Total Score	Total Count	Measure	MNSQ			
					Infit	ZSTD	Outfit	ZSTD
Self-focused HM Domain	22	3213	832	-2.62	1.07	1.3	.98	- .2
	05	3136	832	-2.19	1.00	.0	.93	-1.0
	23	3190	832	-2.49	.86	-2.6	.79	-3.1
Mean		3234.8	832.0	-2.76	1.01	- .43	.94	- .9
S.D.		99.4	.0	.60	.09	1.7	.09	1.4
Other-focused HM Domain	12	2992	832	-1.63	1.07	1.4	1.03	.5
	09	3016	832	-1.74	.97	- .7	.91	-1.6
	08	3097	832	-2.11	.95	-1.0	.88	-2.1
Mean		3035.0	832.0	-1.83	1.00	- .1	.94	-1.1
S.D.		44.9	.0	.21	.06	1.1	.06	1.1
Absence of HM Domain	06	2032	832	1.50	1.02	.5	.98	- .4
	17	2419	832	.32	1.00	.0	1.00	.1
	01	2051	832	1.44	.96	- .7	.97	- .6
Mean		2064.0	832.0	1.43	1.00	.07	.99	- .3

	Item Number	Total Score	Total Count	Measure	MNSQ			
					Infit	ZSTD	Outfit	ZSTD
S.D.		236.3	.0	.76	.02	.4	.02	.3
Introjected HM	04	2822	832	-1.45	1.09	1.8	1.05	.8
Domain	21	2627	832	- .49	.95	-1.0	.90	-1.6
	16	2852	832	-1.60	.93	-1.4	.88	-1.9
Mean		2767.0	832.0	-1.18	.99	- .2	.94	- .9
S.D.		99.7	.0	.50	.07	1.4	.07	1.2
	Mean	2757.20	832.0	- .55	.99		.99	
	S.D.	490.32	.00	1.17	.20		.21	

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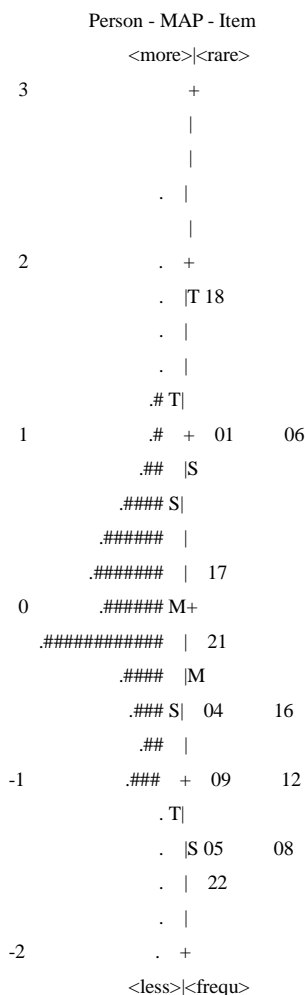
EACH "#" IS 14. EACH "." IS 1 TO 13

Each "#" represents 13. Each "." represents 1 TO 12

Figure 8 Item Person Map for the Finalized Version of CSHM-Q

As Figure 8 showed, item 22 "I practice health-promoting lifestyles because I believe there are strong connections between health and lifestyle" was rated as the easiest or the most likely endorsed item followed by item 05 and item 08. The most unlikely endorsed item is item 18, followed by item 01 and item 06.

Category structures for the four domains of the CSHM-Q were displayed in Tables 15-18. The observed measure and the step calibration for the five categories increased monotonically; in other words, respondents who adopted in

higher categories have higher average measures. Each category of the measurement scale was presented in Figure 9-12, as showed that the category probability curves resembled rolling hills with a clear peak for each category.

However, in other-focused domain, there were only 10 (.40%) observations on Category One, and in self-focused domain, there were only 5 (.15%) observations. In introjected domain, Category One and Category Five had only 10 (.40%) and 65 (2.61%) observations respectively. In absence domain, Category Five had only 12 (.36%) observations. All of this information suggested that a further revision on category design of the rating scale is needed in further studies.

Table 15 Rating Scale Category Function for Self-focused Subscale

CATEGORY		OBSERVED| COUNT %	OBSVD AVRGE	SAMPLE| EXPECT|	INFIT MNSQ	OUTFIT MNSQ	ANDRICH THRESHOLD|	CATEGORY| MEASURE
LABEL	SCORE							
1	1	5 (0.15%)	-1.46	-1.72	1.11	1.10	None	(-5.48)
2	2	97 (2.91%)	- .73	- .93	1.16	1.24	-4.31	-3.23
3	3	587 s(17.64%)	.41	.49	.94	.85	-2.09	- .83
4	4	2216 (66.59%)	3.03	3.02	.99	.98	.37	3.21
5	5	423 (12.71%)	5.56	5.56	1.00	.92	6.03	(7.13)
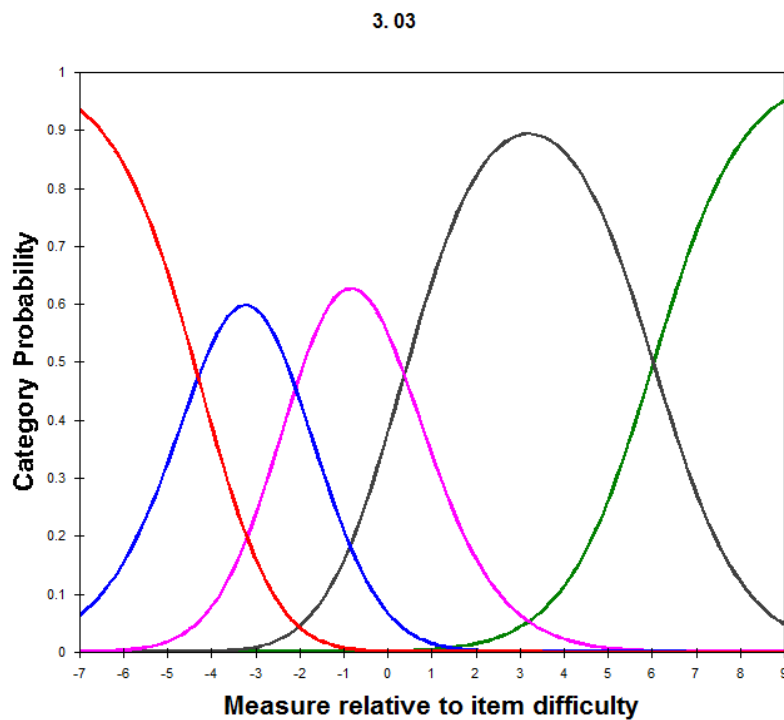
Figure 9 Category Probability Curve for Self-focused Subscale

Table 16 Rating Scale Category Function for Other-focused Subscale

CATEGORY		OBSERVED|	OBSVD	SAMPLE|	INFIT	OUTFIT	ANDRICH	CATEGORY|
		COUNT %	AVRGE	EXPECT|	MNSQ	MNSQ	THRESHOLD|	MEASURE
LABEL	SCORE							
1	1	10 (.40%)	-2.59	-2.47	.90	.91	None	(-5.83)
2	2	186 (7.45%)	-1.00	-1.08	1.06	1.03	-4.70	-3.21
3	3	700 (28.04%)	.32	.36	.99	.92	-1.69	- .50
4	4	1377 (55.17%)	2.54	2.53	.95	.94	.67	3.20
5	5	223 (8.93%)	4.97	4.97	1.04	.90	5.71	(6.82)
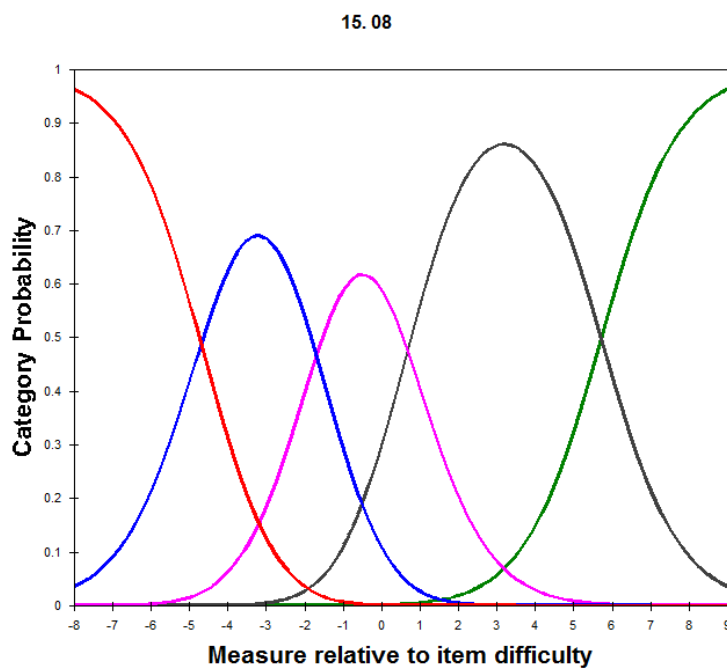
Figure 10 Category Probability Curve for Other-focused Subscale

Table 17 Rating Scale Category Function for Absence Subscale

| CATEGORY | | OBSERVED\| | OBSVD | SAMPLE\| | INFIT | OUTFIT | ANDRICH | CATEGORY\| |
LABEL	SCORE	COUNT %	AVRGE	EXPECT|	MNSQ	MNSQ	THRESHOLD|	MEASURE
1	1	277 (8.32%)	-3.57	-3.63	1.07	1.03	None	(-5.68)
2	2	1643 (49.37%)	-2.04	-2.00	.96	.98	-4.56	-2.72
3	3	951 (28.58%)	- .65	- .73	.94	.92	- .80	- .09
4	4	445 (13.37%)	.40	.44	1.04	1.03	.61	2.71
5	5	12 (0.36%)	1.56	1.97	1.15	1.05	4.76	(5.87)
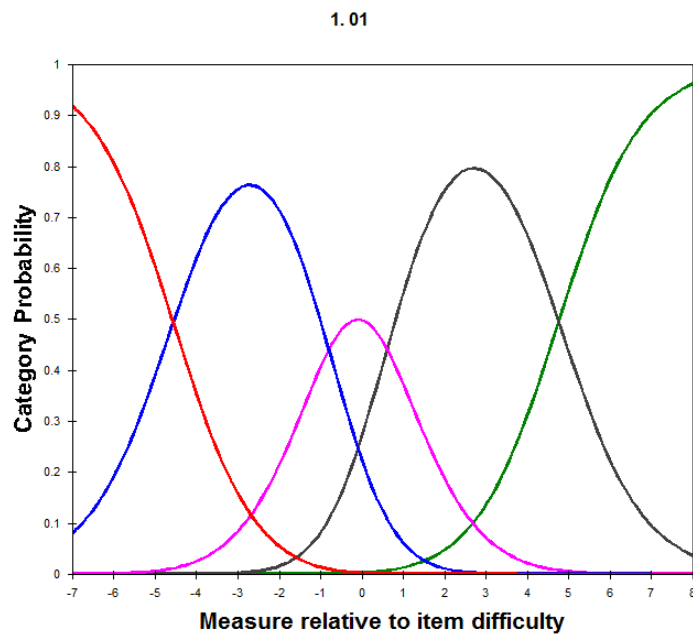
Figure 11 Category Characteristic Curves for Absence Subscale

Table 18 Rating Scale Category Function for Introjected Subscale

| CATEGORY | | OBSERVED\| | OBSVD | SAMPLE\| | INFIT | OUTFIT | ANDRICH | CATEGORY\| |
| | | COUNT % | AVRGE | EXPECT\| | MNSQ | MNSQ | THRESHOLD\| | MEASURE |
LABEL	SCORE							
1	1	10 (0.40%)	-3.97	-4.82	1.44	1.05	None	(-7.93)
2	2	378 (15.14%)	-1.87	-1.83	.99	.99	-6.82	-4.28
3	3	962 (38.54%)	.16	.19	.94	.90	-1.72	- .21
4	4	1081 (43.31%)	2.93	2.88	.96	.96	1.29	4.27
5	5	65 (2.61%)	5.63	6.02	1.24	.93	7.25	(8.35)
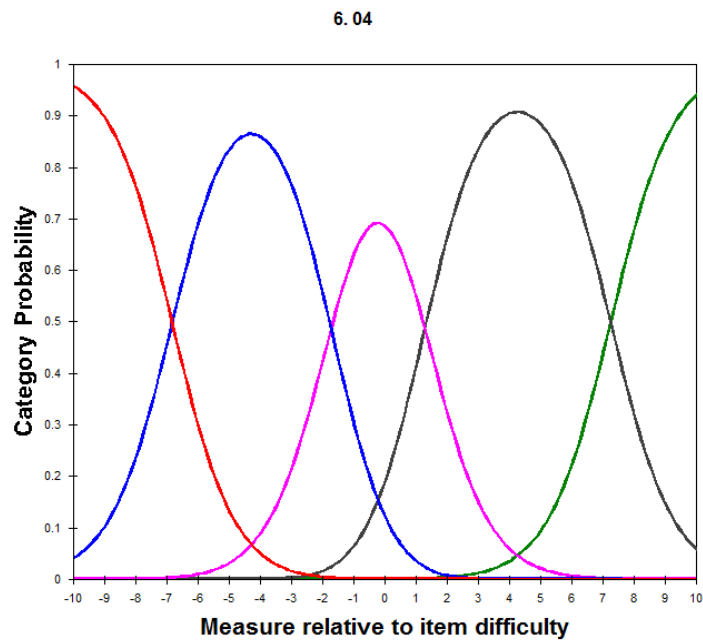
Figure 12 Category Characteristic Curves for Introjected Subscale

Reliability statistics for each domain are presented in Table 19- 22.

Table 19 Summary of Measured Persons and Measured Items for Self-focused Subscale

	TOTAL SCORE	COUNT	MEASURE	MODEL ERROR|	INFIT		OUTFIT	
					MNSQ	ZSTD	MNSQ	ZSTD
MEAN	15.5	4.0	.00	1.17	.93	- .2	.94	- .2
S.D.	1.8	.0	2.11	.23	1.21	1.1	1.27	1.1
MAX.	19.0	4.0	4.45	1.44	9.90	4.4	9.90	3.8
MIN.	10.0	4.0	-4.81	.77	.04	-1.9	.04	-1.9
REAL RMSE 1.41	TRUE SD 1.58		SEPARATION	1.12	Person RELIABILITY .56			
MODEL RMSE 1.19	TRUE SD 1.75		SEPARATION	1.46	Person RELIABILITY .68			
Person RAW SCORE-TO-MEASURE CORRELATION = .98								
S.E. of Person MEAN = .07								

	TOTAL SCORE	COUNT	MEASURE	MODEL ERROR|	INFIT		OUTFIT	
					MNSQ	ZSTD	MNSQ	ZSTD
MEAN	3234.8	832.0	-2.76	.08	1.01	.1	.94	- .9
S.D.	99.4	.0	.60	.00	.09	1.7	.09	1.4
MAX.	3400.0	832.0	-2.19	.08	1.09	1.6	1.05	.8
MIN.	3136.0	832.0	-3.76	.07	.86	-2.6	.79	-3.1
REAL RMSE .08	TRUE SD .59		SEPARATION	7.59	Item RELIABILITY .98			
MODEL RMSE .08	TRUE SD .59		SEPARATION	7.75	Item RELIABILITY .98			
Person RAW SCORE-TO-MEASURE CORRELATION = .								
S.E. of Person MEAN = .34								
UMEAN=.0000 USCALE=1.0000								
Item RAW SCORE-TO-MEASURE CORRELATION = -1.00								
3312 DATA POINTS. LOG-LIKELIHOOD CHI-SQUARE: 4014.63 with 2478 d.f. p=.0000								
Global Root-Mean-Square Residual (excluding extreme scores): .4561								

Table 20 Summary of Measured Persons and Measured Items for Other-focused Subscale

	TOTAL SCORE	COUNT	MEASURE	MODEL ERROR|	INFIT		OUTFIT	
					MNSQ	ZSTD	MNSQ	ZSTD
MEAN	10.9	3.0	.00	1.18	.94	- .2	.94	- .2
S.D.	1.7	.0	2.13	.24	1.16	1.2	1.17	1.2
MAX.	14.0	3.0	4.59	1.53	6.32	3.5	6.65	3.5
MIN.	5.0	3.0	-6.10	.92	.01	-2.6	.01	-2.6
REAL RMSE 1.42	TRUE SD 1.59		SEPARATION	1.12		Person RELIABILITY		.56
MODEL RMSE 1.21	TRUE SD 1.76		SEPARATION	1.46		Person RELIABILITY		.68

Person RAW SCORE-TO-MEASURE CORRELATION = .98

S.E. of Person MEAN = .07

	TOTAL SCORE	COUNT	MEASURE	MODEL ERROR|	INFIT		OUTFIT	
					MNSQ	ZSTD	MNSQ	ZSTD
MEAN	3035.0	832.0	-1.83	.07	1.00	- .1	.94	-1.1
S.D.	44.9	.0	.21	.00	.06	1.1	.06	1.1
MAX.	3097.0	832.0	-1.63	.07	1.07	1.4	1.03	.5
MIN.	2992.0	832.0	-2.11	.07	.95	-1.0	.88	-2.1
REAL RMSE .07	TRUE SD .19		SEPARATION	2.84		Item RELIABILITY		.89
MODEL RMSE .07	TRUE SD .19		SEPARATION	2.88		Item RELIABILITY		.89

S.E. of Person MEAN = .15

UMEAN=.0000 USCALE=1.0000

Item RAW SCORE-TO-MEASURE CORRELATION = -1.00

2478 DATA POINTS. LOG-LIKELIHOOD CHI-SQUARE: 3591.81 with 1647 d.f. p=.0000

Global Root-Mean-Square Residual (excluding extreme scores): .5147

Table 21 Summary of Measured Persons and Measured Items for Absence Subscale

	TOTAL SCORE	COUNT	MEASURE	MODEL ERROR|	INFIT		OUTFIT	
					MNSQ	ZSTD	MNSQ	ZSTD
MEAN	9.9	4.0	.00	.84	.98	- .1	.99	- .1
S.D.	2.0	.0	1.41	.09	.85	1.2	.89	1.1
MAX.	17.0	4.0	5.23	1.20	6.31	3.9	6.07	3.6
MIN.	5.0	4.0	-4.39	.74	.13	-2.0	.12	-1.8

REAL RMSE .97 TRUE SD 1.03 SEPARATION 1.07 Person RELIABILITY .55

MODEL RMSE .85 TRUE SD 1.13 SEPARATION 1.34 Person RELIABILITY .64

Person RAW SCORE-TO-MEASURE CORRELATION = .99

S.E. of Person MEAN = .05

	TOTAL SCORE	COUNT	MEASURE	MODEL ERROR|	INFIT		OUTFIT	
					MNSQ	ZSTD	MNSQ	ZSTD
MEAN	2064.0	832.0	1.43	.06	1.00	.0	.99	- .2
S.D.	236.3	.0	.76	.00	.02	.4	.02	.3
MAX.	2419.0	832.0	2.48	.06	1.02	.5	1.00	.1
MIN.	1754.0	832.0	.32	.05	.96	- .7	.97	- .6

REAL RMSE .06 TRUE SD .76 SEPARATION 13.17 Item RELIABILITY .99

MODEL RMSE .06 TRUE SD .76 SEPARATION 13.21 Item RELIABILITY .99

S.E. of Person MEAN = .44

UMEAN=.0000 USCALE=1.0000

Item RAW SCORE-TO-MEASURE CORRELATION = -1.00

3328 DATA POINTS. LOG-LIKELIHOOD CHI-SQUARE: 5842.03 with 2490 d.f. p=.0000

Global Root-Mean-Square Residual (excluding extreme scores): .6041

Table 22 Summary of Measured Persons and Measured Items for Introjected Subscale

	TOTAL SCORE	COUNT	MEASURE	MODEL ERROR|	INFIT		OUTFIT	
					MNSQ	ZSTD	MNSQ	ZSTD
MEAN	10.0	3.0	.00	1.26	.94	- .2	.94	- .2
S.D.	1.8	.0	2.48	.31	1.25	1.2	1.26	1.2
MAX.	14.0	3.0	6.80	1.82	7.24	4.0	8.10	4.2
MIN.	4.0	3.0	-8.75	1.04	.02	-1.8	.02	-1.8
REAL RMSE 1.55	TRUE SD 1.93		SEPARATION		1.25	Person RELIABILITY		.61
MODEL RMSE 1.30	TRUE SD 2.11		SEPARATION		1.63	Person RELIABILITY		.73

Person RAW SCORE-TO-MEASURE CORRELATION = .99

S.E. of Person MEAN =   .09

	TOTAL SCORE	COUNT	MEASURE	MODEL ERROR|	INFIT		OUTFIT	
					MNSQ	ZSTD	MNSQ	ZSTD
MEAN	2767.0	832.0	-1.18	.07	.99	- .2	.94	- .9
S.D.	99.7	0	.50	.00	.07	1.4	.07	1.2
MAX.	2852.0	832	- .49	.07	1.09	1.8	1.05	.8
MIN.	2627.0	832	-1.60	.07	.93	-1.4	.88	-1.9
REAL RMSE .07	TRUE SD .49		SEPARATION		6.81	Item RELIABILITY		.98
MODEL RMSE .07	TRUE SD .49		SEPARATION		6.92	Item RELIABILITY		.98

S.E. of Person MEAN =   .35

UMEAN=.0000 USCALE=1.0000

Item RAW SCORE-TO-MEASURE CORRELATION = -1.00

3312 DATA POINTS. LOG-LIKELIHOOD CHI-SQUARE: 4014.63 with 2478 d.f. p=.0000

Global Root-Mean-Square Residual (excluding extreme scores): .4561

4.5 Internal Consistency

Cronbach's Alphas for each domain of the CSHM-Q are illustrated in Table 23. The value of Cronbach's Alpha for self-focused domain was .73, .61 for other-focused domain, .63 for absence domain, and .65 for introjected domain. These values were close to the estimate of Cronbach's Alpha based on Rasch analysis. Although acceptable values of alpha ranged from .70 to .95 (DeVellis, 2003), researchers believed that a range from .6 to .9 is also acceptable given that the value was strongly influenced by the length of the test (Streiner, 2003). In this case, each domain has 3 items, and Cronbach's Alphas for domains were all above .60. The mean of inter item correlation is a measure of relationship between item and the sum of the rest in the domain. Items were neither redundant nor unrelated completely, indicated by moderate or low correlations as shown in Table 23.

Table 23 Cronbach's Alpha Coefficients for Subscales of CSHM-Q

Domains	Number of items	Cronbach's Alpha	Cronbach's Alpha from Rasch	Mean of Inter-item correlation
Self-focused Domain	3	.73	.68	.41
Other-focused Domain	3	.61	.58	.38
Absence Domain	3	.63	.54	.30
Introjected Domain	3	.65	.65	.38

On the one hand, Pearson's correlations between each domain score and the total score were .819, .710, - .716 and .733 (p< .001) (Table 24). Moderate correlations were found between domains as displayed in Table 24 in the next page, noted that Absence Domain had negative moderate correlations with the rest other domains, and this was consistent with the theoretical hypothesis. Results indicated distinctions between domains. On the other hand, medium high correlations between each domain and the total score of CSHM-Q were observed, indicating that each domain was strongly correlated with the overall score of health motivation.

Table 24 Person's Correlations Matrix between Subscales of CSHM-Q

	Self-focused Domain	Other-focused Domain	Absence Domain	Introjected Domain	Correlation with total score of CSHM-Q
Self-focused Domain	1				.819** (p< .000)
Other-focused Domain	.476** (p< .000)	1			.710** (p< .000)
Absence Domain	- .459** (p< .000)	- .250** (p< .000)	1		- .716** (p< .000)
Introjected Domain	.479** (p< .000)	.464** (p< .000)	- .301** (p< .000)	1	.733** (p< .000)

** Correlation is significant at the .01 level (2-tailed)

4.6 Test-retest Reliability

Consistency of a measurement scale can be evaluated by examining the change in mean scores between test and retest over a period of time. This change can be analyzed by conducting paired t test. Test-retest reliability can be established if heterogeneous difference cannot be observed between test and retest scores. Test-retest reliability can also be estimated by examining the intra-class correlation coefficient (ICC), the ICC values closer to 1.0 show greater stability of an instrument over time, greater than .80 is regarded good, .60 - .80 is regarded acceptable as suggested by Streiner and Norman (2008).

In this study, 32 college students were invited to respond to the same questionnaire at two different time points, and the period between the two time points (T1 and T2) was 3 weeks. Subscale scores and total score from the first a baseline test (T1) and a test three weeks later (T2) test for the CSHM-Q were displayed in Table 25 in the next page. The change and ICC values between these scores were also indicated. As can be seen in Table 25, mean differences in sub-scales over a 3-weeks interval were .19, .19, .34, .09 respectively, mean difference in total score over two time points was .13, all mean differences were less than .03%, p values for each domain were .49, .41, .25, and .64, it can be concluded that there was no significant mean difference in scores between T1 and T2. Finally, ICC values indicated good test-retest reliability for each sub-scale of the CSHM-Q (self-focused domain = .92, other-focused domain = .89, absence domain = .91, introjected domain = .93 and total score=.96 respectively).

Table 25 Mean Scores, Difference Overtime and ICCs Results

CSHM-Q	T1 mean (SD, SE)	T2 mean (SD, SE)	Minimum		Maximum		Mean change	ICC	95% CI
			T1	T2	T1	T2	(SD, SE, p value)		
Self-focused HM Domain	15.81 (2.87, .51)	15.63 (2.72, .48)	7	7	20	20	.19 (1.51, .27, .49)	.92	(.84- .96)
Other-focused HM Domain	10.91 (2.25, .40)	10.72 (1.96, .35)	6	7	13	13	.19 (1.28, .23, .41)	.89	(.79- .95)
Absence HM Domain	10.06 (3.13, .55)	9.72 (2.92, .52)	4	4	16	17	.34 (1.66, .29, .25)	.91	(.83- .96)
Introjected HM Domain	9.69 (2.28, .40)	9.59 (2.14, .38)	5	5	14	13	.09 (1.12, .20, .64)	.93	(.86- .96)
Total Score	26.34 (9.03, 1.60)	26.22 (7.38, 1.31)	4	7	39	38	.13 (3.42, .61, .84)	.96	(.91- .98)

Note: T1: baseline test in the first time point, T2: test after a period of three weeks, *p* value (paired samples *t* test; significance $p < .05$),

ICC: intraclass correlation coefficient, CI: confidence interval

4.7 Group Invariance

DIF analysis is a way of testing equivalence of item difficulty hierarchy between groups. All items should be DIF-free in order to obtain comparable measures among groups. DIF is said to occur when a difference larger than .5 logits in the difficulty estimates between groups (Shih & Wang, 2009). In this study, the author merely detected DIF by t-testing and observed whether DIF was found across items in the CSHM-Q. Four demographic groups were checked for DIF, including gender (male and female), college year (classified into four groups), age (ranging from 17 to 24), and family residence (urban, suburban and countryside).

From Figures 13-16, it can be seen that the DIF was found with t-values greater than absolute 2. Item 03 was identified to exhibit a substantial DIF between college years (Figure 16). Item18 was identified to exhibit a substantial DIF between age groups and family residence groups (Figure 15). Therefore, item 03 and item18 were removed from the CSHM-Q, and after the exclusion of those items with substantial DIFs, the CSHM-Q can be used to compare health motivations between college students at different demographic groups.
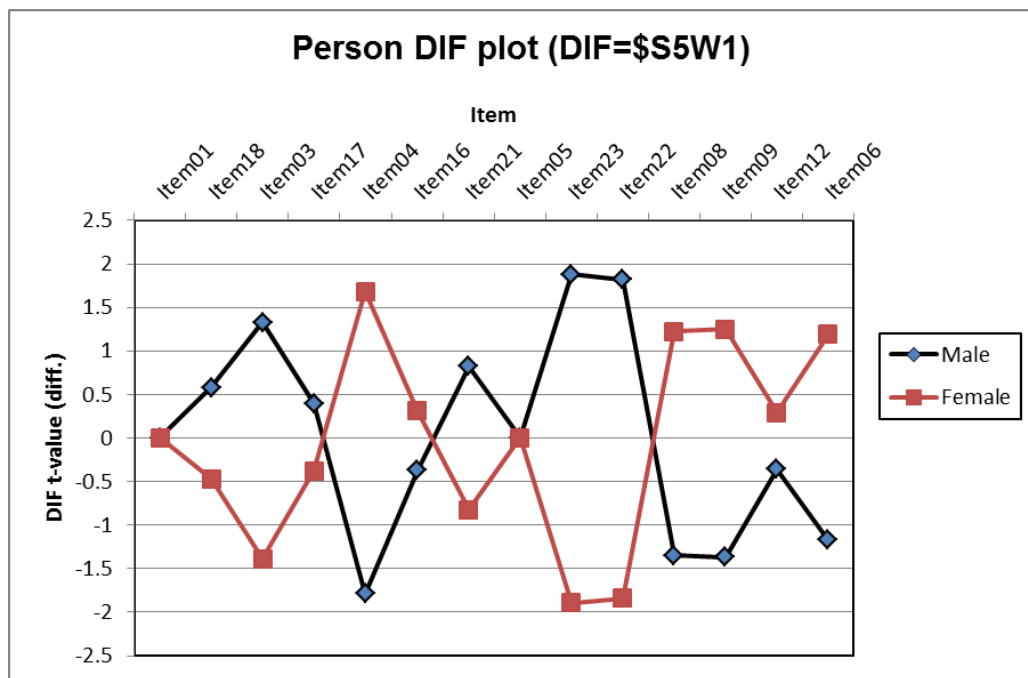
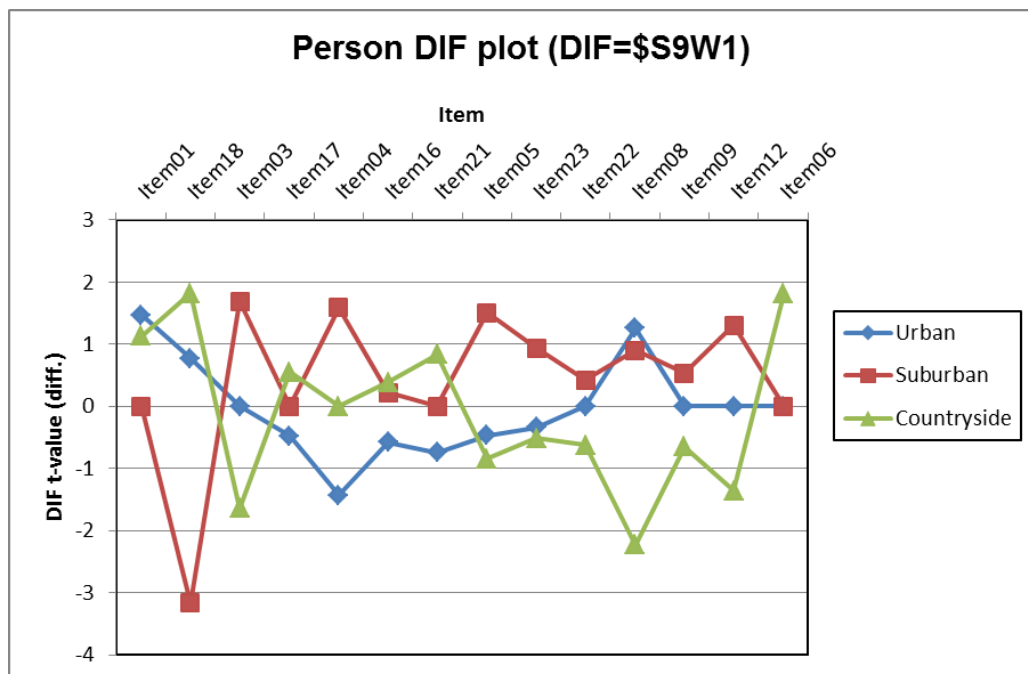Figure 13 DIF for Gender (Male and Female)

Figure 14 DIF for Family Residence (Urban, Suburban and Countryside)
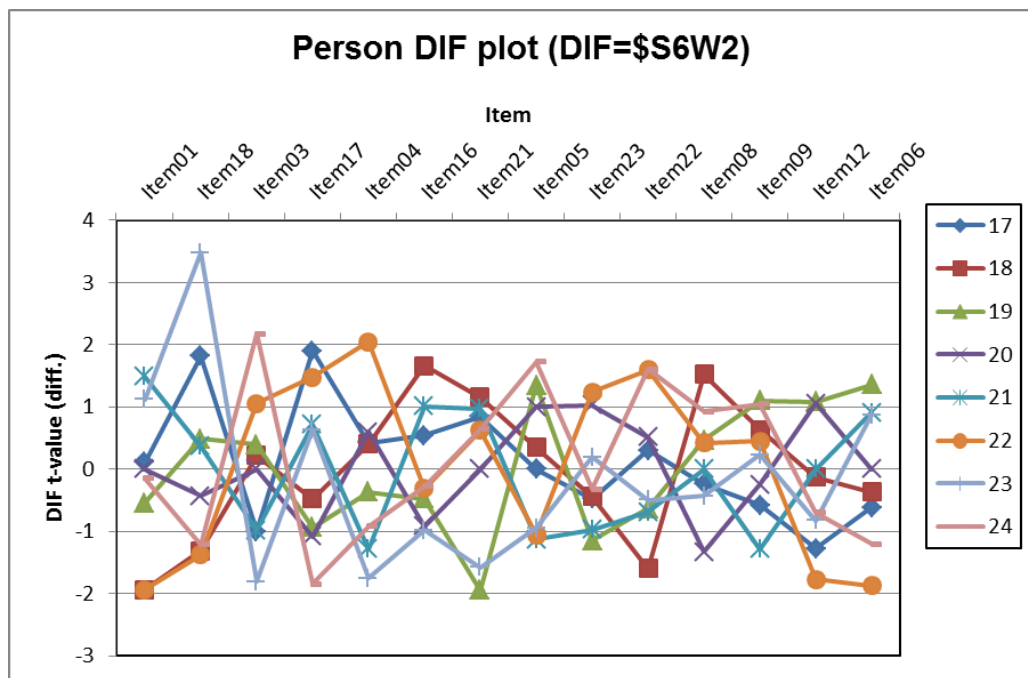
Figure 15 DIF for Age (from 17 to 24)
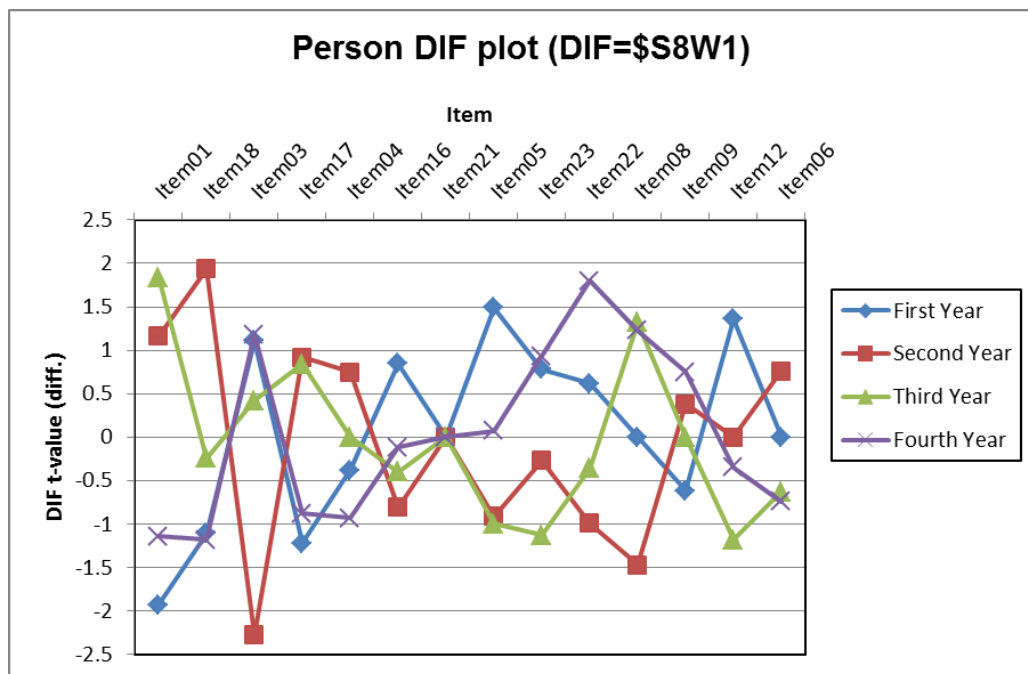
Figure 16 DIF for College Year

4.8 Convergent Validity

Table 26 Correlation Coefficients between CSHMQ, BREQ-2 and SRAHP

Health motivation	Exercise motivation: Total	Health-promoting lifestyles: Total
Self-focused Domain	.52** (p< .000)	.31** (p< .000)
Other-focused Domain	.46** (p< .000)	.23** (p< .000)
Absence Domain	- .31** (p< .000)	- .27** (p< .000)
Introjected Domain	.46** (p< .000)	.21** (p< .000)
Total Score	.58** (p< .000)	.34** (p< .000)

**Correlation was significant at the .01 level (2-tailed)

Convergent validity can be demonstrated through examining the correlation between two instruments that measure a similar conceptual construct. Correlation is weak when coefficient is less than .35, moderate when .36 to .67 and coefficient between .68 to 1.0 is regarded strong, correlation is very high when coefficient is greater than .90 (Weber & Lam, 1970; Mason, Lind, & Marchal, 1983).

Intraclass Correlation Coefficient (ICC) was used. The values of ICC between each domain of CSHM-Q and the total score of BREQ-2 were between 0.31 (p<0.01) and 0.52 (p<0.01) in absolute value, absence domain was negatively correlated with the total score of BREQ-2 (-0.31, p<0.01) as expected (Table 26), the ICC between the total score of CSHM-Q and BREQ-2 was 0.58 (p<0.01), indicating a moderate correlation between motivation for practicing health-promoting lifestyles and motivation for exercising. Given the assumption that health-promoting lifestyles is a multidimensional concept comprised of exercising, nutritional habits, social support, stress management, identity awareness, health awareness and safety practices (Lee & Loke, 2011), this

preliminary finding was reasonable. Further research is needed to expand and explore the relationships between health motivation and motivations for other types of health-related lifestyles, e.g., motivations for nutritional habits, social support, or stress management with regression techniques.

On the other hand, Intra-class Correlation Coefficient was also used to examine the relationship between motivations for practicing health-promoting lifestyles (measured by CSHM-Q) and health-promoting lifestyles measured by Self Rated Abilities for Health Practices Scale. As illustrated in Table 26, subscale scores on the CSHM-Q correlated in the expected directions the total score of self-rated abilities for health-promoting lifestyles. However, low and weak correlations were observed while ICC values were all less than 0.35 ($p<0.01$), indicating the relationship between motivation for practicing health-promoting lifestyles and the real practice of health-promoting lifestyles was weak. This showed a preliminary sign of insignificant effect of motivation on health-promoting lifestyles. This also implied that even the participants were having a higher level of health motivation, and they were not bound to undertake health-promoting lifestyles. Although some studies (Farrand & Cox, 1993; Champion, 1988) found motivation could explain over half of the variance in health-related lifestyles, more studies including motivation as a predictor of health-promoting lifestyles were less successful, in fact only a small proportion of variance in health-promoting lifestyles could be explained by motivation among most existing studies (Carter & Kulbok, 2002). In addition to health motivation, there might have other potential factors that affect their choices of adoption of health-promoting lifestyles. For example, motivation could be explained by factors such as health locus of control, value orientation, self-control, social support and approval, income, education, employment, self-esteem, attractiveness and health (Carter & Kulbok, 2002). Further discussion on this topic can be found in the final chapter.

Chapter 5

DISCUSSIONS AND CONCLUSIONS

5.1 General Findings

College students comprise a major proportion of the emerging adults' population and they are experiencing a crucial transitional period from adolescence to adulthood. Thus, emerging adults in higher education must be helped to make right decisions, and it is crucial to motivate them to "want to" live in a healthy manner (O'Donnell, 2012) and maintain health-promoting practices for the rest of their lives. Health-promoting lifestyles cover a variety of behaviors (Chen, Wang, Yang, & Liou, 2003), and although motivations for certain types of health-promoting lifestyles have been widely studied (Markland & Tobin, 2004; Okada, 2005; Verstuyf, Patrick, Vansteenkiste, & Teixeira, 2012), limited research has been conducted on college students' motivations for adopting health-promoting lifestyles. Therefore, why some college students are motivated to practice health-promoting lifestyles whereas others are not is a topic that warrants further study.

When developing an inventory that can be used for measuring health motivations of college students and identifying the effective interventions required for improving their motivation levels, it is critical to thoroughly collect the input from college students regarding their reasons for practicing health-promoting lifestyles, the challenges they encounter, and the suggestions that could be used for promoting them to strive to engage in health-promoting lifestyles in their daily lives. Our results indicated that in this study, a validated measurement scale, the CSHM-Q, was successfully developed. Researchers can use this instrument to examine health motivation levels, and suggestions can be provided based on

that when designing health-intervention programs aiming to promote them to want to practice health-promoting lifestyles.

Findings from focus group interviews demonstrated that college students have different reasons, or different types of health motivation to practice health-promoting lifestyles. For example, content analysis revealed that, 17.2% (16 participants) of the 93 interviewees reported that they did not have any health motivations, 51.6% (48 participants) were having non-autonomous health motivations, while 31.2% (29 participants) were identified as having autonomous health motivations.

In general, the findings of this study support the conceptual structure of health motivation framed by the Self-determination Theory. People who practice health-promoting lifestyles in order to maintain good health are motivated to do so at multiple levels. Health motivation was considered to be absent in college students who lacked any motivation to practice health-promoting lifestyles (absence of health motive). When college students practice health-promoting lifestyles because of social pressure, external reward or punishment, or outside influences, they were considered to exhibit other-focused health motivation; the sense of 'others' was expressed through the students' oral descriptions when they explained their reasons for engaging in health-promoting lifestyles (Ryan & Deci, 2004). Introjected health motivation resulted from internal pressure. For example, the pressure that arose when the college students felt guilty or anxious because of failing to practice health-promoting lifestyles. Deci and Ryan (2004) indicated that introjected motivation was typically accompanied by a tension or psychological struggle between 'have to' interact and 'identified' to do so. People who exhibited identified health motives experience a sense of value when they practice health-promoting lifestyles, and a sense of 'I' can be expressed (Vallerand, 2001) when college students orally described their reasons for pursuing health goals. Finally, integrated health motive refers to reasons such as personal interests, hobbies, curiosity, and a spirit of exploration that can motivate college students to continue practicing health-promoting lifestyles.

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Although both content analysis and exploratory factor analysis suggested a five-domain structure, a four-domain solution emerged from further Confirmatory Factor Analysis. Based on Self-determination Theory, four domains were finally identified and were re-named as follows: Domain 1, *Self-focused Health Motivation*, the most integrated form of regulation, pleasure, happiness, satisfaction or personal interests were identified as the most autonomous evidence of practicing health-promoting lifestyles; Domain 2, *Other-focused Health Motivation*, indicating health-promoting lifestyles were externally regulated and were undertaken because of external pressure or the intention of shunning negative impact on health; Domain 3, *Absence of Health Motivation*, involved the reasons of inaction that individuals do not want to perform health-promoting lifestyles from their own initiative. It should be noted that with respect to individuals who possessed the absence of health motivation it does not necessarily mean they did not adopt health-promoting lifestyles. The fourth domain was named as *Introjected Health Motivation*, which reflected internal struggle during the internalization and integration process from non-self-determined regulation to fully self-determined regulation.

This four-domain scale, the College Students' Health Motivation Questionnaire (CSHM-Q), comprised 12 items in total with three items in each domain. Each item represented a possible reason why college students might try to perform health-promoting lifestyles. Respondents could select the degree to which the provided reasons corresponded to their personal reasons on a five-point Likert scale ranging from 1 (Strongly Disagree), 3 (Neutral), to 5 (Strongly Agree).

The implications of the distinct types of motivation identified in this study must be clarified in the context of health practice. First, although absence of health motivation referred to the lack of motivation, and a negative relationship was observed between motives and outcomes (Standage, Duda, & Ntoumanis, 2003), some of the participants admitted that they practiced health-promoting lifestyles because of requirements from the "others"; they were forced to act though they

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did not want to. However, health-promoting lifestyles could still be observed, which means that in the case of certain students, an absence of health motivation did not necessarily mean that they would engage in health-threatening lifestyles. Secondly, external rewards or punishment did not affect participants' health-promoting lifestyles (Kowal & Fortier, 1999). Perhaps because no external rewards or punishment were present and inaction did not have an immediate impact on health, no participant reported that their health-promoting lifestyles were motivated by external rewards or punishment, and their external health motivations mainly included pressure from significant others. Finally, identified and integrated health motivations were well expressed by some participants, which was in line with SDT.

Although both autonomous and controlled health motivations were identified, quite a number of participants did not report any motivations to want to adopt health-promoting lifestyles; some participants even considered health-promoting lifestyles as a burden, and they were unaware of the potential consequences of health-threatening lifestyles. This should remind health practitioners to first evoke their awareness of the negative impact that health-threatening lifestyles might have and then enhance the autonomous health motivation among college students in order to promote them to realize the importance of health practices. College students must be encouraged to make their own choices, and, concurrently, they must be provided with related information on health-promoting lifestyles.

Relationships between different domains suggested from SDT were also identified. On the one hand, positive relationships were identified between external, introjected and autonomous health motivations; on the other hand, inverse relationships were observed between absence of health motivation and the rest of other three domains, which is also consistent with the theoretical framework.

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Persistence is another very important issue addressed in studies on health practices because maintaining health-promoting lifestyles for a few days or maintaining it half-heartedly will not help people in their quest for being healthy. Health-promoting lifestyles would only be beneficial when people persist with it for a long time.

Numerous studies have repeatedly demonstrated that autonomous motivation can positively predict outcomes of specific behaviors, but the relationship between controlled motivation and expected outcomes remains unresolved. Although a number of studies showed that controlled motivation was negatively related to outcomes (Deci & Ryan, 2000; Vallerand, 1997; Koestner, Otis, Powers, Pelletier, & Gagnon, 2008), a meta-analysis study has also indicated, that controlled motivation was not associated with outcomes (Ilies & Judge, 2005). Koestner et al (2008) further suggested that attention should be devoted towards enhancing autonomous motivation, rather than towards repressing controlled motivation. However, some evidence in this study suggested that, for emerging adults (typically college students in this study) who have not established health-promoting lifestyles, requirements, feedback or other forms of stimuli from significant others also played a role; therefore further study is needed to test the relation between other-focused health motives and expected health-promoting lifestyles.

5.2 Psychometric Properties of CSHM-Q

Both Rasch analysis and classical test theory were conducted in the development of the CSHM-Q. The development process started from a literature review on both Self-determination Theory and other existing measurement scales based on SDT. During Phase One of the present study, 93 college students were invited and interviewed, theory-directed approach was used to analyze the transcripts, coding process was conducted independently by

two student helpers, and an agreement was reached by discussions with the author. An item pool was generated from a synthesis of the coding result and reviews on several existing instruments. A panel discussion was organized in order to examine the content validity. 24 original items were rated as having high level of relevance and readability.

To explore and identify the internal structure of the Chinese College Students' Health Motivation Measurement Scale, 283 college students were then surveyed. Exploratory factor analysis indicated five factors, namely, intrinsic health motive, introjected health motive, external health motive, identified health motive and absence of health motive. Based on SDT, the aggregate of intrinsic and identified health motive was named as autonomous health motive, and the aggregate of external and introjected health motive was named as non-autonomous health motive. Five factors explained 62.53% of total variance. Cronbach's Alpha coefficients of each factor were between .60 and .86, indicating an acceptable reliability. Correlation coefficients between each factors were less than .30, showing an independent relationship among factors, correlation coefficients between each factor and the total score of the questionnaire were all greater than .63 (P < . 01). Good model fit indices from confirmatory factor analysis suggested that the four-domain solution of the CSHM-Q has a more stable structure and was generally consistent with the theoretical model based on Self-determination Theory. Further examinations of correlations between components also showed that each domain was distinct and cannot be replaced by any other domains.

After internal structure was identified, Rasch analysis was performed to examine the unidimensionality and construct validity of each sub-scale. Rasch reliability test is based on measures and it has the advantage over conventional reliability test. In this study, the Rasch person reliabilities for each domain were all greater than .6, indicating that the item difficulty placement would be similar when another comparable survey was conducted using the CSHM-Q. Each

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subscale of CSHM-Q had satisfactory fit values. Fit indices are crucial because they indicate whether or not the items are measuring the same latent trait. After eliminating outfit items, unidimensionalities were demonstrated since all of the fit values were located within the recommended range (.7-1.3). Through the category functioning analysis, the step calibration advanced monotonically. With a much larger sample size in final research phase, the category probability curves for each domain had distinct peaks and the distances between categories were all greater than 1.0 logits, suggesting a five-category solution in the CHSM-Q had enough distance for participants to differentiate.

Reliability and validity were further established in Stage 3 of the research. Cronbach's Alphas for each domain were all above the satisfactory level. Test-retest reliability was demonstrated by administering the measurement scale to the same participants at two time points (three weeks), Intraclass Correlation Coefficients were all above .8 at the .01 level, indicating the CSHM-Q has a good consistency over time. Convergent validity was established through examining the relationship between motivations for health practices measured by CSHM-Q and motivations for exercising regularly measured by Chinese version of BREQ-2. Moderate to high relationships were observed, indicating participants with higher health motivations were more likely to exercise regularly. However, weak relationship was observed between health motivation and health-promoting lifestyles, and similar results were also found between exercise motivation and health-promoting lifestyles, this implied that there might have other determinants or barriers that affect people's health practice such as exercise or health-promoting lifestyles.

5.3 Relationship between Health Motivation and Health-promoting Lifestyles

The adoption of health-promoting lifestyles is the ultimate goal of health education. There have been contradictions among literature on the relationship between health motivation and health-promoting lifestyles.

Some studies identified that motivation could predict behaviors, for example, collinear relationship between health motivation and health-promoting lifestyles was reported by several studies (Champion, 1988; Farrand & Cox, 1993), and more self-determined regulation was found to be associated with higher levels of physical activity in obese adolescents (Verloigne et al., 2011; Hwang & Kim, 2013).

Weak relationship between them was reported by some other studies. A handful of studies did not suggest that motivation is a major determinant of health-promoting lifestyles. For instance, Sortet and Banks (1997) found that there was no strong relationship between rural women's health motivation and their monthly breast checking behaviors. The Health Self-determination Index (HSDI) and Schwirian Senior's Lifestyle Inventory (SSLI) were used, and motivation again failed to predict health-promoting lifestyles (Carter, 1997). The HSDI was used again to examine its relationship with primary care satisfaction, and insignificant relationships were reported (Haq, 1988). Consistent with the majority of past quantitative studies, weak correlation was identified between health motivation and health-promoting lifestyles in this study, and once again testified that using health motivation to predict health-promoting lifestyles is unlikely to be successful.

Since previous studies have repeatedly demonstrated that motivation is unlikely to determine engagement in health-promoting lifestyles successfully, in order to

design more effective models or tools to better motivate people to engage in health-promoting lifestyles, further studies are needed to explore other reasons or factors that might have an impact on the engagement in health-promoting lifestyles, particularly on barriers to health-promoting lifestyles (Prohaska, Peters, & Warren, 2000).

In fact, apart from motivation, a number of determinants or indicators have been identified in earlier studies. For example, family's socio-economic status was found to be able to predict breakfast and dinner intake behaviors; richer families were likely to consume more fruit and vegetables; and family's culture environment, as measured by the number of books, was strongly correlated to healthy eating behaviors (Fismen, Samdal, & Torsheim, 2012). A qualitative study found that distress was a psychological factor that could influence the maintenance of health-promoting lifestyles (McKenzie & Harris, 2013). It should be noted that according to many studies (Limbers, Turner, & Varni, 2008; Zuckoff, 2012; Cushing, Jensen, Miller, & Leffingwell, 2014), motivational interviewing was an effective technic for promoting health-related lifestyles.

Other factors that may also have impact on health-promoting lifestyles included: physician advice (Frank, Breyan, & Elon, 2000); school based health promotion programs (Jepson, Harris, Platt, & Tannahill, 2010); health literacy, the competence to comprehend and apply health information (Hepburn, 2012); social media, the access to computer and social media and online activity engagement (Mitra & Padman, 2012); transformational family leadership, inspirational or motivational behaviors from parents (Morton, Wilson, Perlmutter, & Beauchamp, 2012); individual's personality, i.e., childhood energy and sociability, adulthood extraversion and neuroticism (Kern, Reynolds, & Friedman, 2010); locus of control, learned helplessness, self-efficacy and expected outcomes (Koelen & Lindström, 2005); socio-economic status (Iversen & Kraft, 2006); attitudes (Hearty, McCarthy, Gibney, & Kearney, 2007); peer clustering (Barclay, Rydgren, & Edling, 2013);

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relationships and social support from significant others (Aschbrenner, Bartels, Mueser, Carpenter-Song, & Kinney, 2012; Russell, Rufus, Fogarty, Fiscella, & Carroll, 2013); and persuasive messages (Pelletier & Sharp, 2008). Therefore, it is not a surprise to observe moderate to weak relationship between health motivation and health-promoting lifestyles.

In a regression study, city of residence, age, sex, family income, attachment to parents and BMI were included in logistic regression analysis and living with parents in a particular city was identified as the most significant predictor of health-promoting lifestyles among adolescents in Hong Kong and Guangzhou (Lee & Loke, 2011). Perhaps a systematic review on predictors of the practice of health-promoting lifestyles is needed in future studies.

5.4 Implications for Practice

Findings from the research have several implications for health education and health promotion on emerging adults in higher education.
First, perhaps the most significant application of the CSHM-Q is that it provides a useful tool of estimating health motivation levels among emerging adults in higher education, particularly it can help identify those who are motivationally inactive, and based on these information, policy makes could make more effective plans to have college students more intrinsically or internally motivated to adopt their own healthy choices, and help them to really want to practice health-promoting lifestyles. Second, health practitioners in college are advised to be sensitive to different types of motivation and a variety of factors that may activate or influence the setting of healthy lifestyle goals. Third, an effective intervention program for the improvement of health motivation among college students should address a number of issues related to, in essence, perceived locus of causality from external to internal. In particular, practitioners are recommended to facilitate perceptions of competence through goal

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achievement (Elliot et al, 2000). Finally, although health motivation is important, it is not the only factor that determines college students' health-promoting lifestyles as suggested by research findings, so, health practitioners are recommended to seek and adopt more integrated approaches in order to produce the best outcomes in practice.

5.5 Implications for Research

The preliminary testing of the CSHM-Q has produced acceptable results. Further studies on the CSHM-Q could examine its cultural or group invariance to expand its applicability, for example, validation studies could also be conducted in Tai Wan, Hong Kong in Greater China region. It can also be translated into other languages. In this study, group invariance across gender, college year, age and family residence were conducted by t-testing for DIF, studies could further test its invariance across different populations in different culture. Furthermore, other approaches such as SEM could be used to test other forms of group invariance, such as configural invariance, metric invariance and scalar invariance of the CSHM-Q.

Since religious factors were excluded from the this research, the influence of religious beliefs could be further investigated by inviting participants from the western part of China where religious-minority populations are living, such as Tibet and Xinjiang Province. The CSHM-Q can be generalized to these groups of emerging adults after it gets validated.

Finally, this study identified strong correlations between health motivation and exercise motivation; However, the findings did not suggest a strong relationship between health motivation and health-promoting lifestyles, which means there might have other potential factors as suggested by studies, e.g., health awareness, health literacy, self-efficacy, etc., that could affect health behavior

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outcomes along with health motivation. A review of reviews found that most effective interventions on health-promoting lifestyles were individual-level activities such as individual consultancy, health education programs in schools or workplaces. Media influence and policies at the population level were found less effective on behavioral change (Jepson, Harris, Platt, & Tannahill, 2010). Because positive behavior outcomes are desired by health education programs, further studies could also explore their relationships, and establish a more appropriate model to better predict health-promoting lifestyles.

5.6 Strength and Limitations

No study is impeccable. This study has certain limitations that should be noted after reviewing the whole research process. Limitations include sampling method, sample size, data collection method, religion, study design and instrumentation.

5.6.1 Sampling Method and Sample Representation

During the first phase of this research, we attempted to overcome certain challenges when conducting focus-group studies, which have been discussed by Daley (2013). For example, we sought to balance the demographic status of the participants by recruiting students whose health-motivation levels were distinct by conducting a mini pretest, but the potential influences of peers and moderators could not be completely eliminated (Daley, 2013).

The last phase of this research was based on convenient sampling method, although it was efficient, this method may bring selection bias. This "unintended systematic errors" can cause the measurement scale to differ from its true values (Kukull & Ganguli, 2012). In order to exhaust all possibilities,

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we attempted to invite different students from different parts of China as diversified as possible, for example, we had participants from the east, north, middle and south of China except those from the west. But because of limited time and resources, the sample size was not large enough and thus the entire population of college students in China was not adequately represented; moreover, we did not include college students from Hong Kong, Macao, or other areas of the Greater China Region, therefore key regional aspects of health motivation among Chinese college students might have been missed. Eventually this might hurt validity of the CSHM-Q. Findings of this research need to be replicated in other samples that were not included in order to increase its generalizability.

5.6.2 Religion Beliefs

Longitudinal studies in which the relationship between religious beliefs and health status were explored and connections were identified between intrinsic or pro-religious motivation (George, Ellison, & Larson, 2002; Gillum, King, Obisesan, & Koenig, 2008) and health-promoting lifestyles (Masters & Knestel, 2011). However, in this study, only one participant acknowledged that religious beliefs influenced his choice of health-promoting lifestyles. Based on the fact that only 2.1% of the Chinese college student population hold strong religious beliefs and participate in religious activities (Liu, Hou, & Li, 2013), the author decided to exclude religious factors from this study. Subsequent studies could also examine or explore religious impact on health motivations.

5.6.3 The Amount Number of Items

Another limitation is probably the small number of items. A measurement scale with more items may be required. A 12-item CSHM-Q makes a low burden for participants, however, this may also raise an issue of generalizability because a larger item pool would cover a wider range of motivations. Although responses to items that target a single underlying construct will act in the same way, an accurate measurement scale should include items that are representative of the underlying concept. In this case, the items retained generally functioned well, but there is still a possibility that some reasons are untapped.

5.6.4 The Amount Number of Categories

As rating scale diagnostic suggested, the category functioning of CSHM-Q was problematic. For example, Category One (Strongly disagree) and Category Five (Strongly agree) were the most infrequently adopted options by respondents.

In other-focused domain, there were only 10 (.40%) observations on Category One, and in self-focused domain, there were only 5 (.15%) observations. In introjected domain, Category One and Category Five had only 10 (.40%) and 65 (2.61%) observations respectively. In absence domain, Category Five had only 12 (.36%) observations. All of these information suggested a further revision on category design of the rating scale is needed in further studies.

There are two ways to address this issue. The first way is, if the aim is just to remove noise and improve variable clarity, observations on Category One can be collapsed upward into Category Two, and observations on Category Five can be collapsed downward into Category Four, because Category One and Five

were at the far ends of responsive continuum. Another approach is, since majority of respondents in the test has the latent ability at the middle level, more categories can be placed between Category Two and Category Four, therefore further test is needed in future.

5.6.5 Test-retest Reliability

The test-retest reliability was estimated by examining the ICC over a 3-week period. This interval is shorter and may not be very convincing. Thus, test-retest reliability needs a further test over a longer time period.

5.6.7 Determination of Factor Numbers

As discussed, there are a handful of methods of determining factor numbers, including Kaiser Criterion (Eigenvalue greater than 1 rule) (Velicer, Eaton, & Fava, 2000), the Likelihood Ratio Test (LRT), Parallel Analysis (Horn, 1965), the Minimum Average Partial analysis (MAP), bootstrap methods (Lambert, Wildt, & Durand, 1990). Among these methods, Kaiser Criterion has been demonstrated the most inaccurate approach, MAP and PA the most accurate (Schmitt, 2011), Parallel Analysis, in particular, has been advocated by many journal editors as the most accurate approach to determine factor numbers. Since Kaiser Criterion is prone to produce inflated resolution, it is still the most commonly used method to explore factor structure with strong theoretical framework. The author is planning to re-run factor analysis using the PA method in following studies.

5.7 Conclusions

Health motivation plays a key role in behavioral change. This 12-item CSHM-Q is based on the framework of Self-determination Theory and was validated based on Conventional Test Theory and Item Response Theory. Findings of the statistical analysis support the internal structure of the health motivation concept which is consistent in general with the proposal based on Self-determination Theory, although the number of dimensions is not identical with the theoretical hypothesis. Different types of health motivation are differentiated and expected or conceptualized relationships between subscales were observed. Items within each domain measure a single underlying concept demonstrated by Rasch analysis. Most psychometric properties are good acceptable. The CSHM-Q is short and can be finished in less than 2 minutes and lower respondent burden can help yield high-quality data. The CSHM-Q along with other health-promoting measurement scales can serve as a helpful tool for health education and health education programs.

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Appendix A Ethical Application Approval Letter

The Hong Kong Institute of Education
香港教育學院

Powering Education
點亮教育原動力

3 September 2013

Mr AN Min
Doctor of Philosophy Programme
Assessment Research Centre

Dear Mr An,

Application for Ethical Review <Ref. no. 2012-2013-0210>

I am pleased to inform you that approval has been given by the Human Research Ethics Committee (HREC) with regard to your application for ethical review related to the following research project for a period from 3 September 2013 to 31 October 2014:

Project title: Measuring and Investigating Health Motivation among College Students in China

Please note that you are responsible for informing the HREC in advance of any changes in the research proposal or procedures which may affect the validity of this ethical approval. You will receive separate notification should a fresh approval be required.

Thank you for your kind attention.

Yours sincerely,

Cherry Ng (Ms)
Secretary
Human Research Ethics Committee

c.c. Prof Dennis McInerney, Chairperson, Human Research Ethics Committee
Prof Lo Sing Kai, Principal Supervisor of the Applicant

10 Lo Ping Road, Tai Po, New Territories, Hong Kong 香港新界大埔露屏路十號
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Appendix B: Participants Consent Form

香港教育學院參與研究同意書

中 國 大 學 生 健 康 動 機 調 查 與 測 量

本人＿＿＿＿＿＿＿＿同意參加由盧 成 皆 教 授 負責監督,安 敏
執行的研究項目。

本人理解此研究所獲得的資料可用於未來的研究和學術發表。然而本人有權保護自己的隱私, 本人的個人資料將不能洩漏。

本人對所附資料的有關步驟已經得到充分的解釋。本人理解可能會出現的風險。本人是自願參與這項研究。

本人理解我有權在研究過程中提出問題,並在任何時候決定退出研究而不會受到任何不正常的待遇或被追究責任。

參加者姓名:

參加者簽名:

日期:

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有關資料

Measuring and Investigating Health Motivation among College Students in China

誠邀閣下參加盧 成 皆 教 授 負責監督,安 敏 負責執行的研究計劃。

他/她們是香港教育學院學生/教員。

本研究計劃的主要目的是調查中國大學生健康行為動機,最終建立大學生健康行為動機量表,為相關健康促進項目及研究提供基本測量工具,從而最終能夠從動機的角度,有效促進大學生健康行為。

本研究的理論基礎是自我決定理論(Self Determination Theory),由於可能存在的測量偏差(item bias),

所以此研究部分將採取訪談的方法,了解大學生健康行為的真實原因,進而最大程度上消除測量偏差,訪談持續30分鐘左右,訪談問題不涉 及

個人敏感信息,對參與者的身心健康不 會 造成任何風險或不適。

閣下享有充分的權利在研究開始前或後決定退出這項研究,而不會受到任何對閣下不正常的待遇或被追究責任。凡有關閣下的資料將會保密,一切資料的編碼只有研究人員得悉。

如閣下對這項研究有任何不滿,

可隨時與香港教育學院人類實驗對象操守委員會聯絡(電郵: hrec@ied.edu.hk; 電話: 2948-6318; 地址:香港教育學院研究與發展事務處)。

如閣下想獲得更多有關這項研究的資料,請與＿＿＿安敏＿＿＿＿聯絡, 電話＿＿ 或聯絡她/他們的導師＿盧成皆教授＿＿＿,電話

謝謝閣下有興趣參與這項研究。

Appendix C: The Minutes of Experts Panel Discussion

Panel Discussion 10 December 2013 會議討論記錄

Attendee Names	Background Data	10 December 2013

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Mr Zhenlei Jian (Z)	Chinese literature	Time	12:00am – 2:00pm
Ms Carrie Ho (H)	English	Location	Graduate School Meeting Room G4-G/F-02
Dr Mingxia Ji (J)	Education	MC	Dr Mingxia Ji
Ms Lu Liu (L)	Health Education		
Mr Min An	Health Education		
Prof Lawrence Lam	Health Studies		
Prof Sing Kai Lo	Health Studies		

Manuscript of Panel Discussion:

H：你想將這個研究做在中國，為什麼全都在西方理論的基礎上！

父母督促我堅持健康生活方式，this item can also be counted as self-determined, why? Because there is also a Hong Kong University research proved that Chinese kids, they will abide by their parents' choices. Mommy said this so I just follow. In the western eyes, Chinese kids do not have self-determination in that sense or they cannot be autonomous. As the Hong Kong's research, because Chinese kids choose to abide to their parents' idea, they still have the autonomy, and they still have their self-determined choice. So I think in a way in Chinese context, you need to think about that too. Otherwise

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it will be totally a western thing.

J: 你的意思是說，在父母的督促下，我養成了健康的生活習慣。和前面，安敏提出來的理論是有出入的。我這樣來理解的，你提到的自我決定理論，是這次調查問卷的理論基礎。我個人認為，一個行為的促成或養成，主要是依靠個人自身的決定，也不可能排除，在現實生活當中，在他人的影響下，比如打罵，鼓勵，甚至是威脅誘惑這樣的情況下。我的兒子就是這樣的人，一開始他坐體育運動的時候，他根本是被動的，但是我帶著他做了一段時間之後，他漸漸的發現了運動的快樂之後，他也可以自己去做了。所以我認為你的這個自我決定理論，這只是一個理論基礎，你還應該再找其他理論基礎。如果你片面強調這一個理論可能不夠。

H: 如果是你兒子的情況呢，那他這個理論是恰當的。但是我說的這個情況下，ok，mommy said so, yeah, why not. 她就是遵從，她沒有說不情願。她就是自願的跟從我這個決定。這一個小點上，就是 Chinese context。 但是在西方觀點中， 他們不認為服從父母的決定是自我決定的。但是在中國文化中，我認為這是不完全恰當的。So what I am trying to say, we should, if we do it in a Chinese context, we should have some characteristics of Chinese people. 中國人本來就是很容易跟從父母的，這是一個傳統，孔子的教育，本來我們的想法就是不一樣的。所以這個如不考慮的話，問卷是沒有中國的特色的。

回應。。。

父母督促我堅持健康生活方式。這個問題不清晰，可能是自願的，也可能非自願的。所以第七題對我來說，就是有不確定因素。

我從不考慮健康生活方式

H：我不知道為什麼都寫堅持。堅持對我來說，有一個負面的意思在裡面。如果改成維持比較好，不會說堅持。堅持，我感覺，要很努力才可以達到的。

L：其實我覺得堅持是一個很中立的詞，

H：如果用堅持表示已經有立場了。堅持就是表示要一直去做。

Z：堅持應該是一個褒義詞。"我從不考慮健康生活方式"與"我從不考慮堅持健康生活方式"區別比較大。前面比較膚淺，後面相對比較深入。比如講，我平時抽煙喝酒，我從不考慮它。而後面那個說法，可能是這樣的情況，就是有段時間做得好，有段時間做的不好。堅持拿掉，意思比較明確，就是我從沒有考慮過這個問題。

2. 我的生活方式健康與否並不重要

C：並不重要，跟什麼來對比？缺乏比較的物件。換句話說，我的健康生活方式與我的日常生活並不相關。我並不重視

Z：健康的生活方式與我的生活並不相關。

C：健康的生活方式對我而言並不重要。

除非遇到健康問題時，我通常不會考慮健康生活方式

Z：刪掉時，改為除非遇到健康的問題，我通常不會考慮健康的生活方式

L：這裡後半句"我…"有些拗口，建議加"的"，改為"我通常不會考慮健康的生活方式"

我不堅持健康生活方式，是因為生活中有許多更重要的事情

我做不到

不堅持健康生活方式，是因為我生活中有許多更重要的事情。

Z:儘量不放"我"。不可以還是不能，我沒有堅持，所有的堅持都拿掉，或

者改為擁有，維持...個人意見，僅供參考

L：我沒能堅持健康生活方式

J：建議改為：健康生活方式不重要，是因為我生活中有許多更重要的事情。

Z：建議加兩個題目：一是，"生死有命，富貴在天"，二是，"及時行樂，活在當下"。現在其實有一部分人就是這樣的，不但是對健康，甚至可以說是這部分人的一種生活態度了。大體指的是人的生死遭遇皆有天命注定，人只能盡力而為，而無法控制自己的生死，放到健康這個情境下，就是人的健康是自己無法控制和預料的。另外，據我了解，及時行樂，活在當下也是相當一部分中國人的生活心態。所以，我覺得這也是他們不願從事健康行為的原因。

H:"生死有命，富貴在天"，或者，"及時行樂，活在當下"在粵語語境中也是可以理解的

L：是啊，我覺得加上這兩點很好，其實現在有一部分大學生是有這種想法的，覺得人生短暫，該享受就享受。

J：我補充一點，就是"生死有命，富貴在天"，或者"及時行樂，活在當下"也並不一定是消極的，以中性的方式把它的意思講出來，避免誤導 participants 也很重要

總結，加兩個題目：沒有堅持健康的生活方式，是因為我覺得應及時行樂，活在當下；沒有堅持健康的生活方式，是因為我相信生死有命，富貴在天

5. 我不考慮堅持健康生活方式是因為我不喜歡一成不變的生活

Z：什麼是健康生活方式？這個很重要。比如這個題目，是答題者將健康生活方式與一成不變的生活等同起來了。

我認為我不知道什麼是健康生活方式，也可能是一個原因！

J：導語部分可以簡要介紹什麼是健康生活方式。

L：是的，健康生活方式的認知直接影響他填問卷。如果答題者不明白的話，顯然會對整個問卷的信效度產生影響，所以在問卷的一開始就有必要讓 participants 非常清楚的了解健康生活方式的這個概念，它（健康生活方式）

是一個非常客觀具體的一些列行為，還是較為籠統的概念，比如可簡單理解為，凡是有益健康的，促進健康的一些列行為，如鍛煉，飲茶等，都屬於健康的生活方式。Dr Eria 也曾經表達過類似的意見，比如對有些人來說，低碳、環保是他們所認為的健康的生活方式，另外，綠色的出行方式對有些人來說也算是健康的生活方式。從這個角度說，

我是在朋友的影響下堅持健康生活方式

C:這是一個挺好的題目，年輕人受朋輩的影響還是蠻大的。其實還有另外一個方面，就是很多情況下，朋友往往影響一個人從事不健康的生活方式。比如通宵玩遊戲，再比如酗酒，有一些人就是因為面子問題，才會跟朋友去大量飲酒，如果你不去，別的朋友都去，不去的人會感覺被孤立。

Z：建議：在朋友的影響下我堅持健康生活方式。

L:或者改為"養成"？

父母督促我堅持健康生活方式

A：兒行千里母擔憂，對與剛剛脫離父母過獨立生活的孩子來說，父母最掛念的，還是子女的健康問題。根據很多研究，父母，家庭環境會直接影響子女的 健康行為的選擇

Z：父母督促下，我才堅持生活方式

老師說我應該堅持健康生活方式

A：問卷適用的畢竟還是學校的環境，很多大學在開學時會有健康教育課，平時也會有一些的健康資訊等服務，在學校的環境下，不可忽視老師對學生的影響作用。

Z：在老師建議下，我才堅持健康生活方式

其他人還包括傳媒，公眾人物

J:公眾人物現在對青少年的影響其實也是蠻大的，有些人做了不好的示範，年輕人甚至可以將這些不好的行為流行的東西，這就不好了。

L:媒體也很重要啊，我覺得健康信息的獲得，可能最主要就是被動的從媒

體獲得的，比如如何預防 SARS，比如現代人慢性病年輕化及其預防，特別是健康的生活方式對預防慢性病的重要作用，主要還是通過媒體，特別是互聯網的途徑獲得的，這顯然會影響到一個人的健康動機，當然一個人也會主動去蒐集某些健康信息。

　假如我沒有堅持健康生活方式，其他人可能會因此不高興

C：比如我女兒的老外同學，他們在一起的時候，我女兒想去吃肯德基這樣的西式快餐，她的老外同學就會不高興，會說她怎麼可以吃 garbage food，所以這個題目很有必要，不過其他人的含義就比較多了，它可以包括家人，女朋友，同學啊什麼的，所以這個題目問的再具體一些可能會比較明確。

Z：為了讓家人高興，我才堅持健康生活方式

L：為了不打擾他人，我才堅持健康生活方式

J：External 裡面，沒有提到時間的問題，壓力的問題，個人的習慣，朋輩的習慣，以前健康方面的問題對他健康行為的影響。

品嘗過健康生活方式的甜頭和失去健康時的困擾，這個經歷，有沒有體檢
價值觀對於行為的影響，受教育的程度，學生來自的地域，籍貫
閱讀的面和量，比如從來不閱讀的和大量閱讀的人，對於問題的理解是不一樣的，專業很重要，家庭，傳媒，明星效應。

我學校提供的環境設施讓我想堅持健康生活方式

A：這顯然是屬於外部動機的範疇，以我自己的體會，如果學校有一個好的健身房，就會吸引人參加體育鍛煉，有一個好的球場，大家也願意去踢球，沒事可能都喜歡去操場走一走，所謂的 Climate 是會影響到一個人的健康行為的選擇。

Z：學校良好的環境設施讓我想堅持健康生活方式

L：周邊的良好環境設施讓我…

我希望通過堅持健康生活方式，在學業上取得好成績

Z：我希望通過堅持健康生活方式，提高學習效率，取得好成績

J: 這個題目適合在學校的大學生，不過你研究中提到的 Emerging Adulthood 指的是以大學生為主體的這一個年齡層次的人群，還有許多非在校的 Emerging Adults，這個題目就對他們不適合了，對吧。

我堅持健康生活方式是因為，我曾有過健康方面的問題

A：這是經常發生的現象，健康的時候不覺得有什麼，等到"失去了才知道珍惜"，這對有些真正面對死亡威脅的人來說，可能體會尤為深刻。年輕人雖然處在一生中健康狀態最好的時期，但誰都不可能不生病，他們的健康經歷，Health Experience，可以作為健康動機之一。

Z:刪掉"我"，刪掉逗號

J：這個題目會不會涉及健康隱私方面的問題，導致受訪者不願提供準確答案呢？建議仔細考慮措辭

我熟悉的人過往有過健康問題，讓我想堅持健康生活方式

我身邊的人出現過健康問題，。。。

如果身邊其他人沒有堅持健康生活方式，我也不會

Z：有點歧義，建議改為其他人有了健康生活方式,我才有

J：這道題可以考慮放在 absence 和 external 兩處地方.

我想堅持健康生活方式避免昂貴的疾病治療費用

Z：昂貴的治療費用，說的有點重。

A：在我所採訪的學生當中，家庭是農村的，當然現在農村的生活條件也在改善，但是對於一些貧困家庭來說，他們最負擔不起的就是疾病。比如有些農村老年人，小病基本不去看醫生，希望捱過去，大病有可能負擔不起治療費用（社會保障還不夠完善），選擇在家保守治療，這些現象是現實存在的。家庭成員中一人生病，會拖垮全家。因此，對部分受訪者來說，這是他們健康行為的動機之一。

我認為我需要遵從一些有助健康的生活小貼士

Z：我需要靠一些健康小貼士提醒我堅持健康生活方式。

A:不確定在 identified 還是 external 裡面。

L：感覺這個題目有點不合適，好像不應作為一個題目，因為感覺好像並不屬於健康行為的原因。

我覺得健康生活方式是釋放壓力的一個方法

壓力是比較主觀的詞。

我覺得健康生活方式是應對外在的壓力的方法。

我想展現給他人一個健康的印象

Z：健康的形象在人際交往中，很重要，特別對年輕人，在你的研究中所指的 Emerging Adulthood Population， 他們更加重視自己的形象，重視朋輩關係，友誼，當然對不同年齡層次的人群，形象，比如體型，都是人際交往中很重要的一個方面。這個題目還是很有必要的，不過建議改為：為了留給他人一個健康的印象，我才堅持健康生活方式。會更清楚一些

J:我覺得這個題目，對於女孩子可能合適，據我所知，很多女孩子以瘦為美，。

L：補充一點，為了追求瘦和美，未必是健康的目的，所以在設計題目時，應該小心仔細區分開來。

我想堅持健康生活方式，避免生病

J：這個題目很好，對於大多數人來講，避免疾病，強身健體，可能是最直接最簡單的從事健康行為的原因。

L：20-24 題，有前後順序的問題，重的放在了前面，反而不安在後面。在做的時候，重的看完了，輕的再看不會有什麼特別的感覺

J：嗯，我覺得這個建議很好，在設計正式問卷時，從措辭語氣的角度，考慮安排題目的先後順序。

22. 如果沒有堅持健康生活方式，我認為是自我控制能力的失敗

Z：缺乏自我控制能力，失敗這樣的字眼太突出了，不夠中性

L：自控能力，是最輕

謝謝大家！

Appendix D: Original Items and Revisions after Experts Panel Discussion

No.	Original items	Revised items	English version of revised items	Concise items
1	我從不考慮堅持健康生活方式	我從不考慮堅持健康的生活方式	I never think of practicing health-promoting lifestyles	Never give a thought
2	我是在朋友的影響下堅持健康生活方式	在朋友的影響下，我才會堅持健康的生活方式	I practice health-promoting lifestyles because of the influence from my friends	Influence from friends
3	我想展現給他人一個健康的印象	為了留給他人一個健康的印象，我才會堅持健康的生活方式	I practice health-promoting lifestyles because I want to give a healthy image to the others	A healthy image to other people
4	我想通過堅持健康生活方式來提高生活質量	我想通過堅持健康的生活方式以提高生活品質	I practice health-promoting lifestyles I want to improve the quality of my life	Improve life quality
5	堅持健康生活方式的過程很有趣	堅持健康的生活方式很有趣	The process of practicing health-promoting lifestyles because it's fun	It's fun
6	老師說我應該堅持健康生活方式	在老師建議下，我才會堅持健康的生活方式	My teachers told me I should have health-promoting lifestyles	Instructions from teachers
7	我學校的環境設施讓我想堅持健康生活方式	身邊有良好的環境設施，我才會堅持健康的生活方式	The facilities and environment that my school provides make me want to practice health-promoting lifestyles	Facilities and environment
8	我理解健康對自己生活的重要性	我想堅持健康的生活方式，是因	I practice health-promoting lifestyles because I	Understand the importance health

	為我覺得這樣做很重要	understand the importance of health to my life	
9	如果沒有堅持健康生活方式，我會感到不安	如果沒有堅持健康的生活方式，我會感到不安	I get upset if I don't practice health-promoting lifestyles	Be upset if fail to do so.
10	我享受堅持健康生活方式的過程	我享受堅持健康的生活方式的過程	I enjoy the process of practicing health-promoting lifestyles	Enjoy the process
11	除非遇到健康問題，我通常不會考慮健康生活方式	除非遇到健康問題，我通常不會考慮健康的生活方式	I don't think of health-promoting lifestyles unless I have health problems	Don't think of it unless having health problems
12	我希望通過堅持健康生活方式，在學業上取得好成績	我希望通過堅持健康的生活方式，提高學習效率，取得好成績	I practice health-promoting lifestyles in order to keep up a good performance on my study	Improve study performance
13	我覺得健康生活方式是釋放壓力的一個方法	健康的生活方式是應對外在壓力的方法之一	I practice health-promoting lifestyles because I consider it as a way of pressure relief	Pressure relief
14	如果沒有堅持健康生活方式，我認為是自我控制能力的失敗	如果沒有堅持健康的生活方式，我是因為缺乏自我控制能力	I feel like a failure of self-control when I don't practice health-promoting lifestyles	Self-control
15	堅持健康生活方式對我來說是孝順父母的一種形式	堅持健康的生活方式對我來說是孝順父母的一種形式	Practicing health-promoting lifestyles is another form of filial piety to my parents	Filial piety
16	我的生活方式健康與否並不重要	健康的生活方式對我而言並不重要	It doesn't matter whether my lifestyle is healthy or not.	It doesn't matter
17	父母督促我堅持健康生活方式	在父母督促下，我才會堅持健康的生活方式	My parents urge me to practice health-promoting lifestyles	Urges from parents
18	我堅持健康生活方式是因為，我曾有過健康方面的問題	自己曾有過健康方面的問題，我才會堅持健康的生活方式	I practice health-promoting lifestyles because I had health problems in the past	Personal health problems

19	如果沒有堅持健康生活方式，我會感到后悔	如果沒有堅持健康的生活方式，我會感到后悔	I regret when I don't practice health-promoting lifestyles	Regret if fail to do so
20	我想堅持健康生活方式，避免生病	我想堅持健康的生活方式以避免生病	I practice health-promoting lifestyles because I don't want to get sick	Avoid sickness
21	我認為健康也是一種美	健康的生活方式本身就是一種美	I practice health-promoting lifestyles because I believe healthy lifestyle is another form of beauty	A form of beauty
22	我不堅持健康生活方式，是因為生活中有許多更重要的事情	沒有堅持健康的生活方式，是因為我生活中有許多更重要的事情	There are other more important things to do rather than health-promoting lifestyles in my life.	Other more important things
23	我想堅持健康生活方式避免昂貴的疾病治療費用	我想堅持健康的生活方式以避免昂貴的疾病治療費用	I practice health-promoting lifestyles because I am afraid I cannot afford medical cost for a disease	Cannot afford medical cost
24	我認為我需要遵從一些有助健康的生活小貼士	我認為我需要遵從一些有助健康的生活小秘方	I think I have to follow the lifestyle tips for my health	Follow some tips
25	我想通過堅持健康生活方式來保持好身材	我想通過堅持健康的生活方式以保持好身材	I practice health-promoting lifestyles because I want to stay in shape	Stay in shape
26	假如我沒有堅持健康生活方式，其他人可能會因此不高興	為了讓他人高興，我才會堅持健康的生活方式	I practice health-promoting lifestyles so other people would be happy	Make others happy
27	我熟悉的人過往有過健康問題，讓我想堅持健康生活方式	身邊的人出現過健康問題，我才會堅持健康的生活方式	I practice health-promoting lifestyles because someone of whom I am familiar with had health problems in the past	Other people's health problems
28	如果沒有堅持健康生活方式，我	如果沒有堅持健康的生活方式，	I feel guilty when I don't practice	Feel guilty if fail to do so

	會感到內疚	我會感到內疚	health-promoting lifestyles	
29	我相信健康與生活方式之間存在密切聯系	我想堅持健康的生活方式，是因為我相信生活方式會影響健康	I practice health-promoting lifestyles because I believe there are strong connections between health and lifestyle	Believe connections between health and lifestyle
30	通過堅持健康的生活方式，我得到愉悅和滿足	堅持健康的生活方式讓我得到愉悅和滿足	I get pleasure and satisfaction from practicing health-promoting lifestyles	Pleasure and satisfaction
31	我不考慮堅持健康生活方式是因為我不喜歡一成不變的生活	沒有堅持健康的生活方式，是因為我不喜歡一成不變的生活	I don't think of practicing health-promoting lifestyles because I don't like regular, unchangeable behaviors in my life.	Do not like an unchangeable life
32	如果沒有堅持健康生活方式，我會鄙視自己	如果沒有堅持健康的生活方式，我會鄙視自己	I despise myself if I failed to practice health-promoting lifestyles	Despise myself if I fail to do so
33	健康生活方式是我的習慣	堅持健康的生活方式是我的習慣	Practicing health-promoting lifestyles is one of my habits	A habit
34		沒有堅持健康的生活方式，是因為我覺得應及時行樂，活在當下	I do not practice health-promoting lifestyles because I just want to enjoy the pleasures of life at present	I don't because I want to enjoy the pleasures of life at present
35		在公眾人士的影響下，我才會堅持健康的生活方式	I practice health-promoting lifestyles because of the influence from people in public life	Influence from people in public life
36		我想通過堅持健康的生活方式對身邊的人產生積極影響	I practice health-promoting lifestyles in order to affect other people positively	Affect other people positively
37		堅持健康的生活方式是我的一種人生觀	Practicing health-promoting lifestyles is a philosophy of life	A philosophy of life
38		在伴侶的影響下，我才會堅持健	I practice health-promoting lifestyles because	Partners' influence

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		康的生活方式	of the influence from my partner	
39		沒有堅持健康的生活方式，是因為我相信生死有命，富貴在天	I don't practice health-promoting lifestyles because life and death are decreed by fate	I don't do because life and death are decreed by fate
40		在傳媒的影響下，我才會堅持健康的生活方式	I practice it because my choice was influenced by media	Media influence
41	其他人說我應該堅持健康生活方式		I practice health-promoting lifestyles because other people say I should.	Other people say I should
42	如果身邊其他人沒有堅持健康生活方式，我也不會		If other people don't practice health-promoting lifestyles, I don't either	I won't do when others don't do it

大學生健康動機量表

　　健康的生活方式是有利於維持健康的一系列持續性的行為。這些行為是多種多樣的，每個人可能有不同的、個性化的健康生活方式。下列問題是通常會被問到的、有關堅持健康生活方式的原因，這些原因稱之為健康動機。請注意，這些題目所關注的並不是多樣化的健康行為，而是行為背後的原因。請仔細閱讀每一個題目，並選擇能準確反映你健康動機的數字。

"1"= 非常不同意，"2"= 不同意，"3"= 既不同意，也不反對，"4"= 同意，"5"= 非常同意

你的年齡：_____　　　　　　　　你的性別：_____

年級：_____　　　　主修課程/專業：_____　　　　學

校：_____

題號	題　　　　目	你 的 選 擇				
1	我從不考慮堅持健康的生活方式	1	2	3	4	5
2	在朋友的影響下，我才會堅持健康的生活方式	1	2	3	4	5
3	為了留給他人一個健康的印象，我才會堅持健康的生活方式	1	2	3	4	5
4	我想通過堅持健康的生活方式以提高生活品質	1	2	3	4	5
5	堅持健康的生活方式很有趣	1	2	3	4	5
6	在老師建議下，我才會堅持健康的生活方式	1	2	3	4	5
7	沒有堅持健康的生活方式，是因為我覺得應及時行	1	2	3	4	5

題號	題　　目	你　的　選　擇				
	樂，活在當下					
8	身邊有良好的環境設施，我才會堅持健康的生活方式	1	2	3	4	5
9	我想堅持健康的生活方式，是因為我覺得這樣做很重要	1	2	3	4	5
10	如果沒有堅持健康的生活方式，我會感到不安	1	2	3	4	5
11	我享受堅持健康的生活方式的過程	1	2	3	4	5
12	除非遇到健康問題，我通常不會考慮健康的生活方式	1	2	3	4	5
13	在公眾人士的影響下，我才會堅持健康的生活方式	1	2	3	4	5
14	我希望通過堅持健康的生活方式，提高學習效率，取得好成績	1	2	3	4	5
15	健康的生活方式是應對外在壓力的方法之一	1	2	3	4	5
16	如果沒有堅持健康的生活方式，我是因為缺乏自我控制能力	1	2	3	4	5
17	我想通過堅持健康的生活方式對身邊的人產生積極影響	1	2	3	4	5
18	堅持健康的生活方式對我來說是孝順父母的一種形式	1	2	3	4	5
19	健康的生活方式對我而言並不重要	1	2	3	4	5
20	在父母督促下，我才會堅持健康的生活方式	1	2	3	4	5
21	自己曾有過健康方面的問題，我才會堅持健康的生活方式	1	2	3	4	5

題號	題 目	你 的 選 擇				
22	如果沒有堅持健康的生活方式，我會感到後悔	1	2	3	4	5
23	我想堅持健康的生活方式以避免生病	1	2	3	4	5
24	健康的生活方式本身就是一種美	1	2	3	4	5
25	沒有堅持健康的生活方式，是因為我生活中有許多更重要的事情	1	2	3	4	5
26	在伴侶的影響下，我才會堅持健康的生活方式	1	2	3	4	5
27	我想堅持健康的生活方式以避免昂貴的疾病治療費用	1	2	3	4	5
28	我認為我需要遵從一些有助健康的生活小秘方	1	2	3	4	5
29	我想通過堅持健康的生活方式以保持好身材	1	2	3	4	5
30	沒有堅持健康的生活方式，是因為我相信生死有命，富貴在天	1	2	3	4	5
31	為了讓他人高興，我才會堅持健康的生活方式	1	2	3	4	5
32	身邊的人出現過健康問題，我才會堅持健康的生活方式	1	2	3	4	5
33	如果沒有堅持健康的生活方式，我會感到內疚	1	2	3	4	5
34	我想堅持健康的生活方式，是因為我相信生活方式會影響健康	1	2	3	4	5
35	堅持健康的生活方式讓我得到愉悅和滿足	1	2	3	4	5
36	沒有堅持健康的生活方式，是因為我不喜歡一成不變的生活	1	2	3	4	5

題號	題　　　目	你　的　選　擇				
37	在傳媒的影響下，我才會堅持健康的生活方式	1	2	3	4	5
38	如果沒有堅持健康的生活方式，我會鄙視自己	1	2	3	4	5
39	堅持健康的生活方式是我的習慣	1	2	3	4	5
40	堅持健康的生活方式是我的一種人生觀	1	2	3	4	5

Appendix F: Revised Version of CSHM-Q for Validation Study

大學生健康動機量表

　　健康的生活方式是有利於維持健康的一系列持續性的行為。這些行為是多種多樣的，每個人可能有不同的、個性化的健康生活方式。下列問題是通常會被問到的、有關堅持健康生活方式的原因，這些原因稱之為健康動機。請注意，這些題目所關注的並不是多樣化的健康行為，而是行為背後的原因。請仔細閱讀每一個題目，並選擇能準確反映你健康動機的項目（加粗或高亮以選擇）。

1. 沒有堅持健康的生活方式，是因為我覺得應及時行樂，活在當下

□ 非常反對　　　□ 反對　　　□ 既不同意，也不反對　　　□ 同意　　　□ 非常同意

2. 身邊有良好的環境設施，我才會堅持健康的生活方式

□ 非常反對　　　□ 反對　　　□ 既不同意，也不反對　　　□ 同意　　　□ 非常同意

3. 我想堅持健康的生活方式，是因為我覺得這樣做很重要

□ 非常反對　　　□ 反對　　　□ 既不同意，也不反對　　　□ 同意　　　□ 非常同意

4. 如果沒有堅持健康的生活方式，我會感到不安

□ 非常反對　　　□ 反對　　　□ 既不同意，也不反對　　　□ 同意　　　□ 非常同意

5. 我享受堅持健康的生活方式的過程

☐ 非常反對　　☐ 反對　　☐ 既不同意，也不反對　　☐ 同意　　☐ 非常同意

6. 除非遇到健康問題，我通常不會考慮健康的生活方式

☐ 非常反對　　☐ 反對　　☐ 既不同意，也不反對　　☐ 同意　　☐ 非常同意

7. 在公眾人士的影響下，我才會堅持健康的生活方式

☐ 非常反對　　☐ 反對　　☐ 既不同意，也不反對　　☐ 同意　　☐ 非常同意

8. 我希望通過堅持健康的生活方式，提高學習效率，取得好成績

☐ 非常反對　　☐ 反對　　☐ 既不同意，也不反對　　☐ 同意　　☐ 非常同意

9. 健康的生活方式是我應對外在壓力的方法之一

☐ 非常反對　　☐ 反對　　☐ 既不同意，也不反對　　☐ 同意　　☐ 非常同意

10. 如果沒有堅持健康的生活方式，我是因為缺乏自我控制能力

☐ 非常反對　　☐ 反對　　☐ 既不同意，也不反對　　☐ 同意　　☐ 非常同意

11. 我想通過堅持健康的生活方式對身邊的人產生積極影響

☐ 非常反對　　☐ 反對　　☐ 既不同意，也不反對　　☐ 同意　　☐ 非常同意

12. 堅持健康的生活方式對我來說是孝順父母的一種形式

☐ 非常反對　　☐ 反對　　☐ 既不同意，也不反對　　☐ 同意　　☐ 非常同意

13. 健康的生活方式對我而言並不重要

☐ 非常反對　　☐ 反對　　☐ 既不同意，也不反對　　☐ 同意　　☐ 非常同意

14. 在父母督促下，我才會堅持健康的生活方式

☐ 非常反對　　☐ 反對　　☐ 既不同意，也不反對　　☐ 同意　　☐ 非常同意

15. 自己曾有過健康方面的問題，我才會堅持健康的生活方式

☐ 非常反對　　☐ 反對　　☐ 既不同意，也不反對　　☐ 同意　　☐ 非常同意

16. 如果沒有堅持健康的生活方式，我會感到後悔

☐ 非常反對　　☐ 反對　　☐ 既不同意，也不反對　　☐ 同意　　☐ 非常同意

17. 沒有堅持健康的生活方式，是因為我生活中有許多更重要的事情

☐ 非常反對　　☐ 反對　　☐ 既不同意，也不反對　　☐ 同意　　☐ 非常同意

18. 沒有堅持健康的生活方式，是因為我相信生死有命，富貴在天

☐ 非常反對　　☐ 反對　　☐ 既不同意，也不反對　　☐ 同意　　☐ 非常同意

19. 為了讓他人高興，我才會堅持健康的生活方式

☐ 非常反對　　☐ 反對　　☐ 既不同意，也不反對　　☐ 同意　　☐ 非常同意

20. 身邊的人出現過健康問題，我才會堅持健康的生活方式

☐ 非常反對　　☐ 反對　　☐ 既不同意，也不反對　　☐ 同意　　☐ 非常同意

21. 如果沒有堅持健康的生活方式，我會感到內疚

☐ 非常反對　　☐ 反對　　☐ 既不同意，也不反對　　☐ 同意　　☐ 非常同意

22. 我想堅持健康的生活方式，是因為我相信生活方式會影響健康

□ 非常反對　　　□ 反對　　　　□ 既不同意，也不反對　　　□ 同意　　　□ 非常同意

23. 堅持健康的生活方式讓我得到愉悅和滿足

□ 非常反對　　　□ 反對　　　　□ 既不同意，也不反對　　　□ 同意　　　□ 非常同意

24. 在傳媒的影響下，我才會堅持健康的生活方式

□ 非常反對　　　□ 反對　　　　□ 既不同意，也不反對　　　□ 同意　　　□ 非常同意

大學生健康動機量表

健康的生活方式是有利於維持健康的一系列持續性的行為。這些行為是多種多樣的，每個人可能有不同的、個性化的健康生活方式。下列問題是通常會被問到的、有關堅持健康生活方式的原因，這些原因稱之為健康動機。請注意，這些題目所關注的並不是多樣化的健康行為，而是行為背後的原因。請仔細閱讀每一個題目，並選擇能準確反映你健康動機的項目（加粗或高亮以選擇）。

1．我想堅持健康的生活方式，是因為我相信生活方式會影響健康

□ 非常反對　　□ 反對　　□ 既不同意，也不反對　　□ 同意　　□ 非常同意

2. 堅持健康的生活方式讓我得到愉悅和滿足

□ 非常反對　　□ 反對　　□ 既不同意，也不反對　　□ 同意　　□ 非常同意

3. 我享受堅持健康的生活方式的過程

□ 非常反對　　□ 反對　　□ 既不同意，也不反對　　□ 同意　　□ 非常同意

4. 我希望通過堅持健康的生活方式，提高學習效率，取得好成績

□ 非常反對　　□ 反對　　□ 既不同意，也不反對　　□ 同意　　□ 非常同意

5. 堅持健康的生活方式對我來說是孝順父母的一種形式

□ 非常反對　　□ 反對　　□ 既不同意，也不反對　　□ 同意　　□ 非常同意

6. 健康的生活方式是應對外在壓力的方法之一

□ 非常反對　　□ 反對　　□ 既不同意，也不反對　　□ 同意　　□ 非常同意

7. 沒有堅持健康的生活方式，是因為我覺得應及時行樂，活在當下

□ 非常反對　　□ 反對　　□ 既不同意，也不反對　　□ 同意　　□ 非常同意

8. 除非遇到健康問題，我通常不會考慮健康的生活方式

□ 非常反對　　□ 反對　　□ 既不同意，也不反對　　□ 同意　　□ 非常同意

9. 沒有堅持健康的生活方式，是因為我生活中有許多更重要的事情

□ 非常反對　　□ 反對　　□ 既不同意，也不反對　　□ 同意　　□ 非常同意

10. 如果沒有堅持健康的生活方式，我會感到內疚

□ 非常反對　　□ 反對　　□ 既不同意，也不反對　　□ 同意　　□ 非常同意

11. 如果沒有堅持健康的生活方式，我會感到不安

☐ 非常反對　　　☐ 反對　　　☐ 既不同意，也不反對　　　☐ 同意　　　☐ 非常同意

12. 如果沒有堅持健康的生活方式，我會感到后悔

☐ 非常反對　　　☐ 反對　　　☐ 既不同意，也不反對　　　☐ 同意　　　☐ 非常同意

[1] I practice health-promoting lifestyles because I believe there are strong connections between health and lifestyle

□ Strongly Disagree   □ Disagree   □ Neither Disagree Nor Agree   □ Agree   □ Strongly Agree

[2] I get pleasure and satisfaction from practicing health-promoting lifestyles

□ Strongly Disagree   □ Disagree   □ Neither Disagree Nor Agree   □ Agree   □ Strongly Agree

[3] I enjoy the process of practicing health-promoting lifestyles

□ Strongly Disagree   □ Disagree   □ Neither Disagree Nor Agree   □ Agree   □ Strongly Agree

[4] I practice health-promoting lifestyles in order to keep up a good performance on my study

□ Strongly Disagree   □ Disagree   □ Neither Disagree Nor Agree   □ Agree   □ Strongly Agree

[5] Practicing health-promoting lifestyles is another form of filial piety to my parents

□ Strongly Disagree   □ Disagree   □ Neither Disagree Nor Agree   □ Agree   □ Strongly Agree

[6] I practice health-promoting lifestyles because I consider it as a way of pressure relief

□ Strongly Disagree   □ Disagree   □ Neither Disagree Nor Agree   □ Agree   □ Strongly Agree

[7] I do not practice health-promoting lifestyles because I just want to enjoy the pleasures of life at present

□ Strongly Disagree   □ Disagree   □ Neither Disagree Nor Agree   □ Agree   □ Strongly Agree

[8] I don't think of health-promoting lifestyles unless I have health problems

□ Strongly Disagree   □ Disagree   □ Neither Disagree Nor Agree   □ Agree   □ Strongly Agree

[9] There are other more important things to do rather than health-promoting lifestyles in my life

□ Strongly Disagree   □ Disagree   □ Neither Disagree Nor Agree   □ Agree   □ Strongly Agree

[10] I feel guilty when I don't practice health-promoting lifestyles

□ Strongly Disagree   □ Disagree   □ Neither Disagree Nor Agree   □ Agree   □ Strongly Agree

[11] I get upset if I don't practice health-promoting lifestyles

□ Strongly Disagree   □ Disagree   □ Neither Disagree Nor Agree   □ Agree   □ Strongly Agree

[12] I regret when I don't practice health-promoting lifestyles

□ Strongly Disagree   □ Disagree   □ Neither Disagree Nor Agree   □ Agree   □ Strongly Agree

Appendix I: Scoring Method for the CSHM-Q

The self-reported College Students Health Motivation Questionnaire (CSHM-Q) comprises 4 domains with 12 items in total. It can be used to examine college students' perceptions of the degree to which their health-promoting lifestyles are internal motivated or external motivated. The Health Motivation Index (HMI) can be created as a single score to reflect the degree to which the health-promoting lifestyles are self-determined. Computation of the HMI would be simple based on a summative-based scoring method for cross-sectional studies (Las Hayas, Bilbao, Quintana, Garcia, & Lafuente, 2011).

This scoring method is proposed based on several considerations. First, fully autonomous or non-autonomous health-promoting lifestyles are very unlikely to happen for emerging adults. In most cases in this study, they are both self-determined and non-self-determined to practice health-promoting lifestyles. Second, the concept of absence of health motivation is depended on research questions. Third, items from the external and introjected domains could form the non-self-determined sub-scale and items from the intrinsic domain could form the self-determined sub-scale. Thus, a self-concordance degree can be created by subtracting averaged non-self-determined sub-scale scores from averaged non-self-determined sub-scale scores.

It should be noted that responses on items within absence of health motivation are scored negatively. In other words, total score is calculated by summing up sub-scale scores of external, introjected and intrinsic domains, and subtracting sub-scale score of absence domain. The total score can be averaged by the number of the items. Higher scores represent a higher level of self-determined health motivation. Lower scores indicate a higher level of non-self-determined health motivation. On the other hand, a self-concordance can be generated using the method described above.