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Contributors to wellness of university students

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Contributors to Wellness of University Students

PANG Sau Lin, Jofy

A thesis submitted in partial fulfillment of the requirements

for the degree of

Doctor of Philosophy

Principal Supervisor: Prof. CHOW Bik Chu

Hong Kong Baptist University

August 2014

DECLARATION

I hereby declare that this thesis presents my own work which has been done after registration for the degree of PhD at Hong Kong Baptist University, and has not been previously included in a thesis or dissertation submitted to this or other institution for a degree, diploma or other qualification.

Signature: _____

Date: August 2014

ABSTRACT

Wellness refers to the optimal state of being. A review of literature indicated that leisure time physical activity (LTPA), academic stress, leisure satisfaction, and perceived problem solving ability (PPSA) are prominent factors contributing to an individual's wellness. However, the underlying mechanism of how these factors affect wellness has not been explored. The purposes of this cross-sectional study were (1) to examine the relative contribution of LTPA, academic stress, leisure satisfaction, and PPSA to wellness of university students in Hong Kong; (2) to find out whether gender impacted the LTPA, academic stress, leisure satisfaction, PPSA, and wellness scores. A total of 712 participants took part in this study by completing a questionnaire on a voluntary basis. After data cleaning, 691 cases were used for further analyses using SPSS 17.0 and LISREL 8.7. Findings of this study indicated that university students in Hong Kong had moderate wellness perception ($M = 4.09$, possible range = 1 - 6) and academic stress levels ($M = 2.83$, possible range = 1 - 5). Male students reported higher level of wellness in physical domain while female students had higher level of wellness perception in social domain. Female students also

reported higher academic stress in psychosocial aspect. Results from the study suggested that PPSA and leisure satisfaction were the most significant contributing factors to wellness among male and female students but in different order. This study also found that 62.5% of the students did not take part in enough LTPA to the level that could bring health benefit to them. Based on these findings, recommendations were made to promote wellness among university students in Hong Kong.

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TABLE OF CONTENTS

	Page
DECLARATION.....	i
ABSTRACT.....	ii
ACKNOWLEDGEMENTS.....	iv
TABLE OF CONTENTS.....	v
LIST OF TABLES.....	xi
LIST OF FIGURES.....	xiii
LIST OF SYMBOLS.....	xv
LIST OF ABBREVIATIONS.....	xvi
CHAPTER 1	
INTRODUCTION.....	1
Background of Study.....	1
Statement of the Problem.....	6
Theoretical Basis of the Study.....	7
Research Questions.....	15
Research Hypotheses.....	15
Significance of the Study.....	16
Delimitations.....	17
Limitations.....	18
Assumptions.....	19

	Page
Definition of Terms.....	19
<i>Wellness</i>	19
<i>Academic Stress</i>	20
<i>Leisure Satisfaction</i>	21
<i>Perceived Problem Solving Ability (PPSA)</i>	21
<i>Leisure Time Physical Activity (LTPA)</i>	21
 CHAPTER 2	
LITERATURE REVIEW.....	23
Concept and Development of Wellness.....	23
Wellness Models.....	26
<i>The Wellness Continuum</i>	26
<i>The Six Dimensions of Wellness Model</i>	27
<i>The Wheel of Wellness</i>	28
<i>The Invisible Self</i>	30
Summary on Review of Wellness Models.....	31
Wellness Measurements Tools.....	32
<i>The Wellness Evaluation of Lifestyle (WEL)</i>	33
<i>The Five Factor Wellness Inventory (5F-Wel)</i>	33
<i>The Perceived Wellness Survey (PWS)</i>	34
<i>The Lifestyle Assessment Questionnaire (LAQ)</i>	35
<i>TestWell Wellness Inventory (TestWell)</i>	35

	Page
<i>HKPFA Wellness Test</i>	36
Summary on Wellness Measurement Tools.....	37
Previous Studies on Wellness.....	38
Factors Associated with Wellness.....	40
Academic Stress.....	40
<i>Academic Stress Scale (ASS)</i>	43
<i>Student-life Stress Inventory (SSI)</i>	44
<i>Academic Stress Questionnaire (ASQ)</i>	44
<i>Perceived Stress Scale (PSS)</i>	45
Summary on Academic Stress Measurement Tools.....	45
Leisure Satisfaction.....	48
<i>Leisure Satisfaction Scale (LSS)</i>	50
<i>Leisure Satisfaction Scale - Short Form (LSS-Short Form)</i> ..	51
Summary on Leisure Satisfaction Measurement Tools.....	51
Perceived Problem Solving Ability (PPSA).....	52
<i>Social Problem-Solving Inventory-Revised (SPSI-R)</i>	53
<i>Problem Solving Inventory (PSI)</i>	54
Summary on Problem Solving Measurement Tools.....	54
Leisure Time Physical Activity (LTPA).....	56
<i>International Physical Activity Questionnaire (IPAQ)</i>	56
<i>Godin Leisure-Time Exercise Questionnaire (QLTEQ)</i>	57

	Page
Summary on Leisure Time Physical Activity Measurement Tools....	58
Summary of Literature Review.....	58
CHAPTER 3	
METHOD OF STUDY.....	62
Participants.....	62
Instruments.....	63
<i>Wellness</i>	63
<i>Academic Stress</i>	64
<i>Leisure Satisfaction</i>	65
<i>Perceived Problem Solving Ability (PPSA)</i>	66
<i>Leisure Time Physical Activity (LTPA)</i>	67
Pilot Testing of the Instruments.....	68
Statistical Analysis.....	69
CHAPTER 4	
RESULTS.....	72
Treatment of Data.....	72
Sample Characteristics.....	73
Psychometric Properties of the Measurement Scales.....	75
Descriptive Statistics of Major Variables.....	84
Gender Differences.....	89
Hypotheses and Model Testing.....	91

	Page
<i>Hypothesis 1</i>	91
<i>Hypothesis 2</i>	92
<i>Total Sample Model</i>	93
<i>Hypothesis 3</i>	99
<i>Male Model</i>	99
<i>Female Model</i>	103
Supplementary Analyses.....	109
<i>Male Problem Solving and Wellness Model</i>	110
<i>Female Problem Solving and Wellness Model</i>	115
<i>Male Leisure Satisfaction and Wellness Model</i>	120
<i>Female Leisure Satisfaction and Wellness Model</i>	125
Summary of Results.....	130
CHAPTER 5	
DISCUSSION.....	134
Academic Stress of University Students in Hong Kong.....	134
Important Contributors to Academic Stress.....	137
Wellness of University Students in Hong Kong.....	139
Important Contributors to Wellness.....	142
<i>PPSA</i>	142
<i>Leisure Satisfaction</i>	144
<i>Academic Stress</i>	147

	Page
<i>LTPA</i>	148
Summary and Recommendations for Future Studies.....	152
REFERENCES.....	157
APPENDIX	
Questionnaire.....	183
CURRICULUM VITAE.....	191

LIST OF TABLES

Table	Page
1. University of the Participants.....	74
2. Year of Study of the Participants.....	75
3. Cronbach's Alpha for Measurement Scales Used in the Study.....	76
4. Mean and Standard Deviation of the Items of the PWS.....	78
5. Inter-correlation Coefficients of the Items of the PWS.....	79
6. Standardized Item Coefficients and Model Fit Indices of the Dimensions of the PWS.....	81
7. Descriptive Statistics of PWS, ASS, PSI, LSS and LTPA.....	85
8. Descriptive Statistics of Inter-correlations among Major Variables..	87
9. Summary of Standardized Effects of the Total Sample Model.....	96
10. Means, Standard Deviations and PPMC Coefficients of Male Students.....	100
11. Summary of Standardized Effects of the Male Model.....	103
12. Means, Standard Deviations and PPMC Coefficients of Female Students.....	104
13. Summary of Standardized Effects of the Female Model.....	107
14. Gender Differences of the Effects on Perceive Wellness.....	108
15. Descriptive Statistics and Inter-correlations among the Problem Solving Items and Wellness Domains of Male Students.....	112

Table	Page
16. Descriptive Statistics and Inter-correlations among the Problem Solving Items and Wellness Domains of Female Students.....	117
17. Descriptive Statistics and Inter-correlations among the Leisure Satisfaction Items and Wellness Domains of Male Students.....	122
18. Descriptive Statistics and Inter-correlations among the Leisure Satisfaction Items and Wellness Domains of Female Students.....	127

LIST OF FIGURES

Figure	Page
1. Model of Stress Process.....	8
2. Conceptual map of research questions.....	14
3. The Health Grid, Its Axes and Quadrants.....	25
4. The Illness-Wellness Continuum.....	27
5. The Six Dimensions of Wellness.....	28
6. The Wheel of Wellness.....	29
7. The Invisible Self.....	31
8. Factorial structure of the PWS with standardized coefficients.....	83
9. Total Sample Model subjected to path analysis.....	93
10. Standardized coefficients and t-values of Total Sample Model.....	94
11. New Total Sample Model subjected to path analysis.....	97
12. Standardized coefficients and t-values of New Total Sample Model.....	98
13. Standardized coefficients and t-values of Male Model.....	101
14. Standardized coefficients and t-values of Female Model.....	105
15. Male Problem Solving and Wellness Model.....	111
16. Standardized coefficients and t-values of Male Problem Solving and Wellness Model.....	114

Figure	Page
17. Standardized coefficients and t-values of Female Problem Solving and Wellness Model.....	119
18. Male Leisure Satisfaction and Wellness Model.....	121
19. Standardized coefficients and t-values of Male Leisure Satisfaction and Wellness Model.....	124
20. Standardized coefficients and t-values of Female Leisure Satisfaction and Wellness Model.....	129

LIST OF SYMBOLS

χ^2	Chi-square
r	Correlation coefficient
α	Cronbach's alpha
df	Degrees of freedom
F	Fisher's F ratio
GFI	Goodness-of-fit index
M	Mean
MANOVA	Multivariate analyses of variance
Max	Maximum
Min	Minimum
NNFI	Non-normed fit index
n	Number of sample
p	Probability
R^2	R-square
SD	Standard deviation
SRMR	Standardized root mean square

LIST OF ABBREVIATIONS

ACSM	American College of Sports Medicine
AS	Academic Stress
CDC	Centers for Disease Control and Prevention
CEPAS	Common English Proficiency Assessment System
GLTEQ	Godin Leisure Time Exercise Questionnaire
IELTS	International English Language Testing System
LeiS	Leisure Satisfaction
LTPA	Leisure Time Physical Activity
MET	Metabolic Equivalent
MIMIC	Multiple Indicators and Multiple Causes Model
PPMC	Pearson Product Moment Correlation
PPSA	Perceived Problem Solving Ability
PSI	Problem Solving Inventory
PWS	Perceived Wellness Scale
SPSS	Statistical Package for Social Science
UGC	University Grant Committee

CHAPTER 1

INTRODUCTION

Background of Study

Today, wellness is a widely used term by health and fitness professionals and the general public. Despite the considerable research conducted on wellness, there is a lack of consensus as to what constitutes wellness (Corbin & Pangrazi, 2001; Harari, Waehler, & Rogers, 2005; Roscoe, 2009). For years, health professionals, scholars and researchers have defined wellness differently. Bill Hetler (1984), widely known as the father of the modern wellness movement (Myers & Sweeney, 2007), defined wellness as “an active process through which people become aware of, and make choices toward a more successful existence” (p.14). Myers, Sweeney, and Witmer (2000) reviewed literature from different disciplines and concluded that wellness is “a way of life oriented toward optimal health and well-being, in which body, mind, and spirit are integrated by the individual to live life more fully within the human and natural community” (p. 252). More recently, Robins, Powers, and Burgess (2006) defined wellness as “an integrated and dynamic level of functioning oriented toward maximizing potential, dependent on self-responsibility” (p.8). Although the above definitions given to wellness vary according to the perspectives taken by the

health professionals, they all suggested that wellness represented the optimal functioning of all systems in the individuals. And, it was the responsibility of the individuals to take initiative to reach their maximum potential by making correct choices. Those systems or elements of wellness were sometimes referred to as “dimensions” or “components” in the literature (Alters & Schiff, 2006; Brown, Thomas, & Kotecki, 2002; Edlin, Golanaty, & Brown, 2002). Corbin and Pangrazi (2001) pointed out that the number of wellness dimensions could range from two to seven or more according to the perspective from which different authors defined wellness. However, they argued that the basics of personal wellness were concerned with an individual’s physical, social, intellectual, emotional, and spiritual dimensions. Other dimensions, such as vocational and environmental, were characteristics of the environment that influenced an individual’s wellness and thus less proximal.

To date, wellness research has branched into two major themes, one focuses on identifying determining factors of wellness and the other one on intervention. Research that sought to identify the determinants of wellness examined the demographic and psychosocial variables associated with wellness. For example, Hybertson, Hulme, Smith, and Holton (1992) studied the impact of age and social support systems on wellness and found that age interacted with the social

environmental factors to influence wellness in their sample of college students. Other correlates that have been identified included social support (Granello, 1999; Medland, Howard-Ruben, & Whitaker, 2004; Myers & Bechtel, 2004), physical activity (Bezner, Adams, & Whistler, 1999), exercise self-efficacy (Sidman, D'Abundo, & Hritz, 2009), perceived stress (Degges-White, Myers, Adelman, & Pastoor, 2003; Myers & Bechtel, 2004), life satisfaction (Degges-White & Myers, 2006), leisure satisfaction (Tsai, Liu, & Wu, 2012) and internet use (Erickson & Johnson, 2011). Research on interventions mainly evaluated the effectiveness of various planned intervention on enhancing wellness. These include studies on the impact of exercise on smoking (Anderson, Mizzari, & Kain, 2006; Harvey, Fleming, & Patterson, 2002), management of coronary heart disease (White & Jacques, 2007) cardiovascular disease (Anderson et al., 2006), and health related quality of life (Edries, Jelsma, & Maart, 2013).

Although research on wellness has accumulated over the past 20 years, there remains a paucity of research on wellness in university students. Among the handful of studies on wellness in university students, most attempted to evaluate the effectiveness of various wellness programmes offered by the universities (Higgins, Lauzon, Yew, Bratseth, & Morley, 2009; Lockwood & Wohl, 2012; Mack & Shaddox, 2004; McCormick & Lockwood, 2006; McGrady, Brennan, &

Lynch, 2009; Milroy, Orsini, D'Abundo & Sidman, 2013) and relatively little attention has been paid to identify factors associated with wellness among university students.

Traditionally, Chinese placed greater emphasis on academic achievement than other ethnicities (Ang & Huan, 2006a; Huan, Yeo, Ang & Chong, 2006). Hong Kong is a city of China where academic success is highly valued. Thus, the university students in Hong Kong may face immense pressure. Their stress can be further intensified by the changes in some local educational policies in higher education. These changes include the introduction of the Common English Proficiency Assessment Scheme (CEPAS) in 2002/03 under which final year students of undergraduate programmes funded by the University Grant Council (UGC) are encouraged to take the International English Language Testing System (IELTS) (University Grant Committee, 2003). Results of the test could have far-reaching impacts on the students in terms of their future employment and further studies.

On the other hand, to provide more articulation opportunities for Associate Degree graduates and holders of other relevant qualifications, another change of educational policy involved the provision of about 3,800 publicly-funded Year 2 and Year 3 undergraduate places in the UGC-funded institutions (University

undergraduate places, 2007) by phases from the 2005/06 to 2010/11 academic years. Since 2005/06, local universities in Hong Kong have also begun to admit non-local students (majority from Mainland China) to their full-time publicly-funded programmes up to 10% of the approved student number targets (Cheng et al., 2009). The increase in student number due to these two policies may have resulted in larger class size, keen competitions among university students for resources as well as academic achievement. The above changes may put university students in Hong Kong under tremendous stress and may have affected their wellness negatively. Therefore the issue of student stress and wellness deserves more attention from all concerned.

Researchers and scholars (e.g. Donatelle, 2009; Gwen, Powers, & Burgess, 2011; Hoeger, Turner, & Hafen, 2002) supported that wellness could be influenced by many factors. When resources are limited, one should focus on identifying factors that are modifiable. This is in line with the view of health professionals interested in behavioral change. Green and Kreuter (1999) suggested that among the modifiable factors, one should only concentrate on those that were more important to the health condition under study. The present study aimed to study underlying mechanism influencing wellness, and thus, the focus is on the more important and modifiable factors contributing to wellness. Although

extensive review of literature provided a short listing of potential variables affecting wellness, the paucity of wellness research, particularly on the wellness of university students, rendered the validity of these variables questionable. Wellness is a desirable health condition and there is a genuine need to collect more evidence related to its correlates. The presence of a literature gap in wellness of university students prompted the need to conduct studies on this population.

Statement of the Problem

In the 1980s, fewer than 5% of people had access to university education in Hong Kong. The number was increased to 18% in 1989 by Lord Wilson, the then British Governor of Hong Kong (Witt, 1993). Today, chances for entering universities in Hong Kong have been greater than previously. Graduates from Associate Degree programmes with outstanding academic achievement can also continue their studies in government funded institutions. More Year 2 undergraduate places in the UGC-funded institutions have been provided for Associate Degree graduates since 2005/06. Whether those students getting in university by such means would experience greater academic stress is worth noting. Other changes in local education policies at tertiary level such as the introduction of the Common English Proficiency Assessment Scheme (CEPAS)

and the increase in non-local student quota for publicly-funded programmes may also create undue stress to the students in Hong Kong and affect their wellness negatively. University students are future leaders of the society. Therefore, there is a need to examine their overall wellness. Findings from previous research provided some evidence on the correlates of wellness. However, the validity of these correlates had not been examined in Hong Kong university students. The purpose of this study was to assess the relative contribution of a set of modifiable variables, previously found to be associated with wellness in the literature, to wellness of university students. This set of variables included leisure time physical activity (LTPA) and leisure satisfaction. As the target population of interest was university students, academic stress and PPSA were also included as wellness correlates. By gaining more evidence-based information about the effects of these factors on the wellness perception of the target group, some effective and appropriate recommendations can be made.

Theoretical Basis of the Study

Although previous studies have identified important factors contributing to wellness, not much effort has been made to propose for different behavioral-related wellness models and to test for them for a deeper

understanding of the wellness concept. The present study aimed to make a contribution by incorporating wellness as an outcome variable in a behavioural model. The model selected was the Model of Stress Process which was developed by Carson and Hardy (1998) (see Figure 1).

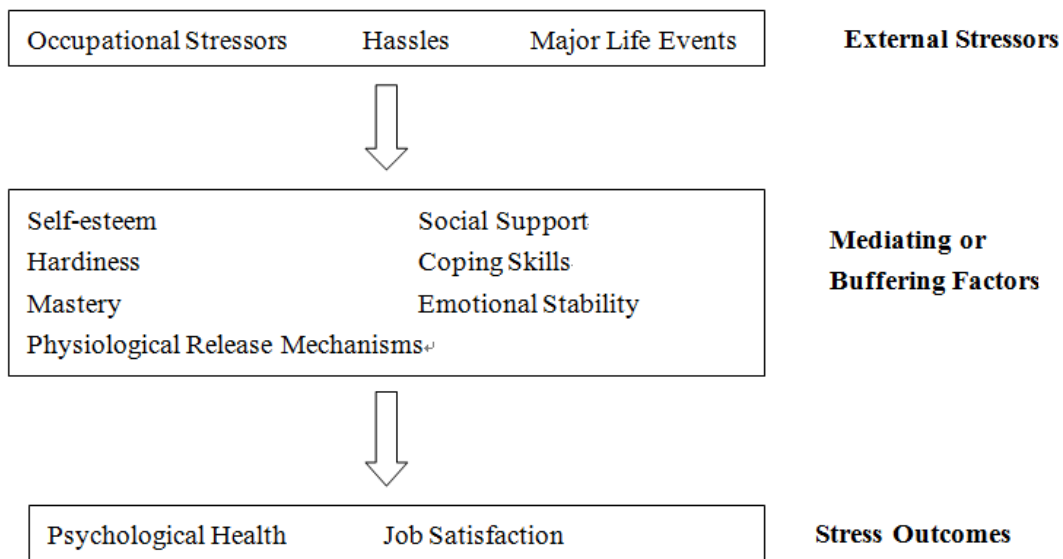


Figure 1. Model of Stress Process (Carson & Hardy, 1998)

According to Carson and Hardy (1998), occupational stressors, daily hassles and major life events were the main sources of external stressors faced by an individual. If the individual did not have enough personal resources (buffering factors) to manage those external stressors, his/her health and job satisfaction would be adversely affected. On the contrary, an individual who had the resources to cope with the external stressors would experience less negative

outcomes from stress.

Although the original model was meant for explaining occupational stress, the stress process could also be applied to study students' stress. Carson and Hardy's model adequately explained how external stressors affected the health of an individual. However, the predicted stress outcome, namely psychological health, was rather limiting. Therefore, the present study aimed to refine the model by including wellness - a holistic construct that included physical, social, emotional, psychological, intellectual, and spiritual dimensions, as the outcome variable. By doing so, a better understanding of the impacts of stress could be obtained.

In this study, academic stress was identified as the major external stressor of university students. It was well supported by different studies (Abouserie, 1994; Akgun & Ciarrochi, 2003; Michie, Glachan & Bray, 2001; Misra & McKean, 2000; Renk & Smith, 2007). When refining Carson and Hardy's model, some important and modifiable variables which were found to be crucial to academic stress and wellness were included. Based on the literature reviewed, these variables included leisure time physical activity (LTPA), leisure satisfaction and perceived problem solving ability (PPSA). It had been well documented that regular physical activity contributed to the prevention of several chronic diseases

(e.g. cardiovascular disease, diabetes, cancer, hypertension, obesity, depression and osteoporosis) and premature death (Warburton, Nicol & Bredin, 2006). It was also found that participating in physical activity was an effective means to reduce stress in adolescents (Norris, Carroll, & Cochrane, 1992) and college students (Bass, Enochs, & DiBrezzo, 2002). Results from previous studies indicated that leisure participation could enhance health and help individuals to cope with stressful life events (Iwasaki, 2006; Siegenthaler, 1997). Leisure satisfaction was also found to be one of the most important determinants of life satisfaction and psychological well-being (Ashby, Kottman, & DeGraaf, 1999). On the other hand, previous studies had indicated that PPSA was an effective factor for combating stress. Results from research indicated that PPSA significantly predicted the perception of stress and health of an individual (Largo-Wight, Peterson, & Chen, 2005).

Many of the previous studies conducted on LTPA, leisure satisfaction, PPSA, academic stress and wellness were cross-sectional correlational studies. For instance, negative correlation between leisure satisfaction and academic stress had been reported (Misra & McKean, 2000; Ragheb & McKinney, 1993); significant correlation between leisure satisfaction and spiritual wellness had been found (Tsai et al., 2012); academic stress was positively associated with depression and

physical illness (MacGeorge, Samter, & Gillihan, 2005); an inverse relationship between perceived stress and happiness was found (Schiffrin & Nelson, 2010); leisure time activity was associated with physical and psychological wellness (Bezner et al., 1999). As cross-sectional correlational studies do not imply causal relationship, the direction of association between the variables is far from conclusive. It is possible that LTPA, leisure satisfaction and PPSA affects the broader aspects of wellness and that academic stress is one of the many paths in which these factors impact on wellness. As such, the model proposed in this study conceptualized that LTPA, leisure satisfaction and PPSA would impact on academic stress which in turns impact on wellness. Simply put, academic stress was treated as a mediator in the proposed model.

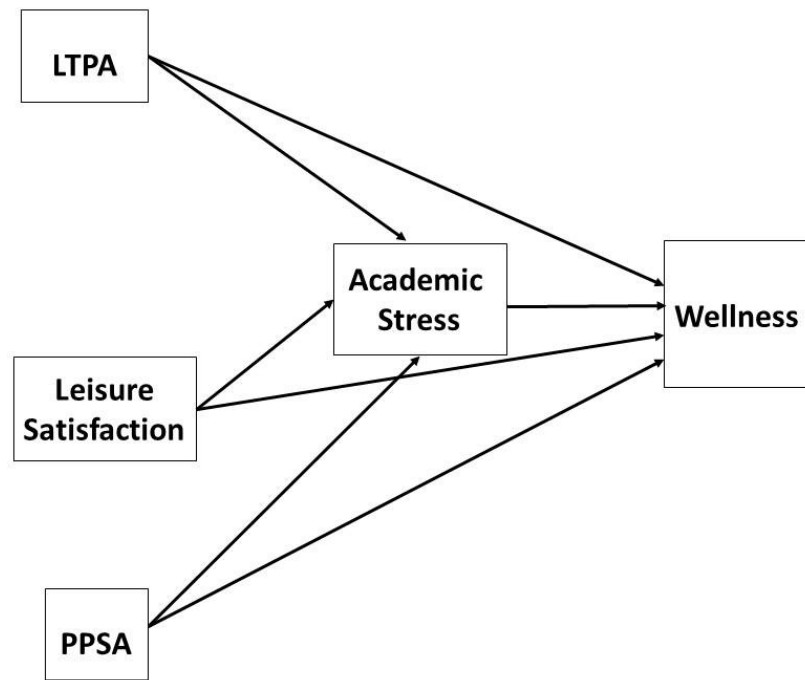
Stress has been viewed as a mediator by researchers in previous studies. Gustafsson and Skoog (2012) conducted a study to investigate the relationship between optimism and burnout symptoms among athletes, and the mediating role played by stress in the relationships. Results from the study revealed that perceived stress fully mediated the links between optimism and two burnout dimensions of exhaustion and sport devaluation. In another study to examine the relations between childhood maltreatment, daily life hassles, and intimate partner violence among low-income, suicidal, abused African American women, Patel,

Bhaju, Thompson, and Kaslow (2012) found that daily life stressors mediated the link between childhood maltreatment and intimate partner violence.

Stress has also been used previously as a mediator in different models. Miquelon and Vallerand (2006) conducted three studies to test an integrative model that examined the relationships between goal motives (i.e. autonomous verses controlled), happiness, self-realization, and physical health. It was found that happiness and self-realization were predicted by autonomous and controlled goals and were closely associated with physical health. Results from one of the studies also revealed that academic stress mediated the relationship between self-realization and physical health. In another study, Yu, Chiu, Lin, Wang, and Chen (2007) proposed a theoretical stress-health model to investigate the roles that objective stress, subjective stress, social support, coping strategies, and personality traits played in the relationship between stress and health. Results from the study indicated that subjective stress had a significant direct influence on health, whereas objective stress required the mediating function of subjective stress so as to exercise an influence on health.

Similar model as the one used in the present study had been adopted by Nonis, Hudson, Logan, and Ford (1998) to explore the links between college students' perceived control of time, stress, health, problem-solving ability, and

academic performance. In their proposed model, it was hypothesized that perceived control of time would have a negative influence on perceived academic stress, and a positive influence on health, perceived problem solving ability, and academic performance. Perceived academic stress was also hypothesized to have a negative influence on health, perceived problem solving ability, and academic performance. One limitation of the proposed model is the indirect effect of perceived control of time on health, perceived problem solving ability and academic performance via perceived academic stress was not tested. The present study aimed at improving the model by testing the mediating effect of perceived academic stress in an alternative model. In other words, the mediating effects of perceived academic stress on the relationship between LTPA, leisure satisfaction, PPSA, and wellness among university students would be studied. As no similar study has been conducted before, it is hoped that the model proposed in the present study would fill the research gap and provide the groundwork for future researchers to construct and evaluate alternative models. A graphic representation of the model for this study is presented in Figure 2.



Note. LTPA = Leisure Time Physical Activity; PPSA = Perceived Problem Solving Ability.

Figure 2. Conceptual map of research questions

In this figure, a path model has been drawn to represent a simultaneous regression analysis. Simultaneous regression models typically have two or more imbedded linear regression equations (Garson, 2013). In the first linear regression equation, academic stress would serve as the endogenous variable with three exogenous variables (LTPA, leisure satisfaction, and PPSA). In the second linear regression equation, wellness would be the endogenous variable with four exogenous variables (LTPA, leisure satisfaction, PPSA, and academic stress). In

the simultaneous regression equations, LTPA, leisure satisfaction, and PPSA were hypothesized to have a direct effect on both academic and wellness. Academic stress also was hypothesized to have a direct effect on wellness. At the same time, LTPA, leisure satisfaction, and PPSA were hypothesized to have an indirect effect on wellness via academic stress.

Research Questions

This study examined systematically wellness among university students in Hong Kong. The main goal of this study was to answer the following two research questions:

1. How does academic stress, LTPA, leisure satisfaction, and PPSA independently and collaboratively contribute to wellness of university students?
2. How does gender impact academic stress, LTPA, leisure satisfaction, PPSA, and wellness scores of university students?

Research Hypotheses

Based on the previous literature, it was hypothesized that:

1. The various factors would contribute to wellness independently:

- a. Academic stress would be negatively associated with wellness
 - b. LTPA would be positively associated with wellness
 - c. Leisure satisfaction would be positively associated with wellness
 - d. PPSA would be positively associated with wellness
2. The effects of LTPA, leisure satisfaction and PPSA on wellness would be mediated by academic stress
- a. LTPA would exert indirect effect on wellness through academic stress
 - b. Leisure satisfaction would exert indirect effect on wellness through academics stress
 - c. PPSA would exert indirect effect on wellness through academic stress
3. The various factors would have different weights in predicting wellness among male and female students.

Significance of the Study

A high level of wellness represents the optimal functioning of all systems in individuals and thus, a naturally sought after condition. This study examined systematically wellness among university students in Hong Kong. It has

important theoretical, empirical, and practical value. Theoretically, the proposed study would enhance existing knowledge regarding wellness by identifying its contributors. Empirically, results from this study would be useful in future multi-site studies to assess the relative weights of different factors in different settings. In terms of practice, specification of factors related to wellness would provide a rational basis for effective prevention and intervention programs. Understanding the various factors related to wellness may help promote early intervention and prevent cases from escalating to clinical problems. Understanding factors related to wellness may also help promote the mental health of students and prepare them for the challenge of examinations and university lives.

Delimitations

The following delimitations were noted in this study:

1. This study examined the relationship among LTPA, leisure satisfaction, PPSA, academic stress and wellness in one selected population, namely university undergraduate students enrolled in full time UGC-funded programmes in Hong Kong.
2. In order to study a focused homogenous sample, exchange students joining

the UCG-funded undergraduate programmes were excluded.

Limitations

The following limitations were identified:

1. Due to the constraints in time and resources, it would not be possible to include all the wellness determinants in the model. In this study, those determinants were limited to those which were more changeable and had been identified by previous studies as important contributors to wellness.
2. Since only university students were studied, the findings have limited generalizability to other populations.
3. The use of convenience sampling method of data collection also imposed limitations in interpreting the data and findings.
4. Using Associate Degree students as sample in the pilot study can be a limitation because their background may be different from those taking a bachelor degree.
5. Associate degree graduates were not identified. So comparison of the stress level between associate degree graduates and students who were admitted directly to undergraduate programmes could not be made.
6. Since the present study relied on the subjective report of university students

and no external verification were employed, the results might be subjected to recall bias and might be influenced by social desirability issues.

Assumptions

The following assumptions were made for this study:

1. It was assumed that full-time students enrolled in the various programmes of the eight local universities shared some kind of similarities in their determinants of wellness. It was also assumed that findings derived from their responses could be applied to others in the population under study.
2. It was also assumed that the university students were able to read and understand all the questions in the questionnaires and they would answer the questions honestly and provide truthful information.

Definition of Terms

To ensure a common understanding of the concepts involved in this study, the terms used in the study were operationally defined as follows:

Wellness

There is no universally accepted definition of wellness. The present study

adopted the wellness model proposed by Adams, Bezner, and Steinhardt (1997).

In their model, wellness consisted of six dimensions, namely physical, social, intellectual, emotional, spiritual, and psychological. Individuals who performed well in these six dimensions were regarded as having a high level of wellness.

Studies on wellness were often based on individuals' own perception. Subjective perceptions were valid indicators that reflect the conditions of individuals (Adams, Bezner, & Steinhardt, 1997). Therefore, wellness used in the present study referred to perceived wellness of the individuals.

Academic Stress

According to Selye (1974), an individual experienced stress when he/she assessed a situation or stimulus as threatening regardless of its actual threat value.

In this study, academic stress was operationally defined as stress experienced by the individual when assessing situations or stimuli encountered or associated with the classroom's physical and social environment, mechanisms of teaching, and demands related to learning. Some examples of these situations or stimuli in academic context were examinations, arriving late for class, and crowded classrooms.

Leisure Satisfaction

Beard and Ragheb (1980) defined leisure satisfaction as the “positive perceptions or feelings which an individual forms, elicits, or gains as a result of engaging in leisure activities” (p. 22). In this study, leisure satisfaction was operationally defined as the gratification that individuals derived from participating in any leisure activities of their own choice.

Perceived Problem Solving Ability (PPSA)

Actual problem solving ability referred to a skill or a cognitive resource which involved the ability to plan, organize, take action, adapt, and summarize (Carson & Runco, 1999). PPSA was operationally defined as an individual’s perception of himself/herself as having such actual problem solving ability.

Leisure Time Physical Activity (LTPA)

Physical activity referred to “any bodily movement produced by skeletal muscles that results in energy expenditure” (Caspersen, Powell, & Christenson, 1985, p.126). Therefore, physical activity basically includes all kinds of physical movements regardless of the energy expenditure. Activities like sports, housework, gardening, playing with kids can also be regarded as physical

activities. However, in this study, leisure time physical activity was operationally defined as sports activities that individuals joined intentionally during their leisure time for their own benefit.

CHAPTER 2

LITERATURE REVIEW

This chapter attempts to summarize some of the literature related to the study. As the purpose of the study was to examine the effects of leisure satisfaction, perceived problem solving ability, and leisure time physical activity on academic stress and wellness, the review of literature was conducted in the areas of: (1) concept and development of wellness, (2) wellness models, (3) wellness measurement tools, (4) factors associated with wellness, and (5) summary of literature review.

Concept and Development of Wellness

The term “wellness” was coined by Dr. Halbert Dunn in 1959. After the end of the Second World War, there was a change in society’s health needs. The advances in medicines and technology, the discovery of antibiotics, and improved sanitation had increased life expectancy. Infectious diseases were no longer the leading cause of death. Instead chronic and lifestyle illnesses like cardiovascular disease, diabetes, cancer had become the major health concern (Dunn, 1959; Miller, 2005; Miller & Foster 2010; Robbins et al., 2006). As a preventive measure, Dunn (1959) envisaged the need for health practitioners to shift their

focus from fighting battles with diseases to raising the general levels of wellness among all peoples. He defined wellness as “an integrated method of functioning which is oriented to maximizing the potential of which an individual is capable, within the environment where he is functioning” (Dunn, 1961, p.4-5).

Based on his concept of wellness, Dunn developed a new “Health Grid” (Figure 3). High-level wellness located in the right hand quadrant of his grid, where positive health and a favorable environment intersected. Dunn’s health grid put forth the idea that wellness was a continuum rather than a fixed state. Everybody was somewhere along the continuum between death and wellness and should actively work to reach high-level wellness. He also believed that we should view life in its totality and consider the unity of man as a whole. To achieve high-level wellness, harmony between body, mind, and spirit had to be maintained.

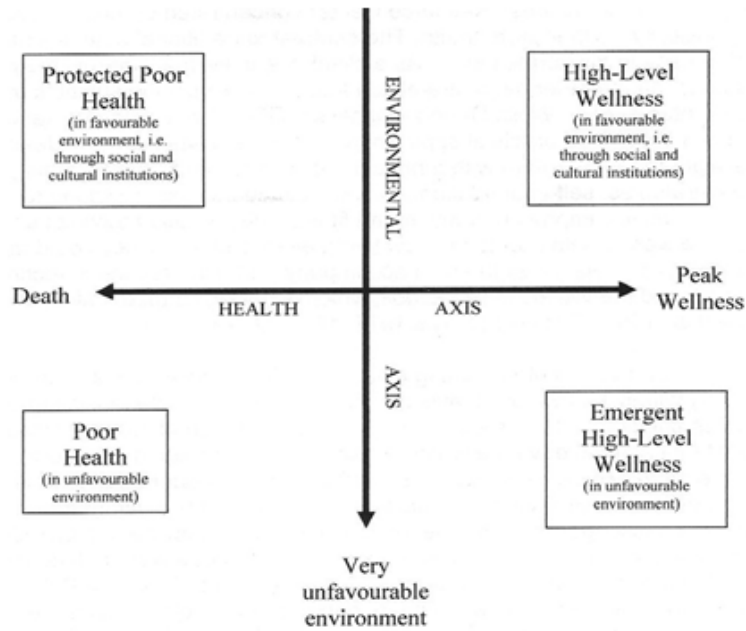


Figure 3. The Health Grid, Its Axes and Quadrants (Dunn, 1959)

Dunn presented his ideas about wellness in 29 short talks and later published his collection of presentations under the book title “High-Level Wellness”. This started the wellness movement in the United States and his idea about wellness had significant impact on a number of people. They formulated their own definitions of wellness and established different wellness models to promote this concept to the general public. Some of the definitions and wellness models have been widely used in different wellness programmes and research studies.

Wellness Models

Wellness models were reviewed in the following sections. The developers, major components and special characteristics of each of the models were highlighted.

The Wellness Continuum

The Wellness Continuum was first developed by John Travis in 1972 (n.d.-a). He modified Dunn's "Health Grid" and reduced it to a single continuum from premature death on one end to high level wellness on the other (Figure 4). The Wellness Continuum illustrated the relationship of the wellness and treatment paradigms. Moving from the midpoint to the left showed a deteriorating state of health. Moving from the midpoint to the right represented an increasing level of wellness. Practitioners of traditional medicine could alleviate disease symptoms and bring people to the neutral point. Whereas wellness education and leading a healthy lifestyle could help people move towards high levels of wellness. The Wellness Continuum indicated clearly that wellness was not a static state. It was a dynamic process that could be affected by human choices. Therefore, it was the responsibility of each individual to move toward high level wellness. Since its development, the Wellness Continuum had been widely used by health practitioners and educators and had undergone some minor modifications until it

took its present form.

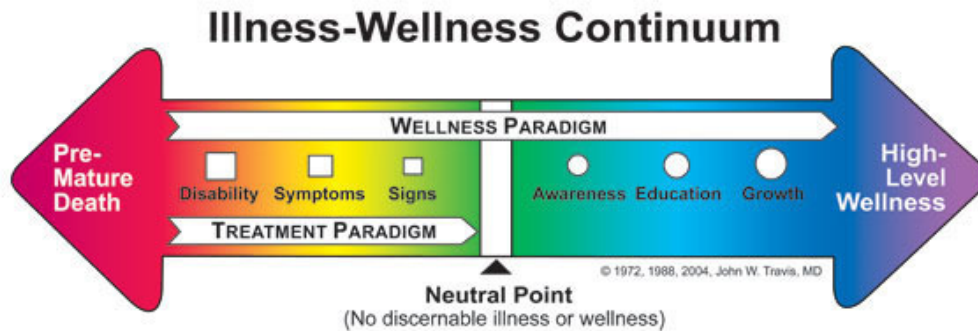


Figure 4. The Illness-Wellness Continuum (Travis, n.d.-b)

The Six Dimensions of Wellness Model

The Six Dimensions of Wellness Model was devised by Dr. Bill Hetler (1976). He defined wellness by six equal areas of our life: physical, emotional, social, intellectual, occupational and spiritual (see Figure 5). No single dimension was more important than the other. Each dimension could affect each other and determine our overall wellness status. In order to enjoy good health, a harmonious balance of all the six dimensions had to be maintained. This model offered an integrated overview of all human life functions and ended the piecemeal way of looking at health (Blaxell, 2002).



Figure 5. The Six Dimensions of Wellness (Hetler, 1976)

The Wheel of Wellness

The Wheel of Wellness was developed by Sweeney and Witmer (1991) and Witmer and Sweeney (1992). It was the first model of wellness based in counseling theory. Adler's Individual Psychology was used as an organizing theory of the model. The Wheel contained five interrelated life tasks: spirituality, self-direction, work and leisure, friendship, and love. Spirituality, the most important characteristics of wellness, was depicted as the centre of the wheel. Surrounding the centre were 12 spokes in the life task of self-direction: sense of worth, sense of control, realistic beliefs, emotional awareness and management,

problem solving and creativity, sense of humor, nutrition, exercise, self-care, stress management, gender identity, and cultural identity. All these components of individual wellness all operated within the contexts of family, community, government, media, business and industry, education, and religion. In addition, individual wellness was also influenced by global events (see Figure 6). All the components of wellness were interactive, and change in one area would lead to changes in other areas of the model.

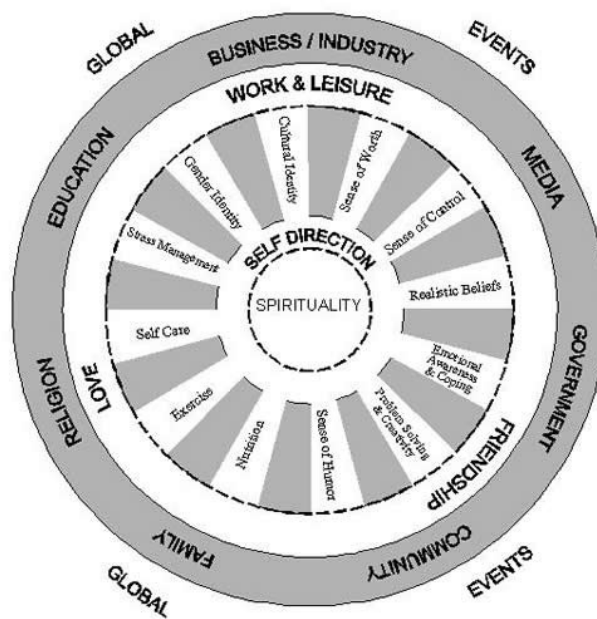


Figure 6. The Wheel of Wellness (Witmer, Sweeney, & Myers, 1998)

The Indivisible Self

Based on research using the Wheel of Wellness, Myers and Sweeney (2004) developed a new model called the Indivisible Self. In this model, self was at the core of wellness and was depicted as indivisible. There were five factors in this new model: Essential Self, which referred to spirituality, gender identity, cultural identity and self-care; Coping Self, which was defined by realistic beliefs, stress management, self-worth and leisure; Social Self, which referred to friendship and love; Creative Self, related to intellectual endeavors, emotions, control, humor, and work; and lastly, Physical Self, which referred to nutrition and exercise. The Indivisible Self could both have an effect on and be affected by some environmental factors, namely local, institutional, global, and chronometrical (see Figure 7). Each component in the model interacted with all others to contribute to holistic functioning. Therefore, improvements in any one dimension would positively affect the whole person.

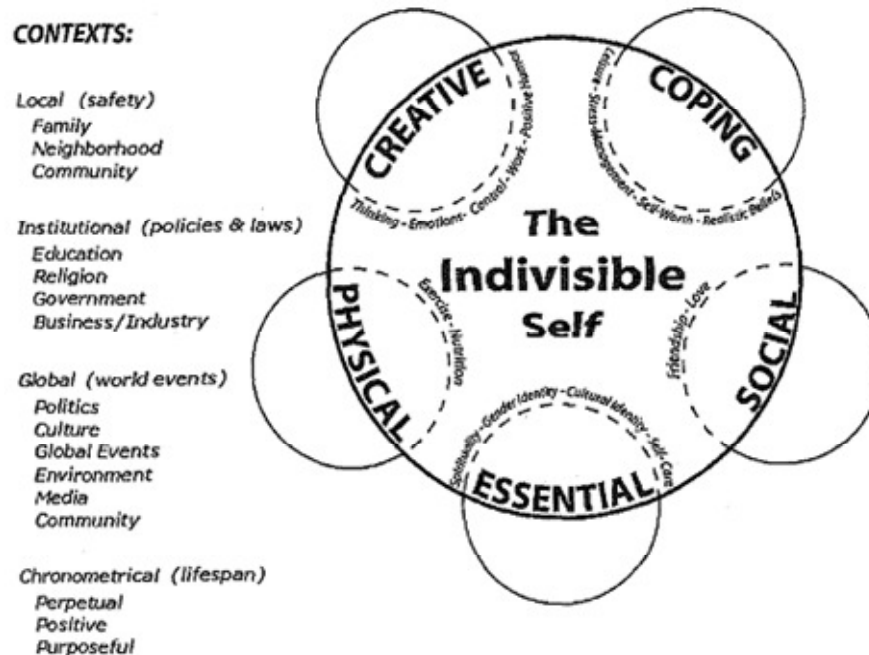


Figure 7. The Invisible Self (Myers & Sweeney, 2004)

Summary on Review of Wellness Models

Based on the above wellness models, some common characteristics about wellness can be identified. First, wellness is multidimensional and it encompasses all aspects of the individuals. All the dimensions are interrelated and no single dimension is more important than the others. Therefore, problems in one dimension will affect the others. To achieve maximum functioning, a balance of all the dimensions is required. Besides, wellness is not a static state. Being well in all dimensions at a certain point of time does not guarantee optimal functioning of all the systems in the future. Moreover, maintaining wellness is

self-responsibility. Individuals can play an active and dynamic role to obtain wellness by pursuing a healthy lifestyle and making sensible choices.

Wellness Measurement Tools

Over the years, researchers and health practitioners have developed different instruments to measure wellness. These tools have been used widely by people from various professions to serve different purposes. People from colleges and universities used the tools to measure the effectiveness of their wellness enhancement courses or programs (Downing & Masterson, 2006; McCormick & Lockwood, 2006; McGrady et al., 2009; Morgan, 2006; Sidman et al., 2009; Sidman, Fiala, & D'Abundo, 2011) whereas counselors used the tools to gather information to help their clients understand and cope with their problems (White & Myers, 2006; Myers et al., 2000). Wellness measurement has also been used by social workers and medical practitioners to measure the effectiveness of their planned intervention on the overall wellness of their clients (White, Myers, Adelman, & Pastoor, 2003). A review of the more frequently used wellness instruments is presented in the following sections.

The Wellness Evaluation of Lifestyle (WEL)

The Wellness Evaluation of Lifestyle (WEL) inventory was developed by Myers, Sweeney and Witmer (1996). It was based on the “Wheel of Wellness”, a holistic model which was developed to measure individual wellness. The WEL consisted of 131 items that were organized into five life task categories (Spirituality, Self-Regulation, Work-Leisure, Friendship, and Love). The Self-Regulation life task was further divided into 12 sub-tasks as depicted in the Wheel of Wellness. Responses were made on 5-point Likert scales (strongly agree, agree, undecided, disagree, strongly disagree). Scores from each subscale were summed to derive a total wellness score for the inventory.

The Five Factor Wellness Inventory (5F-Wel)

The Five Factor Wellness Inventory (5F-Wel) was the latest version of the Wellness Evaluation of Lifestyle (WEL). It was developed by Myers, Luecht and Sweeney (2004) through a series of seven studies over a 12-year period. It was designed to assist individuals in making healthier lifestyle choices based on the “Indivisible Self Wellness (IS-WEL) model”. Wellness was measured based on five general factors (Creative Self, Coping Self, Social Self, Essential Self, and Physical Self). The 5F-Wel contained 73 items that reflected specific attitudinal

and behavioral statements. Self-report responses were provided using a 4-point Likert-type scale (i.e. 1 = strongly agree to 4 = strongly disagree). High scores reflected greater wellness. The 5F-Wel has versions for adult, adolescent and elementary age children and the instrument has been translated into different languages like Hebrew, Korean, Turkish, and Japanese.

The Perceived Wellness Survey (PWS)

The Perceived Wellness Survey (PWS) was developed by Adams et al. (1997). It was a 36-item instrument designed to assess an individual's wellness perceptions in six dimensions (Physical, Social, Emotional, Intellectual, Psychological, and Spiritual). There were six questions in each dimension. Responses to the questions were given on a 6-point scale ranging from "very strongly disagree" to "very strongly agree". Higher scores indicated greater wellness. The scale had been shown to possess adequate reliability and has been widely used among college population (Bezner et al., 1999; Murray, Miller, & Miller, 2001; Sidman et al., 2009). Detailed description about this instrument was presented in the next chapter.

The Lifestyle Assessment Questionnaire (LAQ)

The Lifestyle Assessment Questionnaire (LAQ) was developed by the National Wellness Institute (1983) at the University of Wisconsin in Stevens Point. It was developed to measure the six wellness dimensions outlined by Hetler (1976). It was a 286-item instrument designed to assist in the assessment of an individual's current level of wellness and in the identification of potential risks or hazards. The LAQ was divided into four parts: 1) Wellness Inventory, 2) Topics for Personal Growth, 3) Risk of Death Section, and 4) Alert Section: Medical/Behavioral/Emotion. The LAQ contained 100 questions and measured 11 dimensions. Items were scored on a 5-point scale, with lower scores reflecting lower levels of personal wellness. Results of the LAQ reflected a person's health strength and the possible consequences of chosen health risks. The LAQ also helped a person assess what interest he/she had in improving the quality of his/her life directly related to the six dimensions of health.

TestWell Wellness Inventory (TestWell)

The TestWell Wellness Inventory (National Wellness Institute, 1999) was a modification of the LAQ. It was a 100-item inventory divided into 10 subscales of 10 items each (Stewart, Rowe, & LaLance, 2000). Using the six dimensions

suggested by the National Wellness Institute (physical, emotional, social, intellectual, occupational, and spiritual), the test developers of the TWI(HS) subdivided three domains (physical, social, and emotional) into subcategories for questionnaire. The subscales Physical Fitness and Nutrition, Self-Care, and Safety and Lifestyle were considered to belong to the physical dimension. The subscales Environmental Wellness and Social Awareness were considered to be subcategories of the social dimension. Under the emotional dimension, the authors of the inventory placed the subscales Emotional Awareness and Sexuality and Emotional Management. Three dimensions (intellectual, occupational, and spiritual wellness) were not subdivided. Each item on the test was a statement to which the participant responds using a 5-point Likert scale ranging from 1 (almost never) to 5 (almost always). Subscale total could range from a minimum of 10 (indicating the lowest level of wellness) to 50 (indicating the highest level of wellness). Total scores for the questionnaire thus might range from 100 to 500.

HKPFA Wellness Test

It is a 36-item instrument developed by Sum and Yuan (2006) in their book published by the Hong Kong Physical Fitness Association of Hong Kong. It was a Chinese wellness instrument which based on the six dimensional wellness

model proposed by Dr. Bill Hetler. There were six questions in each dimension. Responses to the questions were given on a 5-point Likert scale ranging from 1 (absolutely not) to 5 (absolutely yes). This locally developed instrument has not been used in large scale studies and it has not been validated yet.

Summary on Wellness Measurement Tools

The Wellness Evaluation of Lifestyle (WEL), Five Factor Wellness Inventory (5F-Wel), Lifestyle Assessment Questionnaire (LAQ) and TestWell Wellness Inventory (TestWell) are popular instruments which have been used in different research studies. However, the four instruments are rather lengthy and they consist of many subscales. The number of items range from 100 to 286 and the instruments contain 10 to 17 subscales. Myers et al. (2004) pointed out that having too many subscales could be difficult to manage as dependent or independent measures in any type of research study. They also found that the reliabilities of some of the subscales of the 5F-WEL were rather low (less than 0.80). Although the HKPFA Wellness Test is a locally developed instrument, it was not adopted for use in the present study because it has not been validated. The Perceived Wellness Survey (PWS) contained six dimensions popularly found in the literature (Miller & Foster, 2010). This measurement scale has been

widely used in studies that involved university students (Adams, Bezner, Drabbs, Zambarano, & Steinhardt, 2000; Sidman et al., 2009) and Chinese adults (Du, 2009; Tsai, 2004). Its validity and reliability were well established (Adams, Bezner, Garner, & Woodruff, 1998; Adams et al., 1997). Therefore, Perceived Wellness Survey (PWS) was used in the present study.

Previous Studies on Wellness

Nowadays, wellness programs are being offered in corporations, hospitals, schools, and institutions of higher education. Quite a number of research studies have been done to evaluate the effectiveness and impact of such wellness courses and programs. Downing, Masterson and Gray (2005) collected data from 982 volunteer students from a university core fitness for life course. The course was comprised of six sections of 1-hour weekly mass lectures plus 65 bi-weekly laboratory sections. Results indicated that no relationship existed between wellness knowledge and the exercise behaviors measured in the survey. In a similar study by Downing and Masterson in 2006, data were collected from 461 volunteer students. Again it was found that the course had no significant effect on the wellness attitudes or wellness behaviors of the participants. The results showed that the students valued wellness in theory but not necessarily in practice.

The knowledge they gained from wellness courses did not help them change their actual lifestyle. Similar results were obtained by Liguori (2006) in a study to assess the effect of a semester long physical activity and wellness course on cardiovascular fitness in college students. A total of 109 students joining a required activity and wellness course took part in the survey. They showed no improvement in cardiovascular fitness at semester end after meeting once a week for an activity lab. The results showed that other than providing adequate knowledge on overall wellness, extra effort had to be made by institutions of higher education to instill positive wellness attitudes and behaviors in young adults attending colleges and universities.

Some studies have been conducted to study the wellness of the less advantaged groups. White et al. (2003) surveyed 60 adults seeking medical care at a headache specialty clinic to provide preliminary information on levels of wellness and perceived stress in this population. It was found that the overall levels of wellness were low and their perceived stress was high compared to a norm group of adults. In another research study undertaken by Brylinsky and Hoadley (1991) to investigate whether there were differences in the self-reported level of wellness of college students reporting suicidal attempts, results indicated that the “Suicidal” and “At Risk” subjects scored lower than the “Control” group

on scales of emotional awareness and emotional management. In general, at risk youth lost interest in their usual activities, had low self-esteem, and high level of associated self-blame and self-criticism.

Factors Associated with Wellness

Previous studies have documented that wellness could be influenced by many factors. In this study, only those important and modifiable factors that had been found to be contributing to wellness were included. The following section will summarize the existing literature on those modifiable factors, some effective measurements and related research.

Academic Stress

Selye (1974) defined stress as the nonspecific response of the body to any demands made upon it. When demands were made on an individual, his/her body would try to adapt or adjust to the situation in order to re-establish homeostasis. However, not all individuals experienced stressful events in the same way. Their response depended on how they perceived the events and whether they believed they had the resources to respond to the stressor (Lazarus & Folkman, 1984). Stress is part of everyday life. It is believed that some stress

or stimulation is needed for optimal performance and moderate amount of stress can be “a motivator toward change and growth” that is beneficial to mental and physical health (Brown et al., 2002, p.292). However, too much stress would reduce the level of performance and lead to many stress-related illnesses such as high blood pressure, asthma, gastrointestinal upset, and skin problems (Edlin et al., 2002).

Stress that comes from work is called “job stress”, “work stress”, or “occupational stress”. Work-related stress arises where work demands of various types and combinations exceed the person’s capacity and capability to cope (Health and Safety Executive, n.d.). For stress which is related to studies, it is called “academic stress”, “study stress”, “student stress” or “college stress”. Research results showed that there had been an increase in student stress (Sax, 1997). Excessive stress from studies not only threatened the physical and psychological health of students (Ellard, Barlow, & Mian, 2005; Felsten, 2004; Kerr, Johnson, Gans, & Krumrine, 2004) but also had negative impacts on their academic performance (Rafidah, Azizah, Norzaidi, Chong, Salwani, & Noraini, 2009). One of the most frightening consequences of college student stress was suicide due to depression or unsatisfactory academic performance (Ang & Huan, 2006b). Attending universities was especially stressful for young people

because they had to make significant adjustments to college life and handle their daily living, studies, interpersonal relationships on their own (Larson, 2006; Rickinson, 1998; Ross, Niebling, & Heckert, 1999). Literature indicated that the greatest sources of academic stress came from examination and examination results, studying for exams, grade competition, too many tests, difficult courses and excessive homework (Abouserie, 1994; Agolla & Ongori, 2009; Archer & Lamnin, 1985; Kohn & Frazer, 1986; Lee, Kang, & Yum, 2005; Ong & Cheong, 2009). If university students had a high level of academic stress, their overall wellness would certainly be affected.

Over the years, quite a number of instruments had been developed to measure academic stress. These instruments mainly focus on identifying possible causes of academic stress and measuring students' reactions to different stressors. Some common stressors that have been identified include academic hassle, personal relationships, negative life events, financial difficulties, living and studying environments, and careers (Abouserie, 1994; Gadzella, 1991; Li, Lin, Bray, & Kehle, 2005; Kohn & Frazer, 1986). Measurement scales for measuring the stress of students taking different programmes have also been developed. The more popular ones include the areas of medicines (O'Rourke, Hammond, O'Flynn, & Boylan, 2010), nursing (Gibbons, Dempster, & Moutray, 2009), and pharmacy

(Alzaeem, Sulaiman, & Gillani, 2010). In the following session, some frequently used instruments for measuring academic stress of students were reviewed.

Academic Stress Scale. The 35-item Academic Stress Scale was developed by Kohn and Frazer (1986) to measure academic worry among college students. It measured the degree of academic worry across three subscales: physical, psychological, and psychosocial. Physical stressors were environmental factors which influenced behavior such as temperature, lighting, and noise. Psychological stressors referred to the irrational interpretation of events that resulted in emotional consequences (e.g. non-native language lectures, fast-paced lectures, reading wrong materials). Psychosocial stressors referred to interpersonal interactions which affected the behavior of an individual (e.g. excessive homework, studying for examinations, waiting for tests). Participants recorded the extent of worry they had on various academic issues, such as studying for examinations. Items were presented with a 1000-point Likert-type scale. Written instructions were given to the participants as follows: If the event was more stressful to them than taking an examination, the item was rated between 501 and 1000. If the event was less stressful to them than taking an

examination, the rating would be between 1 and 499. If it was as stressful as taking an examination, the rating would be 500. Responses were summed and averaged to create a total academic worry score. Higher scores indicated more academic worry.

Student-life Stress Inventory (SSI). Gadzella's Student-life Stress Inventory (SSI) (1991) was designed to assess the students' perceived academic stress and reactions to stress. The instrument contained 51 items arranged on a Likert response format (1 = never true to 5 = always true) that assessed five categories of academic stressors (frustrations, conflicts, pressures, changes, and self-imposed), and four categories describing reactions to stressors (physiological, emotional, behavioral, and cognitive). The items were summed for each subsection to get a total score in all nine categories. A higher score was indicative of greater stress and reactions to stress.

Academic Stress Questionnaire (ASQ). The Academic Stress Questionnaire (ASQ) (Abouserie, 1994) consisted of 34 potential causes of stress covering students' learning, examinations and results, conflict with lecturers and such situational variables as accommodation, financial problems, family crisis and

conflict with peers. The questionnaire invited respondents to indicate the degree of stress experienced in response to each item on a scale of 0 – 7, with “0” indicating “no stress” and “7” indicating “extreme stress”.

Perceived Stress Scale (PSS). The Perceived Stress Scale (PSS) (Cohen, Kamarck, and Mermelstein, 1983) was a measure of the degree to which situations in one’s life were appraised as stressful. Items were designed to tap how unpredictable, uncontrollable, and overloading respondents find their lives. The scale assessed the amount of stress in one’s life rather than in response to a specific stressor. Respondents were asked to rate the frequency of these items across a 5-point Likert-type scale ranging from “0” (never) to “4” (very often). Higher scores reflected greater perceived stress in the last month. There were three versions of the scale (4-item, 10-item and 14-item).

Summary on Academic Stress Measurement Tools

A review of literature showed that all the above four instruments have been used in numerous studies to measure stress of college students. Student-life Stress Inventory (SSI) was found to be a reliable instrument (Gadzella & Baloglu, 2001; Goff, 2011). However, the instrument measured not only the types of

stressors of college students but also their reactions to stressors (e.g. sweating, smoke excessively, attempted suicide). Both Academic Stress Questionnaire (ASQ) and Perceived Stress Scale (PSS) assessed the degree of stress experienced by the individuals rather than their response to a specific stressor. Yet, questions included in the two measurement scales were not confined to academic setting only. Items assessing individuals' responses to financial problems, family crisis, peer pressures were included in ASQ while stressful events like something happened unexpectedly and inability to control something important in life were included in PSS. Academic Stress Scale (ASS) has satisfactory internal consistency and split-half reliability (Kohn & Frazer, 1986). It has been widely used in studies that involved university students (Ginsberg, 2007; Roddenberry & Renk, 2010; Smith & Renk, 2007; Wilks, 2008). The 35 items in the scale are all related to academic worry of college students. Therefore, ASS was adopted for the present study.

Numerous studies have been conducted to examine the academic stress of college students. Bland, Melton, Welle, and Bigham (2012) undertook a study to identify lifestyle habits and coping strategies that might be significantly associated with high or low stress tolerance among millennial college students. They found

that coping mechanisms and lifestyle habits employed by the millennial college students were not only ineffective for alleviating stress, but also putting them at risk for low stress tolerance. Ross et al. (1999) conducted a study to identify the most prevalent sources of stress among college students. They reported that the top five sources of stress were change in sleeping habits, vacations/breaks, change in eating habits, increased work load and new responsibilities. MacGeorge et al. (2005) conducted a research to investigate the capacity of supportive communication from friends and family to buffer the association between academic stress and health among 739 college students. They found that academic stress was positively associated with symptoms of depression and physical illness. In a study to explore the effect of academic worry on sleep quality of college students, Ginsberg (2007) found that academic worry was significantly negatively related to sleep length. Misra and McKean (2000) surveyed 249 university undergraduates to investigate the academic stress, anxiety, time management, and leisure satisfaction of college students. It was found that time management had a greater buffering effect on academic stress than leisure satisfaction activities. Results from the study also indicated that female had more effective time management behaviors than male and they experienced higher academic stress and anxiety than their male counterparts. The findings showed

that faculty members and counselors should make more effort to organize time management workshops, programs and courses for college students. They should also pay more attention to publicize these events to help students better utilize these services. In short, most of the studies on academic stress were related to identifying the source of stress, evaluating its impacts on students, and searching for effective strategies to combat stress.

Leisure Satisfaction

According to Staley and Miller (1972), leisure was not merely “non-working time” or free time. They pointed out that “free time” was only a prerequisite for leisure. What really determined leisure was how a person utilized his/her free time. Therefore, individual feeling had to be considered and he/she should be given alternatives and could determine his/her own choice. Beard and Ragheb (1980) defined leisure satisfaction as a positive sensation experienced during or following a leisure activity and was considered an indication of the degree of contentment an individual experienced towards the activity.

For years, the contribution of leisure had attracted the attention of many researchers. Coleman (1998) surveyed 104 adults and found that leisure helped to maintain physical and mental health by facilitating people to resist stress

induced illness. Results from the study also showed that perceived leisure freedom could act as a buffer against the negative influence of life stress. In a study conducted by Iwasaki, Zuzanek, and Mannell (2001) using the data from Canada's 1994 National Population Health survey, they found that physically active leisure had positive effects on health of respondents who experienced higher stress levels. Results from the study also indicated that physically active leisure had a mediating role between chronic stress and health. Similar findings were obtained by Arai, Mock, and Gallant (2011). In their study to explore the role of physically active leisure participation as a buffer for the negative outcomes of childhood trauma on psychological well-being and health in adulthood, they found that participation in physically active leisure activities enhanced the physical health of those who had experienced multiple childhood traumas. They also found that physically active leisure helped to counteract the negative influences of childhood traumatic experiences on physical health. Previous research studies also indicated that taking part in leisure activities could reduce academic stress. In a study undertaken by Ragheb and McKinney (1993) to examine the interrelationships among campus recreation participation, leisure satisfaction, and academic stress, they found that students who took part in more recreation activities and gained greater satisfaction from their leisure pursuit

perceived less academic stress. In a study to examine the relationships among leisure participation, leisure satisfaction, and life satisfaction of college students in Taiwan, Huang and Carleton (2003) found that there were significant relationships between leisure participation and leisure satisfaction, leisure participation and life satisfaction, and leisure satisfaction and life satisfaction. This implied that college educational administrators could enhance the life satisfaction of the students by encouraging them to take part in more leisure activities. Two popular instruments for measuring leisure satisfaction are reviewed in the following sections.

Leisure Satisfaction Scale (LSS). The Leisure Satisfaction Scale (LSS) was a 51-item measure with 6 subscales. It was designed to “provide a measure of the extent to which individuals perceive that certain personal needs are met or satisfied through leisure activities” (Beard & Ragheb, 1980, p. 22). The subscales were psychological (13 items), educational (12 items), social (11 items), relaxation (4 items), physiological (6 items), and aesthetic (5 items). The items were responded to on a 5 point Likert scale ranging from 1 (“The item is almost never true for me”) to 5 (“The item is almost always true for me”).

Leisure Satisfaction Scale - Short Form (LSS - Short Form). The Leisure Satisfaction Scale was condensed by the authors to a shortened version (Beard & Raghd, 1980). The shortened version consisted of 24 items with 4 items from each subscale. The authors reported high internal consistency and reliability for this scale and it has been proved to be a valid instrument for measuring the leisure satisfaction of adults in Hong Kong (Fung & Tsai, 2006).

Summary on Leisure Satisfaction Measurement Tools

A review of literature indicated that Leisure Satisfaction Scale (LSS) is a very popular instrument for measuring leisure satisfaction. It has been widely used to measure leisure satisfaction amongst different population (Beggs & Elkins, 2010; Raj, Manigandan, & Jacob, 2006; Tsai, Fung, & Tso, 2006; Wang, Chen, Lin, & Wang, 2008) and has been translated into several different languages such as French (Lysyk, Brown, Rodrigues, McNally, & Loo, 2002), Korean (Won, 2000), and Chinese (Sivan & Fung, 1998). The Chinese version has been validated for use for Chinese adults living in Hong Kong (Fung & Tsai, 2006). The author reported an alpha reliability coefficient of .96 for the original version and .93 for the short version. The 24-item short version was widely used in studies that involved university students (Beggs & Elkins, 2010; Chun, Lee, Kim,

& Heo, 2012; Huang & Caletan, 2003; Korotkov, McLean, & Hamilton, 2011) and Chinese adults (Huang & Caletan, 2003; Ngai, 2005; Tsai et al., 2006; Tso, 2007) and therefore was adopted for use in the present study.

Perceived Problem Solving Ability (PPSA)

Problem solving was defined as the complex inter-play of cognitive, affective, and behavioral processes for the purpose of adapting to internal or external demands or challenges (Heppner & Krauskopf, 1987). It is an important skill for people at any age and is tied to critical thinking ability which is considered a prior condition of professional practice (Terzioglu, 2006). Actual problem solving ability is a skill or an internal cognitive ability that enables an individual to plan, organize, take action, adapt, evaluate, and summarize while perceived problem solving is the perception of having such actual problem solving abilities (Largo-Wight et al., 2005). Previous research indicated that one's appraisal of problem-solving skills could influence one's actual problem-solving performance (Noojin & Wallander, 1997). Previous studies indicated that people who lacked problem solving skill experienced psychological maladjustment when facing stressful situations (Heppner & Baker, 1997). On the other hand, self-appraised effective problem solvers reported less depression, less anxiety, a more internal

control orientation, less frequent problems, and less distress associated with these problems as compared to self-appraised ineffective problem solvers (Nezu, 1985).

The following are two popular instruments for assessing the problem solving ability of an individual.

Social Problem-Solving Inventory-Revised (SPSI-R). Social Problem-Solving Inventory-Revised (SPSI-R) (D’Zurilla, Nezu, & Maydeu-Olivares, 2002) was a 52-item questionnaire designed to assess strengths and weaknesses in social problem-solving skills and attitudes. It was derived from the original 70-item Social Problem-Solving Inventory. The measure was composed of 5 subscales: Positive Problem Orientation (PPO: 10 items), Negative Problem Orientation (NPO: 5 items), Rational Problem Solving (RPS: 20 items), Impulsivity-Carelessness Style (ICS: 10 items), and Avoidance Style (AS: 7 items). Respondents rated their responses on a 5-point Likert scale (0 = “not at all true of me” to 4 = extremely true of me). Good problem-solving ability was indicative of high scores on PPO and RPS and low scores on NPO, ICS, and AS.

Problem Solving Inventory (PSI). The Problem Solving Inventory (PSI) (Heppner & Petersen, 1982) was an instrument for evaluating people's perception of their problem solving abilities. The instrument consisted of 35 statements describing responses to situations/problems. Respondents rated their responses on a 6-point Likert scale (1 = strongly agree, 6 = strongly disagree) and higher score implied ineffective problem-solving abilities. The PSI contained three subscales: Problem-Solving Confidence (11 items), Approach-Avoidance Style (16 items), and Personal Control (5 items). The remaining 3 statements were filler items.

Summary on Problem Solving Measurement Tools

Social Problem Solving Inventory-Revised (SPSI-R) was a widely used instrument to assess cognitive, affective and behavioral processes by which individuals attempted to identify and implement adaptive coping responses to handle problematic situations. Reinecke, DuBois, and Schultz (2001) surveyed 105 adolescent psychiatric inpatients to examine the relationships between social problem-solving, mood, and suicidality. Results from the study indicated that there was a relationship between deficits in social problem-solving and risk for depression and suicidality.

Problem Solving Inventory (PSI) was a popular self-report measure that assessed one's perception of problem-solving capabilities rather than his/her actual problem-solving skills. Its validity and reliability were well established (Heppner & Peterson, 1982). It had been used in more than 120 published studies between 1982 and 2002 (Heppner, Witty, & Dixon, 2004) and had been extensively used in studies among university undergraduates. For instance, the PSI was used to examine the learning styles and problem-solving ability of college students (Sirin & Guzel, 2006; Wessel, Loomis, Rennie, Brook, Hoddinott & Aherne, 1999). It was also used to identify the associated variables of depression and anxiety symptoms among graduate students (Eremsoy, Celimli & Gencoz, 2005). The PSI was also used to predict self-reported physical health symptoms and perceived stress (Largo-Wight et al., 2005), and alcohol use (Biscaro, Broer & Taylor, 2004) among undergraduate college students. In a study conducted by Neville, Heppner, and Wang (1997), the PSI was employed to examine the predictive nature of racial identity attitudes on the stress and coping process of African American college students. PSI had been widely used in studies that involved Chinese adults (Chow & Chan, 2010; Yeung, Lui, Ross, & Murrells, 2007). It was adopted to assess the perceived problem solving ability of the participants in the present study.

Leisure Time Physical Activity (LTPA)

It is commonly known that participating in physical activity and exercise is beneficial to our health. Many studies showed that regular physical activity, whether it was work-related or recreational, contributed to our health and lowered the risk of many diseases, namely high blood pressure, stroke, heart disease, diabetes, osteoporosis, and colon cancer (Edlin et al., 2002, 137). Some research also indicated that physical activity was an effective means of reducing anxiety and different indices of stress among adults (Bhui, 2002). Carmack, Boudreaux, Amaral-Melendez, Brantley, and de Moor (1999) also found that leisure time physical activity could help buffer the deleterious effects of hassles among college students.

Some self-reported questionnaires have been developed to measure the physical activities that individuals take part in. Two frequently used questionnaires which focused on a seven-day time frame were reviewed in the following sections.

International Physical Activity Questionnaire (IPAQ). The International Physical Activity Questionnaire (IPAQ) (Craig et al., 2003) was developed by an International Consensus Group between 1997 and 1998 for measuring habitual

physical activity participation during the previous 7 days. The instrument consisted of two versions. The long version contained 27 items while the short one had only 7 items. Respondents were asked to report frequency and duration of walking, moderate-intensity and vigorous-intensity physical activity that lasted for at least 10 minutes. The data were converted to metabolic equivalent scores for each type of activity. The MET score weighed each type of activity by its energy expenditure, using 1 MET for sitting, 3.3 METs for walking, 4 METs for moderate activity, and 8 METs for vigorous activity. The long form of IPAQ assessed physical activity undertaken across four domains: job-related physical activity, transport-related physical activity, domestic and gardening activity, and leisure time physical activity. Total scores were obtained by the summation of the duration (in minutes) and frequency (days) for all the types of activities in all domains.

Godin Leisure-Time Exercise Questionnaire (GLTEQ). Godin Leisure-Time Exercise Questionnaire (GLTEQ) was a simple questionnaire for measuring an individual's leisure time exercise (Godin & Shephard, 1985). Respondents were asked to report the frequencies of strenuous, moderate, and light activities that they engaged in during their free time in a given week. The

activity should last for at least 15 minutes. Strenuous, moderate, and mild activities were assigned the metabolic equivalent (MET) values of 9, 5, and 3 respectively. The total leisure time activity score could be calculated by using a formula: $3 \times (\text{mild}) + 5 \times (\text{moderate}) + 9 \times (\text{strenuous})$.

Summary on Leisure Time Physical Activity Measurement Tools

No formal consensus on a correct method for defining or describing levels of physical activity based on self report format has been reached. Both IPAQ and GLTEQ were popular and valid instruments for measuring physical activity. However, unlike GLTEQ, IPAQ was not confined to measuring leisure time physical activity only. Other activities which are related to work and transportation are also included. Besides, other than walking, no mild exercise level was included in the IPAQ. Some popular physical activities in Hong Kong like yoga and bowling would be excluded. Therefore, GLTEQ is a more suitable instrument for this study.

Summary of Literature Review

A review of literature showed that most wellness advocates believed that wellness is multidimensional, dynamic and continuous. A high level of wellness

requires an optimal functioning in all the dimensions and it involves a lifestyle of deliberate choices. Therefore, each individual is responsible for his or her own level of wellness (Edlin et al., 2002; Robbins et al., 2006). Although wellness has become a popular term today, up to the present moment, no universal definition for wellness has been formulated. In the past few decades, quite a number of dimensions have been included in the different wellness models. Miller and Foster (2010) reviewed over three hundred journal articles, books and web sites and found that the most popular dimensions found within the literature were physical, emotional/psychological, social, intellectual, spiritual, occupational, and environmental. Although health practitioners and wellness advocates do not have any consensus on which dimensions should be included in wellness models, they all agree that keeping a balance of different dimensions is crucial for achieving optimal wellness (Alters & Schiff, 2006; Robbins et al., 2006). There is a strong interconnection among the wellness dimensions and none of them functions in isolation. Therefore, any change in one dimension will inevitably affect the others (Brown et al., 2002; Corbin et al., 2001). Research on stress management showed that excessive stress can lead to severe and long lasting negative impacts on individuals. Studying at university is a potentially stressful time for undergraduate students. They have to handle things independently and

face different challenges arising out of academic requirements, interpersonal relationships and career decisions (Kerr et al, 2004; Larson, 2006; Murff, 2005). Literature indicated that academic stress was one of the most frequently reported stressors among college students. Having too much academic stress will surely affect the overall wellness of the students. Previous research on college stress mainly focused on coping strategies, social support, and psychological well-being (El-Ghoroury, Galper, Sawaqdeh, & Bukfa, 2012; Kerr et al., 2004; Rawson, Bloomer, & Kendall, 1994; Smith & Renk, 2007; Struthers, Perry, & Menec, 2000). Its impacts on the overall wellness of the university students have not been adequately investigated.

Having enough support from other people can help one to face his/her challenges more easily. However, developing personal resources may be more essential for individuals to counteract adverse life situations like academic stress when outside support is not available. Gaining satisfaction from leisure activities, having good problem solving abilities and taking part in some leisure time physical activities may serve as buffers to reduce the academic stress of university students and enhance their wellness level.

Although quite a number of instruments have been developed to measure the different variables identified in this study, the literature search indicated that the

Perceived Wellness Scale (Adams et al., 1997), the Academic Stress Scale (Kohn & Frazer, 1986), the Leisure Satisfaction Scale (Beard & Ragheb, 1980), the Problem Solving Inventory (Heppner & Petersen, 1982), and the Godin Leisure-Time Exercise Questionnaire (Godin & Shephard, 1985) are more suitable for the present study. A more detailed description about these instruments is presented in chapter 3.

CHAPTER 3

METHOD OF STUDY

The methodology employed in this study was comprised of three phases: consolidation of instruments, the pilot study phase and the main study phase. Procedures involved in these three phases were described separately.

Participants

A convenient sampling method was adopted. University undergraduate students enrolled in full time UGC-funded programmes in Hong Kong were recruited to participate in this study.

All data were collected between March and early April so as to avoid clashing with the time for examination which might cause undue stress to university students. Having explained the purpose of the study and assured of the confidentiality of their responses, participants provided written consent and filled out a battery of instruments. Upon completion, participants either returned the questionnaires to the person from whom they received the questionnaires or mailed them back to the investigator using a pre-paid envelope. All participants participated voluntarily without any monetary reward. Among the 1300 participants approached, 712 agreed to participate yield a response rate of 54.8%.

The response rate is considered acceptable in most social sciences research (Babbie, 1998).

Instruments

Wellness

Wellness was measured by the Perceived Wellness Survey (Adams et al., 1997). The survey contained 36 items which measured wellness perception in six dimensions, namely, physical, social, intellectual, emotional, psychological, and spiritual. There were six questions in each dimension. The survey has high internal consistency with alpha coefficient equal .91 for the total scale and .88 to .93 for the subscales (Adams et al., 1997). Sample items from each dimension were, “I expect to always be physically healthy”, “My friends will be there for me when I need help”, “In the past, I have generally found intellectual challenges to be vital to my overall well-being”, “In general, I feel confident about my abilities”, and “In the past, I have expected the best”, “I believe there is a real purpose for my life”. A Chinese version of the scale is available (Du, 2009). For the present study, participants rated each statement on a 6-point scale ranging from 1 “very strongly disagree” to 6 “very strongly agree”. Responses to the negative statements were reverse-coded, and all responses were summed for total scores for

six dimensions. Higher scores indicated a better perception of wellness.

Academic Stress

Academic stress was assessed by the Academic Stress Scale (Kohn & Frazer, 1986). The original scale consisted of 35 items measuring academic stressors of college students. Based on the factor analysis performed by Kohn and Frazer, 17 non-contributing items with loadings less than .40 and 1 double-loading item were excluded from this study. The remaining 17 items were divided into 3 subscales of physical stressors, psychological stressors, and psychosocial stressors. The Academic Stress Scale had been proved to be a valid instrument. Kohn and Frazer (1986) reported an internal consistency of .92 and a split-half reliability of .86. Cultural adaptation was done and individual items were reviewed for their relevance to the local context. As a result, wordings in selected items were changed. For example, "Class speaking" was replaced by "Presentation", "Pop quizzes" was replaced by "Unannounced quizzes", "Irrelevant classes" was replaced by "Non-major classes" and "Evaluating classmates' work" was replaced by "Peer evaluations". The original instruction of the scale requested that respondents compared the stated events to taking an examination, "If the event was more stressful than taking an examination, rated the item between 501 and

1000. If the event was less stressful, rated it between 1 and 499. If it was as stressful as taking an examination, rated it at 500.” For the present study, participants were asked to respond to each of the stressful situations by circling the corresponding number (“1” for not all stressful, and “5” for extremely stressful). Responses were summed and averaged to create a total academic stress score with higher scores indicating more academic stress. Similar scoring method had been adopted in other studies (Burnett & Fanshawe, 1997; Smith & Renk, 2007).

Leisure Satisfaction

Leisure satisfaction was measured by the shortened version of Leisure Satisfaction Scale (Beard & Ragheb, 1980). The scale consisted of 24 items measuring different domains of leisure satisfaction, including psychological, educational, social, relaxation, physiological, and aesthetic. The scale has demonstrated satisfactory internal reliability with alpha-coefficient of the total scale equals 0.93 and those of the subscales ranged from .80 to .93 (Beard & Ragheb, 1980). Other studies that examined the psychometric properties of the scale reported an internal consistency of 0.87 (Trottier, Brown, Hobson & Miller, 2002). The Chinese version of the scale has yielded satisfactory structural

validity and is a valid measure for Hong Kong adults (Fung & Tsai, 2006). For the present study, participants responded to each of the statements on a 5-point Likert scale with “1” representing “almost never true”, and “5” representing “almost always true”.

Perceived Problem Solving Ability (PPSA)

The self-perceived problem solving ability of the participants was assessed by the 35-item Problem Solving Inventory (PSI; Heppner, 1988). The PSI comprised of three subscales: Problem-Solving Confidence (11 items) measured the level of self-assurance while engaging in problem-solving activities (e.g. “I am usually able to think of creative and effective alternatives to my problems”); Approach-Avoidance Style (16 items) assessed the tendency to approach or avoid problem-solving activities (e.g. “When I have a problem, I think of as many possible ways to handle it as I can until I can’t come up with any more ideas”); and Personal Control (5 items) measured the belief that one was in control of his/her emotions and behavior while solving problems (e.g. “I made snap judgments and later regret them”). Items 9, 22, and 29 were filler items and were omitted from scoring. The coefficient alphas reported by Heppner and Peterson (1982) ranged from 0.72 to 0.90 and test-retest correlations ranged from

0.83 to 0.89 over a 2-week period.

For the present study, respondents rated their responses on a 6-point Likert scale. For easy interpretation and to be consistent with the rating format used in the questionnaire (using “1” as “very strongly disagree and “6” for “very strongly agree”), the scoring of PSI was coded in a way that higher scores indicating better problem solving abilities.

Leisure Time Physical Activity (LTPA)

Participants’ engagement in leisure-time physical activity was assessed by the Godin Leisure-Time Exercise Questionnaire (Godin & Shephard, 1985). The questionnaire consisted of two questions. The first question asked respondents to indicate the number of times per week they participated in strenuous, moderate, and mild exercise that lasted for more than 15 minutes during their leisure time. Simple descriptions and types of exercise for each level were given. For instance, strenuous exercise was defined as “quite exhausting and heart beats rapidly” and included running, jogging, rugby, football, squash, basketball, judo, vigorous swimming, vigorous long distance bicycling. To cater for cultural differences, some activities (e.g. alpine skiing and cross country skiing) unpopular in Hong Kong were deleted. In the second question, respondent were asked to

indicate how often they engaged in any regular activity long enough to work up a sweat. The total leisure time physical activity (weekly leisure activity score) was calculated by the formula

$$\text{Total LTPA} = (9 \text{ METs} \times \text{strenuous}) + (5 \text{ METs} \times \text{moderate}) + (3 \text{ METs} \times \text{mild})$$

The Godin Leisure-Time Exercise Questionnaire was found to be a valid and reliable instrument with test-retest reliability of .74 and a significant correlation with maximum oxygen consumption ($r = .24$) and body fat ($r = .13$) (Godin & Shephard, 1985). The Chinese version of this scale is available and researchers reported a test-retest reliability of .89 in a group of 43 Taiwanese high school subjects (Chung & Phillips, 2002).

Pilot Testing of the Instruments

A pilot study was conducted to ascertain the cultural relevance and psychometric properties of major instruments, including the scales measuring wellness, academic stress, leisure satisfaction and PPSA. A total of 89 Associate Degree students took part in this pilot study on a voluntary basis in October 2007. Results from the pilot test suggested that all the instruments yielded acceptable internal consistency. The Cronbach's alpha values obtained were .86 for Leisure

Satisfaction Scale (LSS), .87 for Academic Stress Scale (ASS), .80 for Problem Solving Inventory (PSI), and .84 for Perceived Wellness Survey (PWS).

Statistical Analysis

Data were analyzed by using the SPSS statistical package 17.0 and LISREL Version 8.7. Tests were conducted at the 0.05 level of significance.

Psychometric properties of major instruments were computed using SPSS 17.0 and were compared to those reported by the original authors. Descriptive statistics such as means, standard deviations, and correlations among the major variables were obtained. Independent sample t-tests and MANOVA were conducted to determine the gender differences in the major variables.

To study the relationships of the different variables in the model, Path Analyses with the LISREL Version 8.7 were conducted. Standardized path coefficients were obtained to compare the strength of different exogenous variables on the endogenous variable. Furthermore, the relationships of different variables in the model were decomposed into direct effect, indirect effect, and total effect so as to identify the role and contribution of each variable.

To determine whether the proposed model adequately delineates the relationship between various factors, goodness-of-fit indices were examined.

According to Kelloway (1998), fit indices could be categorized into “absolute fit indices” which evaluated how well the proposed theory fit the sample data, and “incremental fit indices” which compared the target model with a “baseline” model. As there is no “ideal” fit index, most researchers supported using multiple indices of overall fit (Diamantopoulos & Siguaw, 2000; Hoyle, 1995). In this study, both absolute fit index and incremental fit index were used. Absolute fit indices including chi-square to its degree of freedom (χ^2/df), the goodness of fit index (GFI), the standardized root mean squared residual (SRMR), and incremental fit index, such as the non-normed fit index (NNFI) were all taken into consideration in determining the model fit in the present study.

In interpreting the model fit, different standards for χ^2/df has been employed in the literature. Generally, a ratio of less than 5 indicates a good fit to the data (Kelloway, 1998). Marsh and Hocevar (1985) recommended a ratio between 2 and 5 to indicate reasonable fit model. In this study, a ratio of 3 or less was adopted (Kline, 1998). For the goodness of fit index (GFI), values exceeding 0.90 reflected acceptable fit (Diamantopoulos & Siguaw, 2000; Kelloway, 1998). As for the standardized root mean squared residual (SRMR), values less than 0.05 were regarded as well fitting (Byrne, 1998; Diamantopoulos & Siguaw, 2000), however values as high as 0.08 were also regarded as acceptable (Hu & Bentler,

1999). The non-normed fit index (NNFI) was derived from the Tucker-Lewis Index. Bentler and Bonett (1980) suggested values greater than 0.90 to indicate a good model.

CHAPTER 4

RESULTS

This study examined systematically wellness among university students in Hong Kong. The main goal of this study was to investigate the relative contribution of LTPA, leisure satisfaction, PPSA and academic stress to wellness. Results from this study were presented in this chapter in the following sequence: (1) treatment of data, (2) sample characteristics, (3) psychometric properties of measurement scales, (4) descriptive statistics of major variables, (5) hypotheses and model testing, and (6) summary of results.

Treatment of Data

A total of 712 participants took part in the study. All collected data were analyzed by the Statistical Package for Social Science (SPSS for Windows, version 17.0) and LISREL (version 8.7). Before the analysis, the data were screened and cleaned according to the procedures suggested by Tabachnick and Fidell (2007). The accuracy of data entry, missing data, outliers, skewness, and kurtosis for the data set were checked by the SPSS descriptive statistics. Missing data pattern was examined and no systematic pattern was identified. Missing data values were 4.6% and were replaced with series mean (Tabachnik & Fidell,

2007). As the target population in this study were students taking full-time UGC-funded degree programmes in Hong Kong, 14 cases who were enrolled in Diploma, Associate Degree or Doctoral programmes and 2 cases who were studying in part-time mode were excluded. So, the total cases were reduced to 696. In examining the data for normality, the suggestion of Tabachnick and Fidell (2007) was followed. The absolute value of z-score which was ≥ 3.3 was treated as outlier and was excluded from the data set. As a result, another 5 cases were deleted and the final data analysis consists of the remaining 691 valid cases.

Sample Characteristics

Among the 691 participants in this study, 273 (39.5%) were male and 418 (60.5%) were female. The age of the participants ranged from 18 to 33 ($M=21.2$, $SD=1.47$). All the participants were full-time undergraduate students from the 8 local universities receiving grants from the University Grants Committee (Table 1).

Table 1

University of the Participants (n=691)

University	n	Percentage
HKU	113	16.4
CUHK	84	12.2
PolyU	75	10.9
HKBU	199	28.8
CityU	66	9.6
HKUST	27	3.9
LU	80	11.6
HKIED	47	6.8

Note. HKU = University of Hong Kong; CUHK = Chinese University of Hong Kong; PolyU = Hong Kong Polytechnic University; HKBU = Hong Kong Baptist University; CityU = City University of Hong Kong; HKUST = Hong Kong University of Science and Technology; LU = Lingnan University; HKIED = Hong Kong Institute of Education

Most of the participants were in the second year of their studies. In Hong Kong, most of the full-time degree programmes are of 3 years. However, some undergraduate programmes (like Bachelor of Science in Nursing and Bachelor of

Chinese Medicine) require 4 to 5 years to complete. The year of studies of the participants is presented in Table 2.

Table 2

Year of Study of the Participants (n=691)

Year	n	Percentage
1 st	179	25.9
2 nd	254	36.8
3 rd	220	31.8
4 th	37	5.4
5 th	1	0.1

Psychometric Properties of the Measurement Scales

Cronbach's alpha was used to test the reliability of Perceived Wellness Survey (PWS), Academic Stress Scale (ASS), Problem Solving Inventory (PSI), and Leisure Satisfaction Scale (LSS). Nunnally (1994) pointed out that an alpha coefficient larger than .70 is considered acceptable. Cronbach's alphas for the total scale of the four measurement scales were satisfactory (PWS = .89; ASS

= .85; PSI = .85; and LSS = .92). Detailed information about the alpha coefficients of the scales and their sub-dimensions are presented in Table 3.

Table 3

Cronbach's Alpha for Measurement Scales Used in the Study (n=691)

Scale and Sub-Dimension	No. of Items	Alpha Coefficient
Perceived Wellness Scale (PWS)		
Physical	6	.76
Social	6	.63
Emotional	6	.67
Intellectual	6	.33
Psychological	6	.59
Spiritual	6	.76
Total	36	.89
Academic Stress Scale (ASS)		
Physical	6	.88
Psychological	6	.74
Psychosocial	5	.63
Total	17	.85
Problem Solving Inventory (PSI)		
Problem-Solving Confidence	11	.78
Approach-Avoidance Style	16	.74
Personal Control	5	.71
Total	32	.85
Leisure Satisfaction Scale (LSS - Short Form)		
Psychological	4	.83
Educational	4	.82
Social	4	.82
Relaxation	4	.82
Physiological	4	.91
Aesthetic	4	.80
Total	24	.92

Although the four measurement scales demonstrated satisfactory internal consistency, a closer examination of the subscales indicate that some of the subscales of PWS have unacceptably low Cronbach's alpha (psychological = .59, and intellectual = .33). It is thus necessary to re-examine the factor structure of PWS.

A confirmatory factor analysis was conducted with the aid of LISREL 8.7. To determine whether the model tested was tenable, the following fit indices were adopted: χ^2/df , GFI, SRMR, and NNFI. A summary of mean and standard deviation of the 36 items of the PWS is presented in Table 4. For easy reference, items of the same dimension were grouped together and the originally negative items were in italics. The correlation matrix of all items is presented in Table 5.

Table 4

Mean and standard deviation of the items of the PWS

Dimensions and corresponding items		Means	Standard deviations
Physical			
4	<i>My physical health has restricted me in the past.</i>	4.11	1.34
10	My body seems to resist physical illness very well.	3.88	1.13
16	My physical health is excellent.	3.86	1.13
22	Compared to people I know, my past physical health has been excellent.	3.91	1.24
28	I expect to always be physically healthy.	4.35	1.06
34	<i>I expect my physical health to get worse.</i>	3.97	1.27
Social			
3	Members of my family come to me for support.	4.47	1.05
9	<i>Sometimes I wonder if my family will really be there for me when I am in need.</i>	3.86	1.35
15	My friends know they can always confide in me and ask me for advice.	4.25	0.88
21	My family has been available to support me in the past.	4.49	1.09
27	<i>In the past, I have not always had friends with whom I could share my joys and sorrows.</i>	4.17	1.37
33	My friends will be there for me when I need help.	4.42	1.03
Emotional			
2	<i>There have been times when I felt inferior to most of the people I knew.</i>	3.54	1.13
8	In general, I feel confident about my abilities.	4.19	0.93
14	<i>I sometimes think I am a worthless individual.</i>	4.13	1.24
20	<i>I am uncertain about my ability to do things well in the future.</i>	3.47	1.13
26	I will always be secure with who I am.	3.99	1.05
32	In the past, I have felt sure of myself among strangers.	3.72	1.01
Intellectual			
6	I will always seek out activities that challenge me to think and reason.	4.12	0.96
12	<i>I avoid activities which require me to concentrate.</i>	4.30	1.06
18	Generally, I feel pleased with the amount of intellectual stimulation I receive in my daily life.	4.12	0.82
24	The amount of information that I process in a typical day is just about right for me (i.e., not too much and not too little).	3.80	0.96
30	In the past, I have generally found intellectual challenges to be vital to my overall well-being.	3.98	0.93
36	<i>My life has often seemed void of positive mental stimulation.</i>	3.62	1.05
Psychological			
1	I am always optimistic about my future.	4.26	1.00
7	<i>I rarely count on good things happening to me.</i>	3.67	1.22
13	I always look on the bright side of things.	4.11	1.03
19	In the past, I have expected the best.	4.02	1.08
25	<i>In the past, I hardly ever expected things to go my way.</i>	3.76	1.06
31	<i>Things will not work out the way I want them to in the future.</i>	3.75	1.07
Spiritual			
5	I believe there is a real purpose for my life.	4.57	0.96
11	<i>Life does not hold much future promise for me.</i>	3.73	1.13
17	<i>Sometimes I don't understand what life is all about.</i>	3.67	1.20
23	I feel a sense of mission about my future.	4.23	1.04
29	<i>I have felt in the past that my life was meaningless.</i>	4.37	1.22
35	It seems that my life has always had purpose.	4.21	1.07

** Italic items are stated in the negative (shown values are reversed)

Table 5

Inter-correlation coefficients of the items of the PWS

Items	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
1	1.00																																			
2	0.17*	1.00																																		
3	0.27*	0.07	1.00																																	
4	0.12*	0.28*	0.02	1.00																																
5	0.45*	0.10*	0.27*	0.11*	1.00																															
6	0.35*	0.04	0.20*	0.01	0.45*	1.00																														
7	0.10*	0.14*	0.00	0.19*	0.06	-0.05	1.00																													
8	0.53*	0.23*	0.25*	0.12*	0.39*	0.39*	0.00	1.00																												
9	-0.01	0.14*	0.08*	0.16*	0.10*	-0.01	0.08*	0.02	1.00																											
10	0.35*	0.08*	0.19*	0.25*	0.26*	0.21*	0.01	0.37*	-0.07	1.00																										
11	0.31*	0.34*	0.13*	0.28*	0.31*	0.15*	0.25*	0.22*	0.26*	0.05	1.00																									
12	0.17*	0.24*	0.07	0.31*	0.22*	0.16*	0.11*	0.11*	0.18*	0.11*	0.34*	1.00																								
13	0.61*	0.15*	0.26*	0.15*	0.40*	0.31*	0.13*	0.45*	0.08*	0.29*	0.30*	0.13*	1.00																							
14	0.34*	0.36*	0.13*	0.25*	0.28*	0.12*	0.24*	0.31*	0.23*	0.13*	0.42*	0.34*	0.31*	1.00																						
15	0.38*	0.15*	0.26*	0.14*	0.32*	0.24*	0.06	0.40*	0.07	0.25*	0.23*	0.15*	0.36*	0.20*	1.00																					
16	0.41*	0.15*	0.16*	0.39*	0.27*	0.28*	0.02	0.38*	-0.06	0.59*	0.16*	0.11*	0.34*	0.21*	0.32*	1.00																				
17	0.35*	0.25*	0.17*	0.15*	0.35*	0.21*	0.08*	0.27*	0.10*	0.09*	0.41*	0.27*	0.36*	0.39*	0.25*	0.14*	1.00																			
18	0.38*	0.16*	0.24*	0.16*	0.38*	0.30*	0.01	0.42*	0.05	0.28*	0.23*	0.11*	0.36*	0.22*	0.33*	0.33*	0.18*	1.00																		
19	0.23*	0.05	0.18*	-0.01	0.21*	0.30*	-0.09*	0.25*	0.00	0.16*	0.08*	0.01	0.20*	0.04	0.14*	0.23*	0.08*	0.26*	1.00																	
20	0.35*	0.38*	0.18*	0.21*	0.24*	0.15*	0.17*	0.39*	0.16*	0.20*	0.42*	0.27*	0.32*	0.44*	0.28*	0.19*	0.44*	0.26*	0.05	1.00																
21	0.17*	0.05	0.53*	0.05	0.18*	0.14*	-0.01	0.19*	0.23*	0.11*	0.08*	0.09*	0.25*	0.11*	0.29*	0.11*	0.13*	0.20*	0.14*	0.09*	1.00															
22	0.29*	0.14*	0.11*	0.32*	0.14*	0.21*	-0.02	0.27*	-0.05	0.51*	0.12*	0.06	0.27*	0.13*	0.19*	0.69*	0.09*	0.24*	0.23*	0.16*	0.12*	1.00														
23	0.42*	0.13*	0.25*	0.12*	0.56*	0.35*	0.08*	0.43*	0.09*	0.30*	0.28*	0.15*	0.43*	0.25*	0.33*	0.34*	0.32*	0.36*	0.26*	0.27*	0.26*	0.24*	1.00													
24	0.21*	-0.14*	0.05	-0.05	0.11*	0.10*	0.13*	0.14*	-0.16*	0.15*	-0.08*	-0.16*	0.15*	-0.03	0.11*	0.15*	0.00	0.08*	0.05	-0.04	0.08*	0.17*	0.16*	1.00												
25	0.22*	0.24*	0.18*	0.22*	0.20*	0.07	0.13*	0.23*	0.24*	0.10*	0.34*	0.23*	0.21*	0.34*	0.15*	0.07	0.31*	0.17*	0.09*	0.41*	0.19*	0.06	0.21*	-0.15*	1.00											
26	0.30*	0.07	0.15*	0.06	0.30*	0.24*	-0.06	0.33*	0.11*	0.18*	0.14*	0.11*	0.30*	0.18*	0.26*	0.23*	0.23*	0.26*	0.12*	0.17*	0.24*	0.17*	0.29*	0.11*	0.11*	1.00										
27	0.14*	0.25*	0.14*	0.29*	0.10*	0.00	0.20*	0.09*	0.21*	0.05	0.32*	0.24*	0.16*	0.29*	0.23*	0.09*	0.28*	0.10*	0.01	0.28*	0.19*	0.06	0.08*	-0.05	0.32*	0.05	1.00									
28	0.20*	-0.08*	0.02	0.18*	0.11*	0.11*	0.00	0.18*	-0.04	0.30*	-0.03	0.00	0.23*	0.01	0.13*	0.39*	-0.01	0.07	0.08*	0.01	0.11*	0.32*	0.16*	0.11*	0.03	0.26*	0.06	1.00								
29	0.23*	0.17*	0.15*	0.21*	0.25*	0.10*	0.18*	0.19*	0.22*	0.03	0.32*	0.31*	0.25*	0.41*	0.20*	0.07	0.37*	0.16*	-0.02	0.33*	0.26*	0.00	0.22*	-0.03	0.43*	0.27*	0.44*	0.16*	1.00							
30	0.16*	0.00	0.11*	-0.02	0.18*	0.22*	-0.09*	0.19*	0.06	0.14*	0.06	0.03	0.18*	0.07	0.18*	0.17*	0.05	0.26*	0.17*	0.04	0.27*	0.18*	0.27*	0.03	0.11*	0.32*	-0.02	0.20*	0.09*	1.00						
31	0.29*	0.26*	0.08*	0.23*	0.21*	0.12*	0.19*	0.24*	0.21*	0.08*	0.42*	0.29*	0.25*	0.40*	0.24	0.12*	0.35*	0.16*	0.07	0.45*	0.13*	0.05	0.17*	-0.11*	0.42*	0.17*	0.34*	0.03	0.42*	0.08*	1.00					
32	0.25*	0.09*	0.14*	0.01	0.22*	0.26*	-0.05	0.32*	-0.02	0.26*	0.07	-0.04	0.26*	0.06	0.25*	0.28*	0.11*	0.29*	0.16*	0.16*	0.14*	0.25*	0.26*	0.13*	0.11*	0.27*	0.08*	0.20*	0.08*	0.23*	-0.02	1.00				
33	0.23*	-0.02	0.17*	0.12*	0.27*	0.18*	-0.02	0.26*	0.12*	0.20*	0.10*	0.16*	0.27*	0.15*	0.36*	0.21*	0.18*	0.19*	0.08*	0.11*	0.31*	0.12*	0.22*	0.13*	0.15*	0.26*	0.34*	0.23*	0.20*	0.21*	0.15*	0.24*	1.00			
34	0.26*	0.17*	0.08*	0.32*	0.22*	0.12*	0.18*	0.16*	0.07	0.24*	0.27*	0.23*	0.22*	0.34*	0.14*	0.33*	0.25*	0.16*	0.07	0.30*	0.01	0.21*	0.17*	0.11*	0.22*	0.06	0.24*	0.24*	0.25*	-0.03	0.29*	0.04	0.06	1.00		
35	0.44*	0.14*	0.26*	0.09*	0.55*	0.35*	-0.03	0.45*	0.03	0.28*	0.25*	0.11*	0.39*	0.27*	0.32*	0.32*	0.38*	0.39*	0.23*	0.26*	0.20*	0.20*	0.55*	0.16*	0.18*	0.35*	0.08*	0.12*	0.23*	0.27*	0.19*	0.28*	0.28*	0.13*	1.00	
36	0.04	0.08*	0.02	0.17*	0.08*	0.05	0.22*	0.02	0.14*	0.01	0.19*	0.11*	0.08*	0.19*	-0.02	-0.02	0.16*	-0.02	-0.06	0.17*	0.07	-0.01	0.08*	0.03	0.21*	0.03	0.23*	0.04	0.26*	-0.06	0.19*	-0.03	0.02	0.16*	0.02	1.00

*p < .05

The original factor structure of the PWS as presented by Adams et al. (1997) was subjected to analysis. It was found that the data set failed to fit the specified model. To re-build the model according to the theoretical construct posited by Adams et al. (1997), a series of sequential confirmatory factor analyses were conducted. This method of beginning from the basics was recommended by Joreskog and Sorbom (1993).

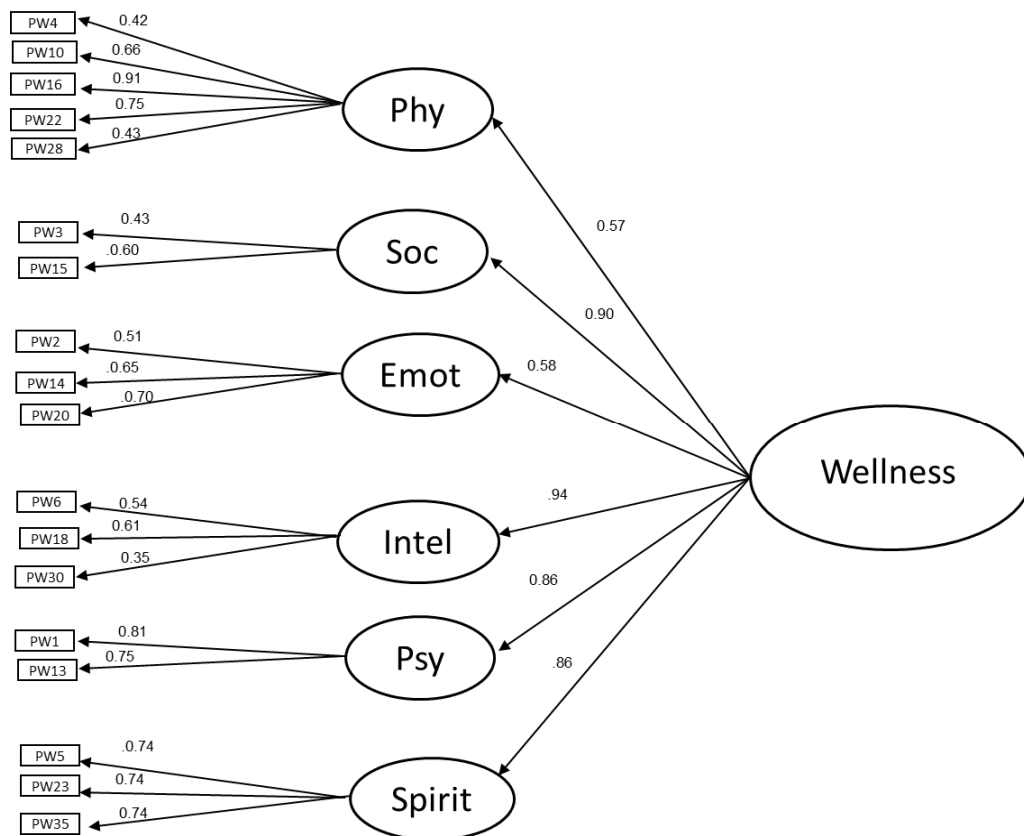
In performing the series of sequential confirmatory factor analyses, each wellness dimension of the PWS was tested independently and the data set of items corresponding to each dimension was subjected to confirmatory factor analysis. The same set of pre-selected fit indices was used to evaluate the tenability of each model. The contributing items to each wellness dimension and the fit indices for each model are presented in Table 6.

Table 6

Standardized item coefficients and model fit indices of the dimensions of the PWS

Dimension and corresponding items	Standardized Coefficients	NNFI Index	GFI Index	SRMR	χ^2/df
Physical		1	1	0.01	0.52
4. My physical health has restricted me in the past	0.42				
10. My body seems to resist physical illness very well	0.66				
16. My physical health is excellent	0.90				
22. Compared to people I know, my past physical health has been excellent	0.77				
28. I expect always to be physically healthy	0.43				
Social		1	1	0	0
3. Members of my family come to me for support	0.72				
15. My friends know they can always confide in me and ask me for advice	0.33				
21. My family has been available to support me in the past	0.85				
Emotional		0.98	1	0.02	2.42
2. There have been times when I felt inferior to most of the people I knew	0.60				
8. In general, I feel confident about my abilities	0.47				
14. I sometimes think I am a worthless individual	0.77				
20. I am uncertain about my ability to do things well in the future	0.81				
Intellectual		1	1	0	0
6. I will always seek out activities that challenge me to think and reason	0.48				
18. Generally, I feel pleased with the amount of intellectual stimulation I receive in my daily life	0.48				
30. In the past, I have generally found intellectual challenges to be vital to my overall well-being	0.41				
Psychological		1	1	0	0
1. I am always optimistic about my future	0.84				
13. I always look on the bright side of things	0.73				
31. Things will not work out the way I want them to in the future	0.34				
Spiritual		1	1	0.01	1.55
5. I believe there is a real purpose for my life	0.74				
17. Sometimes I don't understand what life is all about	0.47				
23. I feel a sense of mission about my future	0.73				
35. It seems that my life has always had purpose	0.75				

When the acceptable model for each dimension was identified, a confirmatory factor analysis with wellness specified as the higher factor order was conducted. During the model fitting process, four items (PW8, PW17, PW21 and PW31) out of the total of 22 items were trimmed due to high within-factor and between factors correlated measurement errors. Although the eventual model presented had fewer items than the original model proposed by Adams et al. (1997), all the first order and second order factor structures were retained. The accepted model and associated coefficients are presented in Figure 8.



Note. Phy = Physical; Soc = Social; Emot = Emotional; Intel = Intellectual; Psy = Psychological

Figure 8. Factorial structure of the PWS with standardized coefficients

The overall fit of the revised PWS consisting of 18 items was acceptable as indicated by the fit-indices ($\chi^2/df = 2.65$, $P = 0.00$; NNFI = 0.97; SRMR = 0.05; GFI = 0.95). The first order factor loadings ranged from .35 to .91. The weakest loading

occurred between PW30 “In the past, I have generally found intellectual challenges to be vital to my overall well-being” and its corresponding factor “Intellectual”. Factor loading below .40 was considered as weak by Briggs and MacCallum (2003). When PW30 was removed in a re-specified model, the model fit was not significantly better than the initial model ($\chi^2/df = 2.47$, $P = 0.00$; NNFI = 0.97; SRMR = 0.05; GFI = 0.95). Therefore, the 18-item PWS was retained in subsequent analysis.

The factor loadings between the wellness dimensions and the higher order construct of Perceived Wellness (PW) ranged from .57 to .94. The lowest coefficient (.57) occurred between Physical dimension and PW. The highest coefficient was the Intellectual dimension (.94) on PW. All associated t-values of the coefficients were significant at the .05 level. The R^2 values associated with each dimension were: Physical = .33, Social = .81, Emotional = .34, Intellectual = .88, Psychological = .75, and Spiritual = .73.

Descriptive Statistics of Major Variables

The SPSS Version 17.0 was used to derive means, standard deviations, maximum and minimum scores of all the 6 measurement scales and their sub-scales. Results are summarized in Table 7.

Table 7

Descriptive Statistics of PWS, ASS, PSI, LSS and LTPA (n =691)

Variable and Sub-dimensions	Possible Range	Min	Max	Mean	SD
Total Perceived Wellness	1 - 6	2.44	5.89	4.09	0.57
Physical	1 - 6	1.40	6.00	4.02	0.84
Social	1 - 6	1.50	6.00	4.36	0.77
Emotional	1 - 6	1.00	6.00	3.71	0.90
Intellectual	1 - 6	2.00	6.00	4.07	0.64
Psychological	1 - 6	1.00	6.00	4.19	0.91
Spiritual	1 - 6	2.00	6.00	4.34	0.86
Total Academic Stress	1 - 5	1.18	4.47	2.83	0.57
Physical	1 - 5	1.00	5.00	2.43	0.85
Psychological	1 - 5	1.00	4.50	2.65	0.70
Psychosocial	1 - 5	1.00	5.00	3.52	0.63
Total PPSA	1 - 6	2.50	5.13	3.80	0.41
Problem-Solving Confidence	1 - 6	1.82	5.36	3.89	0.52
Approach-Avoidance Style	1 - 6	2.19	5.56	3.82	0.45
Personal Control	1 - 6	1.40	5.80	3.53	0.70
Total Leisure Satisfaction	1 - 5	1.92	4.96	3.61	0.54
Psychological	1 - 5	1.00	5.00	3.66	0.68
Educational	1 - 5	1.25	5.00	3.65	0.70
Social	1 - 5	1.00	5.00	3.77	0.70
Relaxation	1 - 5	1.50	5.00	3.92	0.67
Physiological	1 - 5	1.00	5.00	3.26	1.00
Aesthetic	1 - 5	1.00	5.00	3.40	0.70
LTPA	0 - n.a.	0	100	30.58	20.80

The total mean scores for perceived wellness was 4.09 (SD = 0.57). With 6 being the maximum score, this indicated that the wellness level of the participants was moderate. Among the six dimensions, the sample reported the highest perception in the social wellness (M = 4.36, SD = 0.77), followed by the spiritual dimension (M = 4.34, SD = 0.86). Perception of the emotional wellness was the lowest (M = 3.71, SD = 0.90). Generally, the participants had a moderate level of academic stress. The overall mean score on the ASS was 2.83 on a 5-point scale (SD = 0.57). Results obtained showed that the main source of stress of the participants came from psychosocial stressors (M = 3.52, SD = 0.63) and they were least affected by physical environment (M = 2.43, SD = 0.85).

The overall mean scores for perceived problem solving was 3.80 on a 6-point scale (SD = 0.41), suggesting that the participants had moderate perceived problem-solving capabilities. The overall mean scores for leisure satisfaction was 3.61 on a 5-point scale (SD = 0.54). This showed that the participants had a moderate to high level of leisure satisfaction. Among the six subscales, the highest was relaxation (M = 3.92, SD = 0.67) and the lowest was physiological (M = 3.26, SD = 1.00). This implied that most participants believed that the leisure activities they engaged in were restorative and helped them to relax. However, their leisure activities did not help them develop physical fitness and

stay healthy. Regarding LTPA, the overall mean score was 30.58 (SD = 20.80).

The minimum LTPA score was 0 and the maximum was 100.

To explore the relationships among major variables in this study, the Pearson Product Moment Correlation (PPMC) coefficients were generated and examined.

Results are presented in Table 8.

Table 8

Descriptive Statistics and Inter-correlations among Major Variables (n=691)

	Mean	SD	1	2	3	4	5
1. Wellness	4.09	0.57	1.00				
2. AS	2.83	0.57	-.28**	1.00			
3. PPSA	3.80	0.41	.57**	-.20**	1.00		
4. LeiS	3.61	0.54	.52**	-.10**	.39**	1.00	
5. LTPA	30.58	20.80	.19**	-.03	.13**	.27**	1.00

** Correlation is significant at the .01 level

Note. AS = Academic Stress; PPSA = Perceived Problem Solving Ability; LeiS = Leisure Satisfaction; LTPA = Leisure Time Physical Activity

The results indicate that wellness was positively correlated with perceived problem solving ability ($r = .57$, $p < .01$), leisure satisfaction ($r = .52$, $p < .01$) and LTPA ($r = .19$,

$p < .01$), but negatively correlated with academic stress ($r = -.28, p < .01$). This indicated that students who were more satisfied with their leisure activities, participated in more leisure time exercise, had better problem solving skills and less academic stress were more likely to have a positive perception of their state of wellness.

Academic stress was found to be negatively correlated with perceived problem solving ability ($r = -.20, p < .01$) and leisure satisfaction ($r = -.10, p < .01$). This suggested that students who obtained more satisfaction from their leisure activities and had better problem solving skills tended to have less academic stress. No significant correlation was found between academic stress and LTPA ($r = -.03, p > .01$).

Perceived problem solving ability was found to be positively correlated with leisure satisfaction ($r = .39, p < .01$) and LTPA ($r = .13, p < .01$). This indicated that students who gained more satisfaction from their leisure activities and took part in more leisure time physical activities were more likely to have a positive perception of their problem solving ability.

Finally, leisure satisfaction was found to be positively correlated with LTPA ($r = .27, p < .01$). This suggested that students who took part in more leisure time exercise tended to gain more satisfaction from their leisure activities.

Gender Differences

To unearth the possible gender difference in major variables, a series of independent sample t-test and MANOVA were conducted. For LTPA, significant difference was found in scores for males ($M = 35.84$, $SD = 21.31$) and females ($M = 27.15$, $SD = 19.74$); $t(689) = 5.48$, $p < .05$. This suggested that male students participated in more LTPA than female students.

For leisure satisfaction, significant difference was found in the combined dependent variables of leisure satisfaction between male and female students: Wilks' Lambda = .94; $F(6, 683) = 7.76$, $p < 0.05$. When the results for the dependent variables were considered separately, the differences to reach statistical significance were in the subscales of psychological: $F(1, 688) = 10.06$, $p < .05$; physiological: $F(1, 688) = 28.93$, $p < .05$; and aesthetic: $F(1, 688) = 4.42$, $p < .05$. An inspection of the mean scores indicated that males reported significant higher level of leisure satisfaction in all the three aspects (male psychological = 3.76, $SD = 0.70$, female psychological = 3.60, $SD = 0.66$; male physiological = 3.51, $SD = 0.92$, female physiological = 3.10, $SD = 1.01$; male aesthetic = 3.47, $SD = 0.70$, female aesthetic = 3.36, $SD = 0.69$).

For PPSA, no significant difference was found in the combined dependent variables of PPSA between male and females students: Wilks' Lambda = .99; $F(3, 687) = 2.47$, $p > 0.05$. This indicated that male and female students had similar level of

PPSA.

For academic stress, significant difference was found in the combined dependent variables of academic stress between male and females students: Wilks' Lambda = .96; $F(3, 687) = 10.88, p < 0.05$. When the results for the dependent variables were considered separately, the only difference to reach statistical significance was in the subscale of psychosocial: $F(1, 689) = 25.27, p < .05$. An inspection of the mean scores indicated that females reported significantly higher level of academic stress in psychosocial aspect ($M = 3.61, SD = 0.59$) than males ($M = 3.37, SD = 0.67$).

For wellness, significant difference was found in the combined dependent variables of wellness between male and females students: Wilks' Lambda = .97; $F(6, 684) = 3.56, p < 0.05$. When the results for the dependent variables were considered separately, the only differences to reach statistical significance were in the subscales of physical: $F(1, 689) = 8.27, p < .05$; and social: $F(1, 689) = 4.46, p < .05$. An inspection of the mean scores indicated that males reported significantly higher level of wellness in physical aspect ($M = 4.14, SD = 0.05$) than females ($M = 3.95, SD = 0.04$). However, females had significantly higher level of wellness in social aspect ($M = 4.41, SD = 0.04$) than males ($M = 4.29, SD = 0.05$).

Hypotheses and Model Testing

This study examined systematically wellness among university students in Hong Kong. This section describes in details specific statistical procedures made to test out each of the hypothesis, and highlights the relevant results.

Hypothesis 1

The various factors would impact on wellness independently:

- a. Academic stress would be negatively associated with wellness
- b. LTPA would be positively associated with wellness
- c. Leisure satisfaction would be positively associated with wellness
- d. PPSA would be positively associated with wellness

To test the relative contribution of LTPA, leisure satisfaction, PPSA and academic stress to wellness, an a priori model (Total Sample Model) was developed and subjected to path analysis with LISREL (see figure 9). The covariance matrix was used for analysis and the maximum likelihood estimation was selected as the method of analysis.

In determining the significance of a path effect, the t -value associated with the path between two variables was used. If the t value was larger than 1.96, the effect of the independent variable was considered significant at the .05 level of significance.

(Ritchey, 2008).

To compare the relative contribution of LTPA, leisure satisfaction, and PPSA to academic stress and wellness, standardized path coefficients were used. A path with a larger coefficient was assumed to have a greater effect on a target variable than a path with a smaller coefficient (Pedhazur, 1997).

Hypothesis 2

The effects of LTPA, leisure satisfaction, and PPSA on wellness would be mediated by academic stress

- e. LTPA would exert indirect effect on wellness through academic stress
- f. Leisure satisfaction would exert indirect effect on wellness through academic stress
- g. PPSA would exert indirect effect on wellness through academic stress

To test the mediating effects of academic stress, the direct, indirect, and total effects of an independent variable on a dependent variable were also estimated. A direct effect is the influence of one variable on another that is not mediated by another variable in the model. An indirect effect of a variable occurs when its effect on a variable is mediated by at least one intervening variable. Total effect is the sum of the

direct and indirect effects.

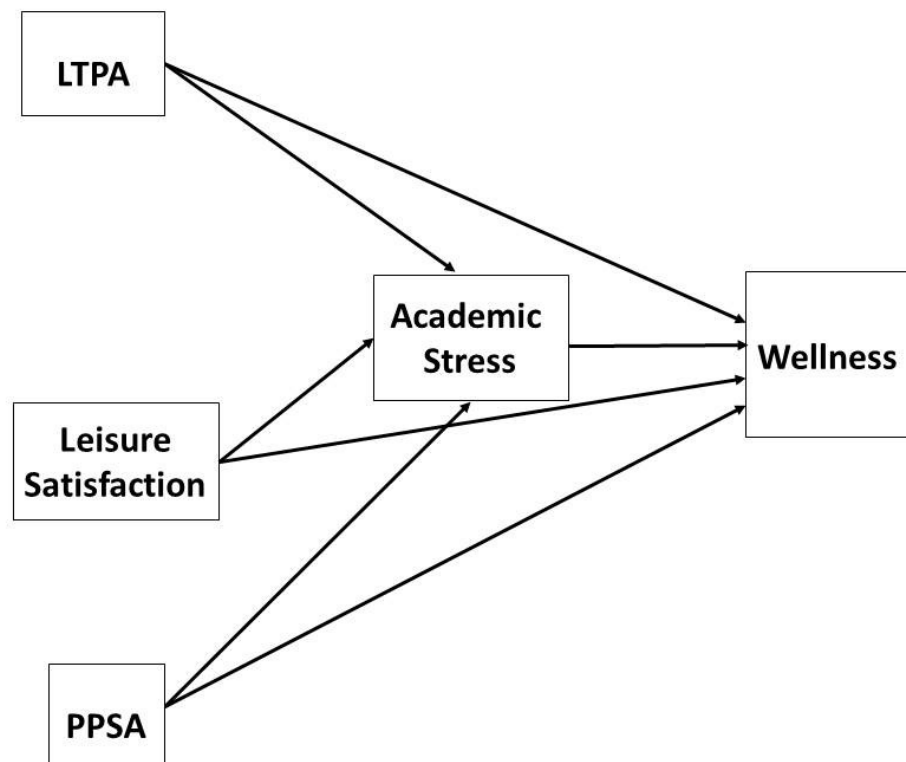


Figure 9. Total Sample Model subjected to path analysis.

Total Sample Model

Result obtained from the model testing suggested that the model was saturated and the overall fit of the model was perfect. For a saturated model, no fit indices were provided. Standardized parameter estimates for the model and the relative (t values) were generated and presented in Figure 10.

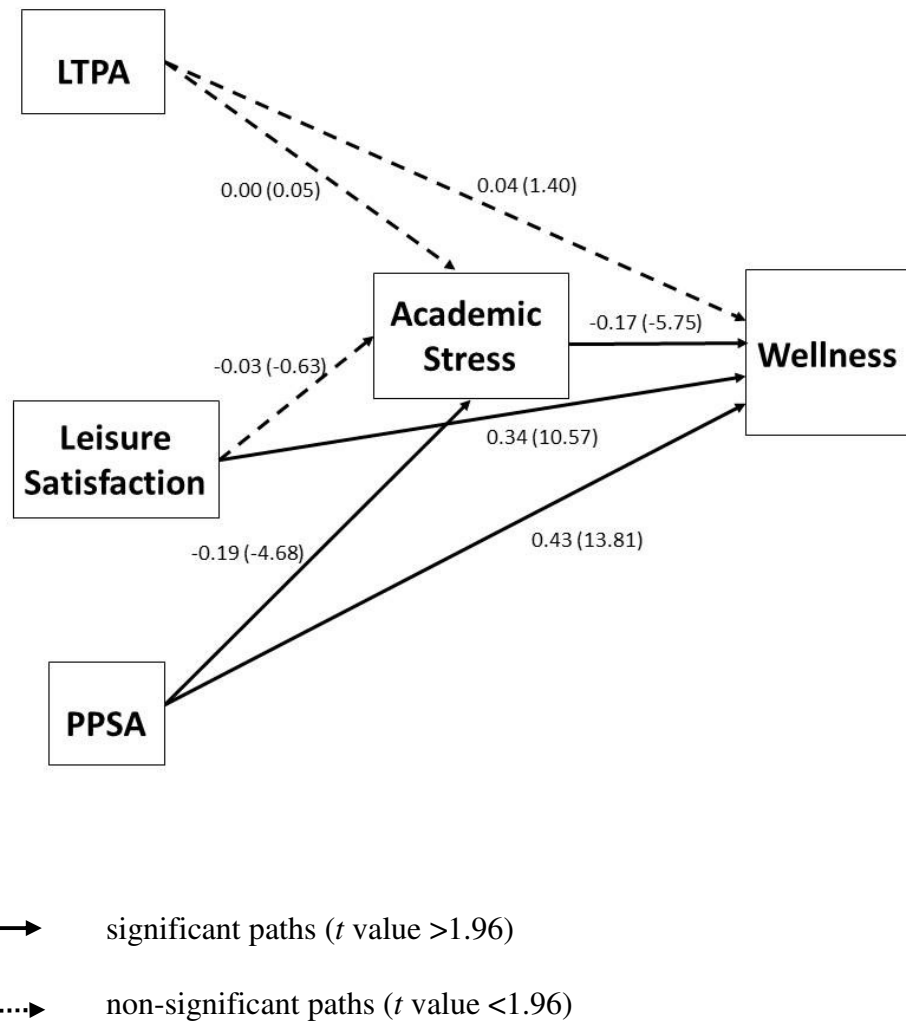


Figure 10. Standardized coefficients and t -values of Total Sample Model ($n = 691$)

A two-stage path analysis was conducted on Total Sample Model. Academic stress was predicted from LTPA, leisure satisfaction, and perceived problem solving ability in stage one. Wellness was predicted from LTPA, leisure satisfaction, perceived problem solving ability, and academic stress in stage two. Results of stage one analysis indicated that neither LTPA ($t = .05$, $p > .05$) nor leisure satisfaction ($t = -.63$, p

> .05) were effective in predicting academic stress. Only perceived problem solving ability was an effective predictor of academic stress ($t = -4.68, p < .05$). A negative direct effect of -.19 was obtained. On the whole, the three variables (LPTA, leisure satisfaction, and perceived problem solving ability), in combination, explained 4% of the academic stress of the students ($R^2 = .04$).

In stage two of the analysis, the relative contribution of LPTA, leisure satisfaction, perceived problem solving ability, and academic stress to wellness was investigated. Results of stage two analysis showed that LPTA was not effective in predicting wellness ($t = 1.40, p > .05$). However, leisure satisfaction ($t = 10.57, p < .05$), perceived problem solving ability ($t = 13.81, p < .05$), and academic stress ($t = -5.75, p < .05$) were all effective predictors of wellness. When the impact strength of the three variables on wellness was compared, they were in the order of perceived problem solving ability (.43), leisure satisfaction (.34), and academic stress (-.17). In combination, the four variables accounted for 43% of the wellness of the students ($R^2 = .43$). Results also indicated that perceived problem solving ability had a significant indirect effect on wellness via academic stress ($t = 3.63, p < .05$). This suggested that perceived problem solving ability in combination with academic stress, can explain more effectively the formulation of wellness perception. In other words, academic stress had a mediating effect between PPSA and wellness. A summary of effects for Total Sample Model is

presented in Table 9.

Table 9

Summary of Standardized Effects of the Total Sample Model

Effect	r	Direct	Indirect	Total	R ²
			via AS		
On AS			-		.04
PPSA	-.20*	-.19*	-	-.19	
LeiS	-.10*	-.03	-	-.03	
LTPA	-.03	.00	-	.00	
on Wellness					.43
AS	-.28*	-.17*	-	-.17	
PPSA	.57*	.43*	.03*	.46	
LeiS	.52*	.34*	.00	.34	
LTPA	.19*	.04	.00	.04	

* $p < .05$

Note. AS = Academic Stress; PPSA = Perceived Problem Solving Ability; LeiS = Leisure Satisfaction; LTPA = Leisure Time Physical Activity

Based on the t-value associated with each path of the Total Sample Model, an insignificant variable (LTPA) was identified. Following the model trimming concept suggested by Pedhazur, (1997), a new model (New Total Sample Model) was specified for re-testing (see Figure 11). In this new model, LTPA was dropped and the following fit indices were used for evaluating the model fit: χ^2/df , the NNFI, the GFI, and the SRMR.

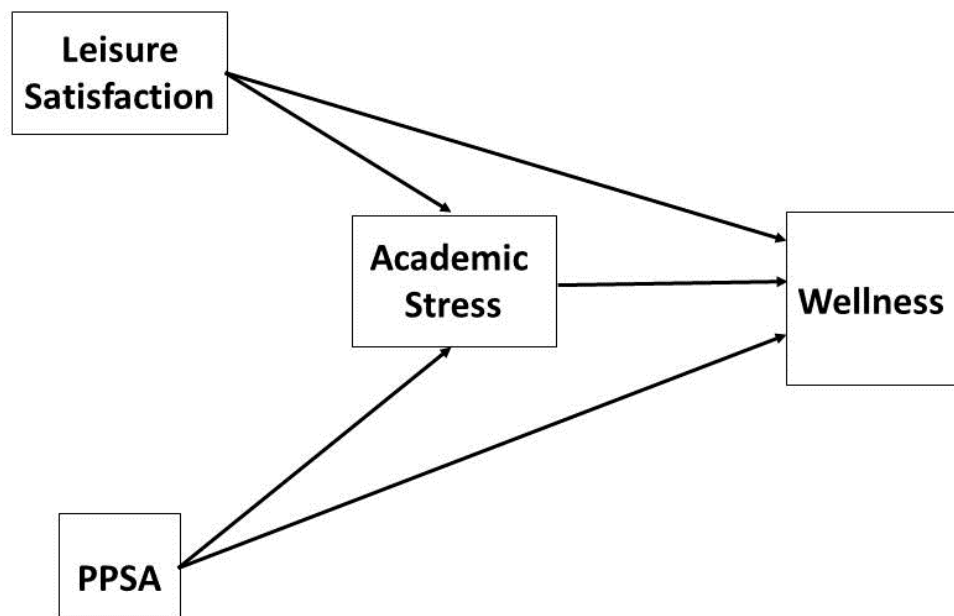
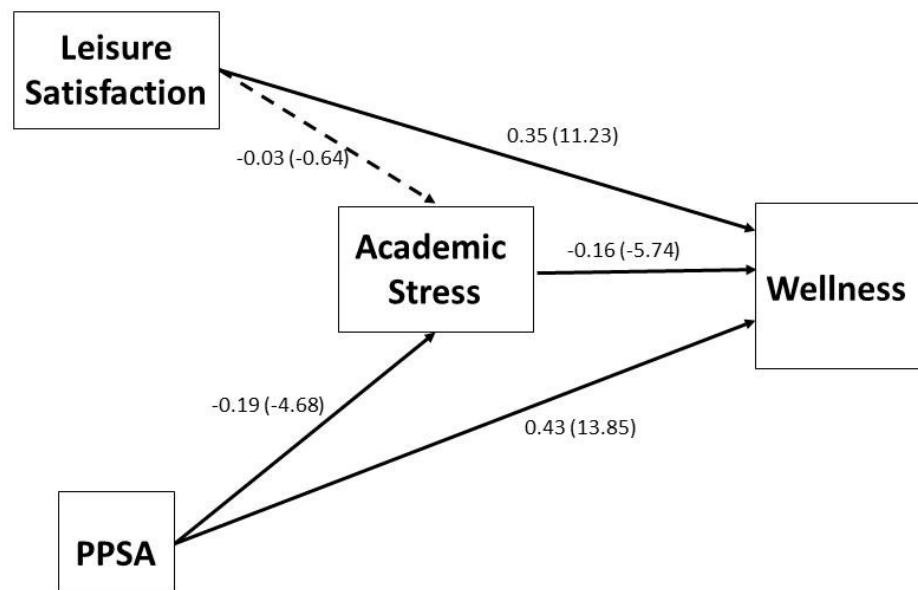


Figure 11. New Total Sample Model subjected to path analysis.

The New Total Sample Model was also a saturated model and no fit indices were provided. Standardized parameter estimates for the New Total Sample Model and the relative (t value) are presented in Figure 12.



- > significant paths (t value >1.96)
> non-significant paths (t value <1.96)

Figure 12. Standardized coefficients and t -values of New Total Sample Model ($n = 691$)

Since both the Total Sample Model and the New Total Sample Model were saturated models, no comparison of fit indices could be made. When the effect size of the independent variables on academic stress and wellness and the squared multiple correlation values for academic stress and wellness obtained from the two models were compared, not much difference was found. Therefore, a cleaner model, the New Total Sample Model, was adopted for this study.

To conclude, the New Total Sample Model was an acceptable model and it showed that academic stress, perceived problem solving ability, and leisure satisfaction all had significant impacts on wellness, no matter directly or indirectly.

Hypothesis 3

The various factors would have different weights in predicting wellness among male and female students.

To find out whether this pattern was consistent among the male and female students, data from male and female students was used for repeated model testing. Results obtained from testing these two models, namely Male Model and Female Model, are presented in the following sections.

Male Model

The correlation matrix subjected for path analysis and model testing is presented in Table 10.

Table 10

Means, Standard Deviations and PPMC Coefficients of Male Students (n=273)

	Mean	SD	1	2	3	4	5	6
1. Wellness	4.12	0.59	1.00					
2. AS	2.79	0.63	-.29*	1.00				
3. PPSA	3.82	0.43	.56*	-.20*	1.00			
4. LeiS	3.69	0.54	.59*	-.13*	.41*	1.00		

*Correlation is significant at the .05 level

Note. AS = Academic Stress; PPSA = Perceived Problem Solving Ability; LeiS = Leisure Satisfaction

Result obtained from the model testing suggested that the overall fit of the Male Model was perfect and the model was also a saturated model. Standardized parameter estimates for the model and the relative (t value) are presented in Figure 13.

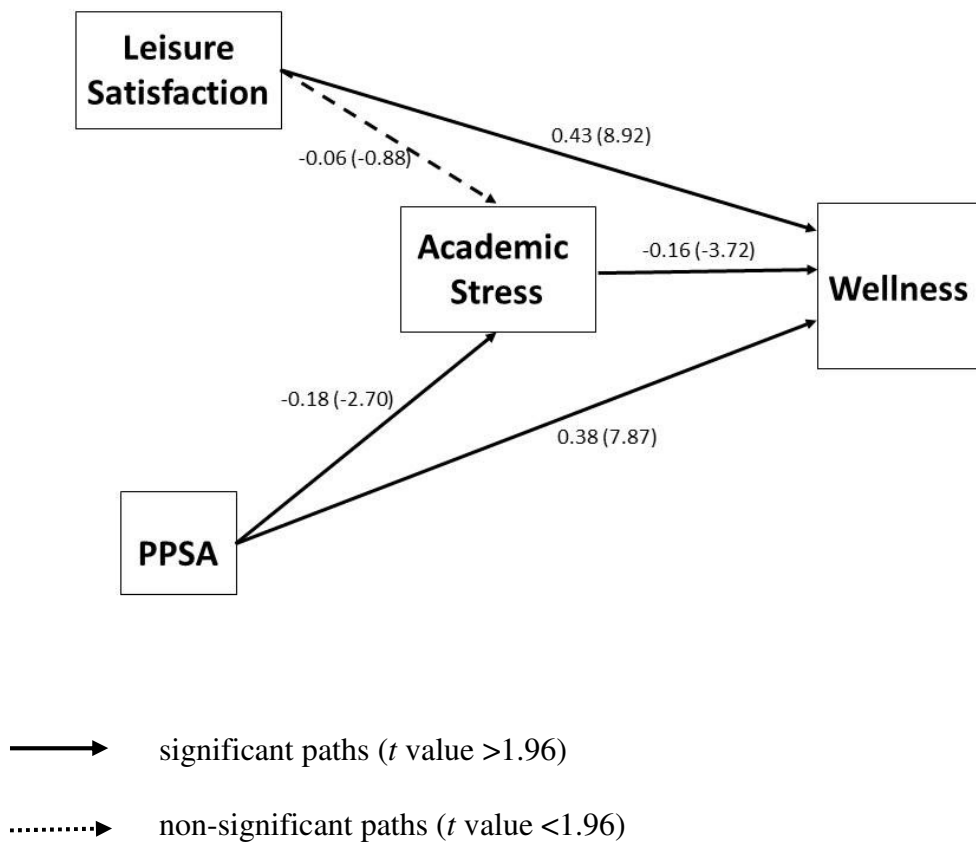


Figure 13. Standardized coefficients and t -values of Male Model ($n = 273$)

A two-stage analysis was conducted on Male Model. The first stage involved assessing the strength of the effects of leisure satisfaction and PPSA on academic stress. The second stage involved assessing the strength of effects of leisure satisfaction, PPSA, and academic stress on wellness.

The standardized path coefficients were inspected. Results of stage one analysis indicated that only the path between PPSA and academic stress was

significant ($t = -2.70, p < .05$). This implied that PPSA appeared to be an effective predictor of academic stress. A negative direct effect of $-.18$ was obtained. In combination, leisure satisfaction and PPSA accounted for 4% of the academic stress of the students ($R^2 = .04$).

Results of stage two analysis of the Male Model indicated that academic stress ($t = -3.72, p < .05$), leisure satisfaction ($t = 8.92, p < .05$), and PPSA ($t = 7.87, p < .05$) were all effective in predicting wellness. When the direct effects of the three variables on wellness were compared, they were in the order of leisure satisfaction (.43), PPSA (.38), and academic stress (-.16). In combination, the three variables accounted for 47% of the wellness of the students ($R^2 = .47$). Results also showed that PPSA had a significant indirect effect on wellness via academic stress ($t = 2.19, p < .05$). This implied that PPSA in combination with academic stress can explain more effectively the wellness perception of the male university students. In short, academic stress had mediating effects between PPSA and wellness of the students. A summary of effects of Male Model is presented in Table 11.

Table 11

Summary of Standardized Effects of the Male Model

Effect	r	Direct	Indirect via AS	Total	R ²
On AS			-		.04
PPSA	-.20*	-.18*	-	-.18	
LeiS	-.13*	-.06	-	-.06	
on Wellness					.47
AS	-.29*	-.16*	-	-.16	
PPSA	.56*	.38*	.03*	.41	
LeiS	.59*	.43*	.01	.44	

* p < .05

Note. AS = Academic Stress; PPSA = Perceived Problem Solving Ability; LeiS = Leisure Satisfaction

Female Model

The correlation matrix subjected for path analysis and model testing is presented in Table 12.

Table 12

Means, Standard Deviations and PPMC Coefficients of Female Students (n=418)

	Mean	SD	1	2	3	4	5	6
1. Wellness	4.07	0.55	1.00					
2. AS	2.85	0.54	-.26*	1.00				
3. PPSA	3.78	0.40	.57*	-.20*	1.00			
4. LeiS	3.56	0.54	.48*	-.07	.36*	1.00		

*Correlation is significant at the .05 level

Note. AS = Academic Stress; PPSA = Perceived Problem Solving Ability; LeiS =

Leisure Satisfaction

The Female Model was also a saturated model, so no fit indices were provided. Standardized parameter estimates for the model and the relative (t value) were generated and presented in Figure 14.

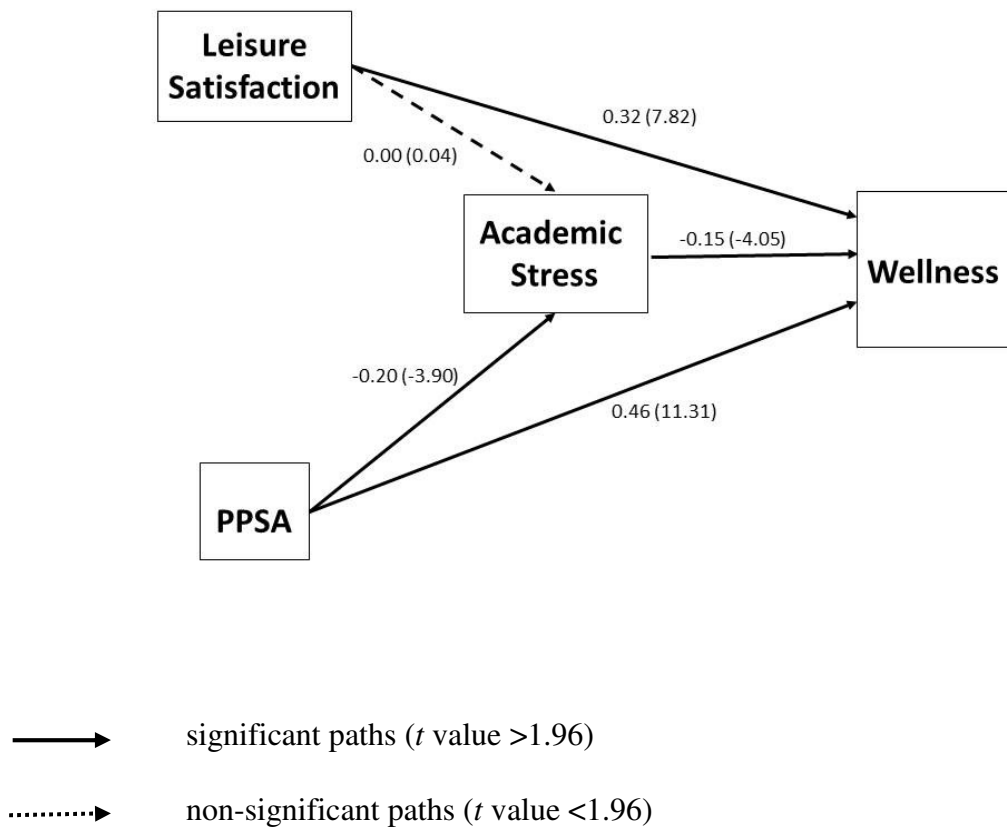


Figure 14. Standardized coefficients and t -values of Female Model ($n=418$)

Path analysis of Female Model was also a two-stage process. The first stage involved assessing the strength of the effects of leisure satisfaction and PPSA on academic stress. The second stage involved assessing the strength of effects of leisure satisfaction, PPSA, and academic stress on wellness.

Results of stage one analysis indicated that only PPSA was an effective predictor of academic stress ($t = -3.90$, $p < .05$). PPSA had a significant negative

direct effect on academic stress, suggesting that students who had better problem solving skills had less academic stress. A negative direct effect of -.20 was obtained. In combination, leisure satisfaction and PPSA accounted for 4% of the academic stress ($R^2 = .04$).

Results of stage two analysis of the Female Model showed that all the three variables (leisure satisfaction, PPSA, and academic stress) were effective predictors of wellness (leisure satisfaction: $t = 7.82$, $p < .05$; PPSA: $t = 11.31$, $p < .05$; academic stress: $t = -4.05$, $p < .05$). When the direct effects of the three variables on wellness were compared, they were in the order of PPSA (.46), leisure satisfaction (.32), and academic stress (-.15). The three variables, in combination, explained 41% of the variability in wellness ($R^2 = .41$). Results also indicated that PPSA had a significant indirect effect on wellness via academic stress ($t = 2.81$, $p < .05$). This implied that PPSA in combination with academic stress, can explain more effectively the formulation of wellness perception. In other words, academic stress had mediating effects between PPSA and wellness of female university students. A summary of effects for Female Model is presented in Table 13.

Table 13

Summary of Standardized Effects of the Female Model

Effect	r	Direct	Indirect	Total	R ²
			via AS		
On AS			-		.04
PPSA	-.20*	-.20*	-	-.20	
LeiS	-.07	.00	-	.00	
on Wellness					.41
AS	-.26*	-.15*	-	-.15	
PPSA	.57*	.46*	.03*	.49	
LeiS	.48*	.32*	.00	.32	

* p < .05

Note. AS = Academic Stress; PPSA = Perceived Problem Solving Ability; LeiS = Leisure Satisfaction

For easy comparison, the direct and indirect effects of the independent variables on academic stress and wellness in Male Model and Female Model are presented in Table 14.

Table 14

Gender Differences of the Effects on Wellness

Effect on AS	r	Direct	Indirect via AS	Total
PPSA				
Male	-.20*	-.18*	-	-.18
Female	-.20*	-.20*	-	-.20
LeiS				
Male	-.13*	-.06	-	-.06
Female	-.07	.00	-	.00
Effect on Wellness	r	Direct	Indirect via AS	Total
AS				
Male	-.29*	-.16*	-	-.16
Female	-.26*	-.15*	-	-.15
PPSA				
Male	.56*	.38*	.03*	.41
Female	.57*	.46*	.03*	.49
LeiS				
Male	.59*	.43*	.01	.44
Female	.48*	.32*	.00	.32

Note. AS = Academic Stress; LeiS = Leisure Satisfaction; PPSA = Perceived Problem Solving Ability.

It was found that both the Male Model and the Female Model were saturated models. Results obtained indicated that PPSA was a significant contributor to academic stress among both male and female students. However, the contributing patterns of the independent variables to their wellness were a bit

different. For male students, the most important contributor to wellness was leisure satisfaction. PPSA was the second significant contributor. However, for female students, PPSA was the most important contributor. Leisure satisfaction only ranked second. It was also found that PPSA had a significant indirect effect on wellness via academic stress among both male and female students. This indicated that academic stress appeared to be a significant mediator between PPSA and wellness of both male and female students.

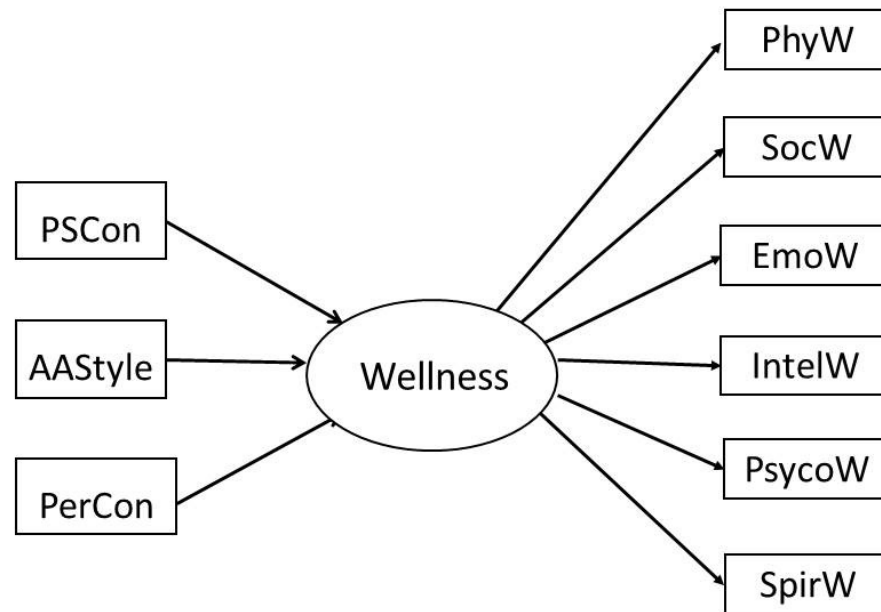
Supplementary Analyses

Both PPSA and leisure satisfaction appeared to contribute significantly to the wellness of both the male and female students. To find out what kinds of problem solving ability and leisure satisfaction gained from which areas were more contributive to wellness, and which wellness dimensions were significant indicators of wellness among the two groups of students, some supplementary analyses were conducted. In this process, four MIMIC models (two Problem Solving and Wellness Model and two Leisure Satisfaction and Wellness Model) were developed. The term MIMIC stands for “Multiple Indicators and Multiple Causes”. It involves using latent variables that are predicted by observed variables (Schumacker & Lomax, 2004). The distinguishing feature of a MIMIC

model is that the latent variable is indicated by several indicator variables and it has multiple causes. Therefore, in a MIMIC model, the latent variable intervenes between two sets of observed variables, one set of variance and a second set of indicator variables.

Male Problem Solving and Wellness Model

A Male Problem Solving and Wellness Model was developed to evaluate the relation between PPSA and wellness among male students (see Figure 15). In this model, the latent variable (wellness) was defined by six indicators (PhyW, SocW, EmoW, IntelW, PsychoW, and SpirW) and predicted by three observed variables (PSCon, AASyle, and PerCon). The correlation matrix submitted for analysis of the Male Problem Solving Model is presented in Table 15.



Note. PSCon = Problem Solving Confidence; AASyle = Approach Avoidance Style; PerCon = Personal Control; PhyW = Physical Wellness; SocW = Social Wellness; EmotW = Emotional Wellness; IntelW = Intellectual Wellness; PsychoW = Psychological Wellness; SpirW = Spiritual Wellness.

Figure 15. Male Problem Solving and Wellness Model

Table 15

Descriptive Statistics and Inter-correlations among the Problem Solving Items and Wellness Domains of Male Students (n = 273)

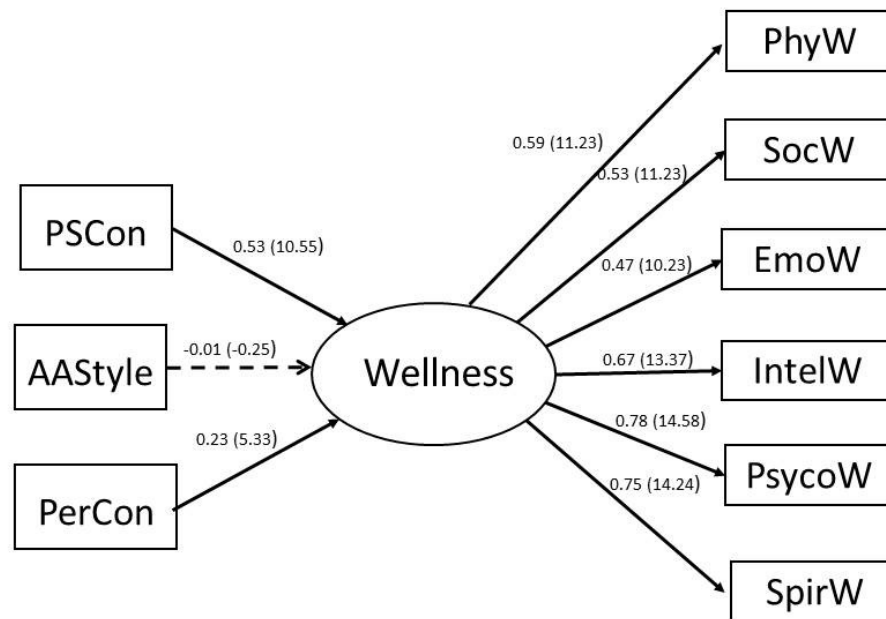
	Mean	SD	PSCon	AAStyle	PerCon	PhyW	SocW	EmoW	IntelW	PsychoW	SpirW
PSCon	3.93	.52	1								
AAStyle	3.82	.46	.54*	1							
PerCon	3.59	.71	.35*	.55*	1						
PhyW	4.14	.77	.30*	.20*	.23*	1					
SocW	4.29	.81	.36*	.31*	.23*	.29*	1				
EmotW	3.71	.93	.33*	.39*	.52*	.31*	.28*	1			
IntelW	4.09	.66	.43*	.36*	.20*	.40*	.38*	.26*	1		
PsychoW	4.18	.99	.46*	.27*	.33*	.47*	.40*	.39*	.49*	1	
SpirW	4.39	.89	.43*	.31*	.30*	.45*	.38*	.30*	.54*	.59*	1

* p < .05

Note. PSCon = Problem Solving Control; AAStyle = Approach Avoidance Style; PerCon = Personal Control; PhyW = Physical Wellness; SocW = Social Wellness; EmotW = Emotional Wellness; IntelW = Intellectual Wellness; PsychoW = Psychological Wellness; SpirW = Spiritual Wellness.

As suggested by Kelloway (1998) and MacCallum, Roznowski, and Necowitz (1992), model modification may be required before a more parsimonious model could be identified. Decisions for modifications could be based on goodness-of-fit indices and the modification index provided by the LISREL program (Hoyle, 1995). However, researchers deemed that model modifications had to be meaningful and supported by clear substantive interpretation (MacCallum et al., 1992). With these suggestions in mind, the process of model testing and model modifications was conducted and described below.

The goodness-of-fit statistics generated from the Male Problem Solving and Wellness Model indicated that the hypothesized model fit the sample data satisfactorily and the model was tenable ($X^2/df = 2.66$, NNFI = 0.98, GFI = 0.98, SRMR = 0.03). The R^2 value obtained was acceptable and the 9 variables in combination explained 40% of wellness. Standardized parameter estimates for the Male Problem Solving and Wellness Model and the relative (t value) are presented in Figure 16.



Note. PSCon = Problem Solving Confidence; AASyle = Approach Avoidance Style; PerCon = Personal Control; PhyW = Physical Wellness; SocW = Social Wellness; EmoW = Emotional Wellness; IntelW = Intellectual Wellness; PsychoW = Psychological Wellness; SpirW = Spiritual Wellness.

————→ significant paths (t value >1.96)
→ non-significant paths (t value <1.96)

Figure 16. Standardized coefficients and t-values of Male Problem Solving and Wellness Model

Results from the Male Problem Solving and Wellness Model indicated that PSCon (Problem Solving Confidence) and PerCon (Personal Control) were contributing predictors of wellness for male students. This suggested that having

self-confidence and a sense of control when handling problems could help to predict wellness of male students. However, AASStyle (Approach Avoidance Style) was not a significant predictor of wellness among male students. This implied that the way they handle their problems, whether it be approaching or avoiding the problems altogether, would not affect the wellness perception of the male university students who took part in this study.

As for wellness, all dimensions were significant indicators. When the standardized coefficients were examined, the most contributing domains were PsychoW (psychological wellness), SpirW (spiritual wellness) and IntellW (intellectual wellness). This suggested that being optimistic, having a purpose in life and enough intellectual challenge helped to indicate the wellness level of male students.

Female Problem Solving and Wellness Model

A Female Problem Solving and Wellness Model was developed to evaluate the relation between PPSA and wellness among female students. Similar to the Male Problem Solving Model, the latent variable (wellness) was defined by six indicators (PhyW, SocW, EmoW, IntelW, PsychoW, and SpirW) and predicted by three observed variables (PSCon, AASStyle, and PerCon). The correlation matrix

submitted for analysis of the Female Problem Solving Model is presented in Table

16.

Table 16

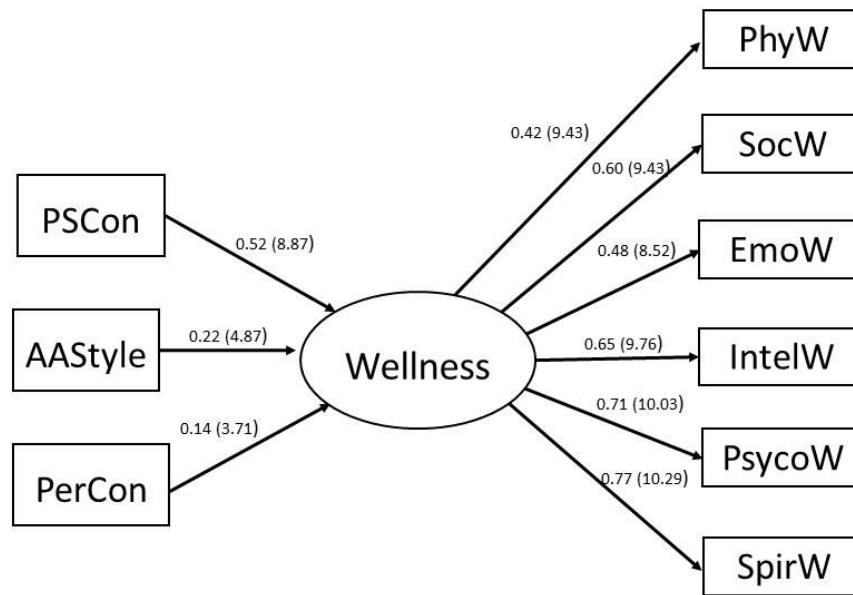
Descriptive Statistics and Inter-correlations among the Problem Solving Items and Wellness Domains of Female Students (n =418)

	Mean	SD	PSCon	AAStyle	PerCon	PhyW	SocW	EmoW	IntelW	PsychoW	SpirW
PSCon	3.87	.52	1								
AAStyle	3.82	.43	.46*	1							
PerCon	3.49	.70	.26*	.44*	1						
PhyW	3.95	.88	.28*	.15*	.16*	1					
SocW	4.41	.73	.39*	.25*	.21*	.26*	1				
EmotW	3.72	.88	.41*	.29*	.46*	.23*	.26*	1			
IntelW	4.06	.63	.46*	.39*	.18*	.28*	.37*	.17*	1		
PsychoW	4.19	.85	.44*	.24*	.30*	.38*	.46*	.40*	.41*	1	
SpirW	4.30	.83	.46*	.39*	.23*	.26*	.49*	.36*	.57*	.54*	1

* p < .05

Note. PSCon = Problem Solving Control; AAStyle = Approach Avoidance Style; PerCon = Personal Control; PhyW = Physical Wellness; SocW = Social Wellness; EmotW = Emotional Wellness; IntelW = Intellectual Wellness; PsychoW = Psychological Wellness; SpirW = Spiritual Wellness.

The goodness-of-fit statistics generated from the Female Problem Solving and Wellness Model also indicated that the hypothesized model fit the sample data satisfactorily (NNFI = 0.94, GFI = 0.96, SRMR = 0.04). Although the ratio of chi-square value to its degree of freedom ($X^2/df = 6.31$) was above three, a cut-off value used in this study, the R^2 value obtained was acceptable and the 9 variables in combination explained 50% of wellness. Standardized parameter estimates for the Female Problem Solving and Wellness Model and the relative (t value) are presented in Figure 17.



Note. PSCon = Problem Solving Confidence; AASyle = Approach Avoidance Style; PerCon = Personal Control; PhyW = Physical Wellness; SocW = Social Wellness; EmoW = Emotional Wellness; IntelW = Intellectual Wellness; PsychoW = Psychological Wellness; SpirW = Spiritual Wellness.

- significant paths (t value >1.96)
-→ non-significant paths (t value <1.96)

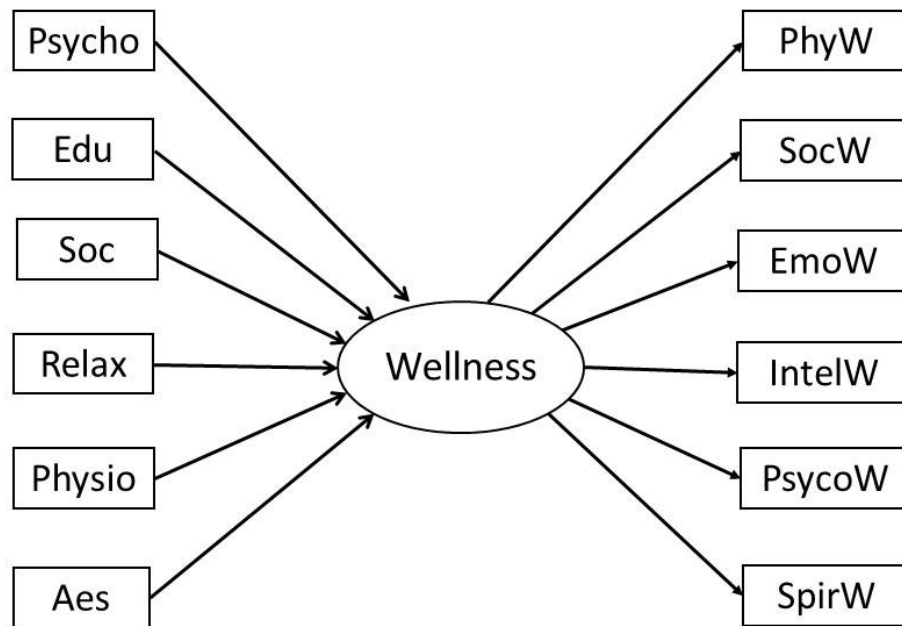
Figure 17. Standardized coefficients and t-values of Female Problem Solving and Wellness Model

Results from the Female Problem Solving and Wellness Model indicated that PSCon (Problem Solving Confidence), AASyle (Approach Avoidance Style), and PerCon (Personal Control) were all contributing predictors of wellness for female students. This suggested that having self-confidence and a sense of control when

handling problems and their attitude towards problems solving all helped to predict wellness of female students. Regarding wellness, all dimensions were significant indicators. When the standardized coefficients were examined, the most contributing domains were SpirW (spiritual wellness), PsychoW (psychological wellness), and IntellW (intellectual wellness). This suggested that finding a purpose in life, being optimistic about the future, and having enough intellectual challenge helped to indicate the wellness perception level of female students.

Male Leisure Satisfaction and Wellness Model

A Male Leisure Satisfaction and Wellness Model was developed to evaluate the relation between leisure satisfaction and wellness among male students (see Figure 18). In this model, the latent variable (wellness) was defined by six indicators (PhyW, SocW, EmoW, IntelW, PsychoW, and SpirW) and predicted by six observed variables (Psycho, Edu, Soc, Relax, Physio, and Aes). The correlation matrix submitted for analysis of the Male Leisure Satisfaction and Wellness Model is presented in Table 17.



Note. Psycho = Psychological; Edu = Educational; Soc = Social; Relax = Relaxation; Physio = Physiological; Aes = Aesthetic; PhyW = Physical Wellness; SocW = Social Wellness; EmotW = Emotional Wellness; IntelW = Intellectual Wellness; PsychoW = Psychological Wellness; SpirW = Spiritual Wellness.

Figure 18. Male Leisure Satisfaction and Wellness Model

Table 17

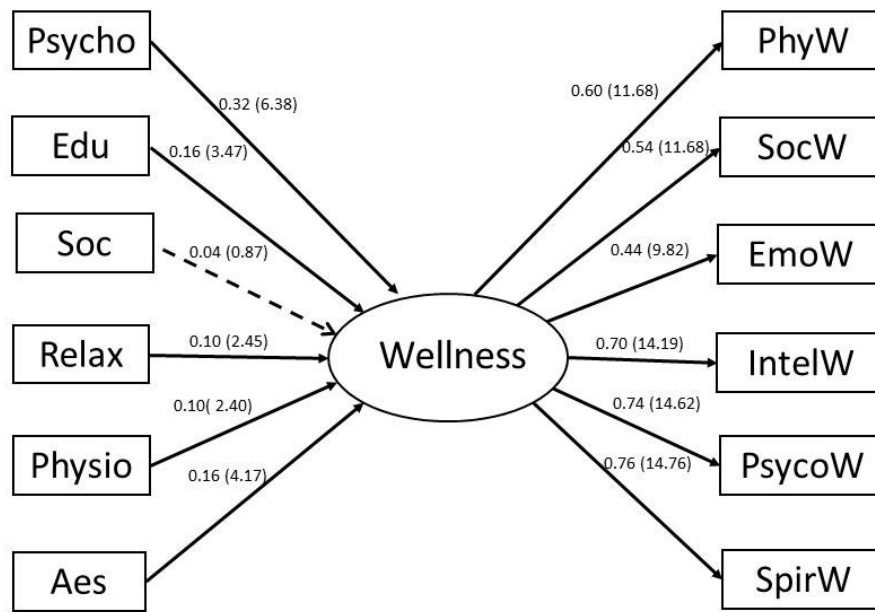
Descriptive Statistics and Inter-correlations among the Leisure Satisfaction Items and Wellness Domains of Male Students (n =273)

	Mean	SD	Psycho	Edu	Soc	Relax	Physio	Aes	PhyW	SocW	EmoW	IntelW	PsychoW	SpirW
Psycho	3.76	.70	1											
Edu	3.69	.71	.60*	1										
Soc	3.79	.69	.61*	.61*	1									
Relax	3.88	.70	.51*	.40*	.51*	1								
Physio	3.51	.92	.42*	.38*	.42*	.30*	1							
Aes	3.47	.70	.35*	.43*	.39*	.30*	.40*	1						
PhyW	4.14	.77	.39*	.32*	.26*	.25*	.44*	.22*	1					
SocW	4.29	.81	.38*	.28*	.31*	.25*	.22*	.25*	.29*	1				
EmotW	3.71	.93	.23*	.18*	.26*	.17*	.15*	.10	.31*	.28*	1			
IntelW	4.09	.66	.47*	.46*	.38*	.30*	.33*	.35*	.40*	.38*	.26*	1		
PsychoW	4.18	.99	.36*	.35*	.35*	.31*	.30*	.32*	.47*	.40*	.39*	.49*	1	
SpirW	4.39	.89	.36*	.39*	.36*	.35*	.30*	.33*	.45*	.38*	.30*	.54*	.59*	1

* p < .05

Note. Psycho = Psychological; Edu = Educational; Soc = Social; Relax = Relaxation; Physio = Physiological; Aes = Aesthetic; PhyW = Physical Wellness; SocW = Social Wellness; EmotW = Emotional Wellness; IntelW = Intellectual Wellness; PsychoW = Psychological Wellness; SpirW = Spiritual Wellness.

The goodness-of-fit statistics generated from the Male Leisure Satisfaction and Wellness Model showed that the hypothesized model fit the sample data satisfactorily and the model was tenable ($\chi^2/df = 2.80$, NNFI = 0.98, GFI = 0.98, SRMR = 0.03). R^2 value obtained was acceptable and the 12 variables in combination explained 45% of wellness. Standardized parameter estimates for the Male Leisure Satisfaction and Wellness Model and the relative (t value) are presented in Figure 19.



Note. Psycho = Psychological; Edu = Educational; Soc = Social; Relax = Relaxation; Physio = Physiological; Aes = Aesthetic; PhyW = Physical Wellness; SocW = Social Wellness; EmotW = Emotional Wellness; IntelW = Intellectual Wellness; PsychoW = Psychological Wellness; SpirW = Spiritual Wellness.

————→ significant paths (t value >1.96)
→ non-significant paths (t value <1.96)

Figure 19. Standardized coefficients and t -values of Male Leisure Satisfaction and Wellness Model

Results from the Male Leisure Satisfaction and Wellness Model indicated that among the six observed variables, only Soc (Social) was not a significant predictor of wellness among male students. Psycho (Psychological), Edu (Educational), Relax (Relaxation), Physio (Physiological), and Aes (Aesthetic)

were all contributing predictors of wellness for male students. When the standardized coefficients were examined, the most contributing predictors were Psycho ($t = 6.38$), Aes ($t = 4.17$), and Edu ($t = 3.47$). This suggested that participating in some enjoyable and enlightening activities in a pleasing environment helped to predict wellness of male students. Regarding wellness, all dimensions were significant indicators. The standardized coefficient values indicated that the most contributing domains were SpirW (spiritual wellness, $t = 14.76$), PsychoW (psychological wellness, $t = 14.62$), and IntellW (intellectual wellness, $t = 14.19$). This suggested that finding a purpose in life, being optimistic about the future, and having enough intellectual challenge all helped to indicate the wellness perception level of male students.

Female Leisure Satisfaction and Wellness Model

To evaluate the relation between leisure satisfaction and wellness among female students, a Female Leisure Satisfaction and Wellness Model was developed. Similar to the Male Leisure Satisfaction and Wellness Model, the latent variable (wellness) was also defined by six indicators (PhyW, SocW, EmoW, IntellW, PsychoW, and SpirW) and predicted by six observed variables (Psycho,

Edu, Soc, Relax, Physio, and Aes). The correlation matrix submitted for analysis of the Female Leisure Satisfaction and Wellness Model is presented in Table 18.

Table 18

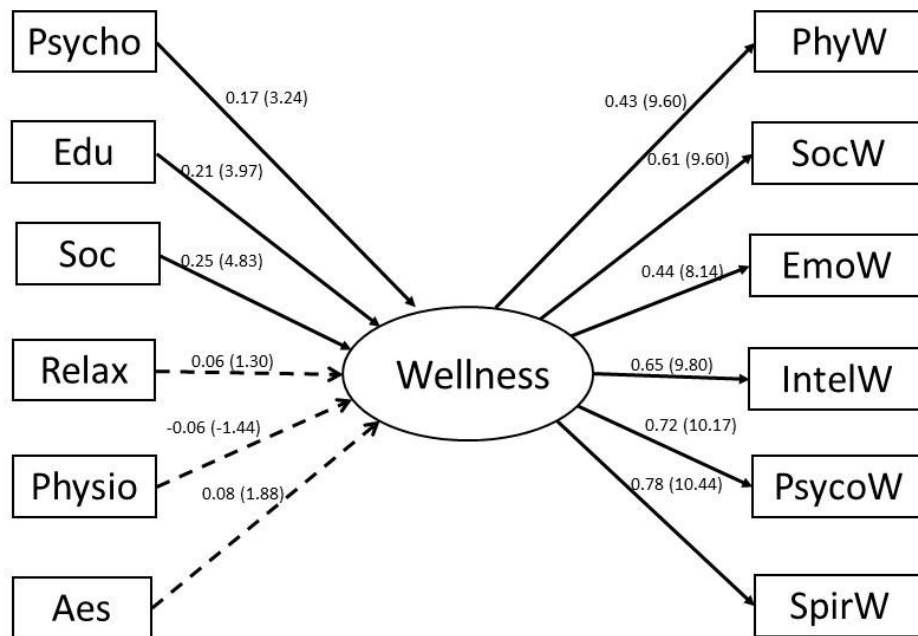
Descriptive Statistics and Inter-correlations among the Leisure Satisfaction Items and Wellness Domains of Female Students (n =418)

	Mean	SD	Psycho	Edu	Soc	Relax	Physio	Aes	PhyW	SocW	EmoW	IntelW	PsychoW	SpirW
Psycho	3.60	.66	1											
Edu	3.62	.69	.61*	1										
Soc	3.77	.70	.49*	.58*	1									
Relax	3.94	.65	.52*	.39*	.39*	1								
Physio	3.10	1.01	.47*	.39*	.39*	.30*	1							
Aes	3.36	.69	.43*	.38*	.39*	.40*	.49*	1						
PhyW	3.95	.88	.24*	.21*	.24*	.17*	.31*	.14*	1					
SocW	4.41	.73	.26*	.28*	.33*	.18*	.13*	.17*	.26*	1				
EmotW	3.72	.88	.16*	.17*	.21*	.14*	.11*	.20*	.23*	.26*	1			
IntelW	4.06	.63	.38*	.39*	.32*	.24*	.23*	.24*	.28*	.37*	.17*	1		
PsychoW	4.19	.85	.32*	.35*	.33*	.24*	.21*	.26*	.38*	.46*	.40*	.41*	1	
SpirW	4.30	.83	.34*	.36*	.37*	.27*	.14*	.23*	.26*	.49*	.36*	.57*	.54*	1

* p < .05

Note. Psycho = Psychological; Edu = Educational; Soc = Social; Relax = Relaxation; Physio = Physiological; Aes = Aesthetic; PhyW = Physical Wellness; SocW = Social Wellness; EmotW = Emotional Wellness; IntelW = Intellectual Wellness; PsychoW = Psychological Wellness; SpirW = Spiritual Wellness.

The goodness-of-fit statistics generated from the Female Leisure Satisfaction and Wellness Model showed that the hypothesized model fit the sample data satisfactorily (NNFI = 0.97 GFI = 0.97, SRMR = 0.03). The ratio of chi-square value to its degree of freedom ($X^2/df = 3.20$) was slightly above three. However, the R^2 value obtained was acceptable and the 12 variables in combination explained 33% of wellness. Standardized parameter estimates for the Female Leisure Satisfaction and Wellness Model and the relative (t value) are presented in Figure 20.



Note. Psycho = Psychological; Edu = Educational; Soc = Social; Relax = Relaxation; Physio = Physiological; Aes = Aesthetic; PhyW = Physical Wellness; SocW = Social Wellness; EmotW = Emotional Wellness; IntelW = Intellectual Wellness; PsychoW = Psychological Wellness; SpirW = Spiritual Wellness.

————→ significant paths (t value >1.96)
→ non-significant paths (t value <1.96)

Figure 20. Standardized coefficients and t-values of Female Leisure Satisfaction and Wellness Model

Results from the Female Leisure Satisfaction and Wellness Model indicated that among the six observed variables, only Psycho (Psychological), Edu (Educational), and Soc (Social) were contributing predictors of wellness for female students. When

the standardized coefficients were examined, the most contributing predictors were Soc ($t = 4.83$), Edu ($t = 3.97$), and Psycho ($t = 3.24$). This suggested that taking part in interactive, enlightening and enjoyable activities helped to predict wellness of female students. As for wellness, like the Male Leisure Satisfaction and Wellness Model, all the six dimensions were significant indicators. The standardized coefficient values indicated that the most contributing domains were also SpirW (spiritual wellness, $t = 10.44$), PsychoW (psychological wellness, $t = 10.17$), and IntellW (intellectual wellness, $t = 9.80$). This suggested that finding a purpose in life, being optimistic about the future, and having enough intellectual challenge also helped to indicate the wellness perception level of female students.

Summary of Results

The purpose of the study was to examine the relative contribution of LTPA, leisure satisfaction, PPSA, and academic stress to wellness. It also aimed at assessing the impact of gender on the strengths of contribution of these variables to wellness. Results from the various statistical analyses successfully answered the major research questions. Some important findings are presented as follows:

1. The university students reported a moderate level of perceived wellness ($M = 4.09$, $SD = 0.57$). Male students had higher level of wellness in physical aspect while female students had higher level of wellness in social aspect.
2. The major contributors to wellness among male and female students were the same but in different order.
3. The most important contributor to wellness among male students was leisure satisfaction. Among the six components of leisure satisfaction, the most significant ones were psychological, aesthetic, and educational. PPSA was the second significant contributor to wellness of male students. Among the three components of PPSA, problem solving confidence and personal control were the most significant ones.
4. The most important contributor to wellness among female students was PPSA. All the three components of PPSA, namely problem solving confidence, approach avoidance style, and personal control, were significant predictors. Leisure satisfaction was the second significant contributor to wellness. The most significant components were social, educational, and psychological.
5. Spiritual wellness, psychological wellness, and intellectual wellness were the most significant indicators of the overall wellness conception of the university students.

6. The university students had a moderate level of academic stress ($M = 2.83$, $SD = 0.57$). Female students reported higher level of academic stress in psychosocial aspect.
7. The most important contributor to academic stress among university students was PPSA.
8. Academic stress had significant mediating effects between PPSA and wellness among both male and female students.
9. The university students had moderate problem-solving capabilities ($M = 3.80$, $SD = 0.41$). The PPSA among male and female students was similar.
10. The level of leisure satisfaction among the university students was moderate to high ($M = 3.61$, $SD = 0.54$). Male students reported notably higher leisure satisfaction in psychological, physiological, and aesthetic aspects.
11. Most of the university students did not participate in adequate amount of physical activities. Male students engaged in more leisure time physical activities than female students, but LTPA was not a significant contributor to the academic stress and wellness of both male and female students.
12. A revised student wellness model was established. In this model, leisure satisfaction, PPSA, and academic stress had direct effect on wellness while

leisure satisfaction and PPSA had an indirect effect on wellness via academic stress.

CHAPTER 5

DISCUSSION

The main purpose of the study was to investigate the relative contribution of LTPA, leisure satisfaction, PPSA, and academic stress to wellness of university students in Hong Kong. Some significant results were obtained from the data collected. In this chapter, these findings were discussed. The current conditions in Hong Kong and some existing literature on similar topics were explored. This chapter contained the following sections: (1) academic stress of university students in Hong Kong; (2) important contributors to academic stress; (3) wellness of university students in Hong Kong; (4) important contributors to wellness; and (5) summary and recommendations for future studies.

Academic Stress of University Students in Hong Kong

University students in the present study had a moderate level of academic stress ($M = 2.83$, $SD = 0.57$). The results were in line with those of earlier studies which reported that a large number of university students in Hong Kong had stress symptoms. Wong, Cheung, Chan, Ma, and Tang (2006) conducted a web-based survey among 7915 first-year university students in Hong Kong. They found that students in their sample had greater depression, anxiety and stress than international and local general

population samples. In another online survey undertaken by University of Hong Kong among 14,073 full-time university students (Tong, 2007), it was reported that 32% of the students had moderate to extremely severe depressive symptoms, 48% suffered from similar levels of anxiety, and 31% of the students had moderate to extremely severe degrees of stress. In a more recent study jointly conducted by Baptist University and the Mental Health Association of Hong Kong (Sun, 2008) among 2,000 adults and students, it was found that 4 out of 10 Hongkongers were troubled by feelings of anxiety, and 2 in 10 had various degrees of depression. Results from the study also indicated that study performance was a source of stress among university and secondary school students.

Significant gender difference in academic stress was also found in this study. Results obtained indicated that female students had significantly higher academic stress in psychosocial subscale than their male counterparts. Items in this subscale were mainly related to academic performance and workload (final grades, studying for examinations, waiting for tests, projects, and excessive homework). These were popular academic stressors which were frequently reported by students (Agolla & Ongori, 2009; Li et al., 2005; Ong & Cheong, 2009). The finding that female students had higher academic stress was consistent with the results obtained in many previous studies (Abouserie, 1994; Michie et al., 2001; Misra, & McKean, 2000;

Lawrence, & Antonio, 2009; Thawabieh & Qaisy, 2012). Some researchers believed that this could be due to the higher anxiety level experienced by female (Misra & McKean, 2000). Females often reported more stress-related symptoms and had a tendency to rate negative events more often and appraise stressors as more severe than males (Allen & Hiebert, 1991; Tamres, Janicki, & Helgeson, 2002). This implied that when facing the same challenge or being given a similar task to complete, it was very likely that females would find it more stressful than males. If this was the case, female students would benefit from training which helped them face adverse situations and manage their anxiety effectively. Stress management, different relaxation techniques and coping strategies should be organized for them. Research studies supported that stress management intervention that included relaxation and coping skills training helped women reduce anxiety and emotional distress effectively (Antoni et al., 2006; Cohen & Fried, 2007; Hall & Long, 2009).

However, across the border, situations in Mainland China were not the same. Previous research conducted in Beijing and Shanghai found that male university students had higher stress levels than female students (Li & Boey, 2002; Chen, Wong, Ran, & Gilson, 2009). The finding was contrary to those obtained in the western world. Chen et al. (2009) pointed out that this might be due to the “one child per couple policy” of China and the higher social expectations bearing upon the males in

Chinese society. Further studies have to be conducted to confirm this. As Hong Kong is a westernized city, it is not surprising that the results obtained in the present study are similar to those found in the western world.

Important Contributors to Academic Stress

When the Total Sample Model (generic model) was re-tested by using the data from male and female students, results indicated that the overall fit of the two models were perfect and the two models were saturated models. When comparing the magnitude of the contributing effects of leisure satisfaction and PPSA to academic stress among male and female students, it was found that PPSA was the most important common contributor of academic stress among university students. It had significant negative direct effects on academic stress of both male and female students with coefficients of -.18 and -.20 for the two groups of students respectively.

The positive effect of PPSA in combating stress could be found in the literature. Baker (2003) undertook a prospective longitudinal investigation to examine the relations between social problem-solving appraisals and subsequent adjustment, stress, health, motivation and performance in a sample of university students during their three years at university. It was found that self perceived problem-solving abilities had direct beneficial effects on psychosocial adjustment to university, perceived stress

levels, and academic performance. In another study conducted by Noojin and Wallander (1997) to investigate the contributions of PPSA to the adjustment of mothers of children with a physical disability, they found that perceptions of competence in problem-solving were associated with better overall adjustment. Those mothers who perceived themselves as effective problem solvers generally reported less distress and tended to select more adaptive coping strategies when faced with stress. Research findings indicated that individuals with higher PPSA had less stress level and could handle adverse situations better.

Literature reflected that PPSA not only helped to predict the perception of stress but was also closely related to self-reported physical health of an individual (Largo-Wight et al., 2005). In a meta-analysis conducted by Heppner et al. (2004) to review more than 120 studies undertaken in the past 20 year using Problem Solving Inventory (PSI), they found that perceived ineffective problem-solvers were more likely to experience higher levels of anxiety, depression, sense of hopelessness, and had more suicide ideation. In a more recent study conducted by Grover et al. (2009) among 102 inpatient adolescents, they also found that adolescents with poor problem-solving skills had elevated suicidal ideation and were at greater risk of making a nonfatal suicide attempt. Similar result was also obtained in Hong Kong by Chow and Chan (2010) who found that problem-solving appraisal was significantly

related to depression and self-rated health among new Chinese migrant women. In short, result from the present study was consistent with those obtained in previous studies and supported that PPSA was an important contributor to academic stress among university students.

Wellness of University Students in Hong Kong

In the present study, university students reported a mean score of 4.09 (SD = 0.57) in perceived wellness. With 6 as the maximum score, the wellness level of the participants could be considered as moderate. The score was relatively lower when compared with the results obtained in studies on other populations such as hospital employees (Bezner et al., 1999), persons with traumatic brain injury (Bezner & Hunter, 2001), and women with breast cancer (Kinney, Rodgers, Nash, & Bray, 2003). However, the score was higher when compared to a sample of university students (Sidman et al., 2009) and a sample of managerial staff in sport and recreation (Du, 2009). Individuals' life experience could affect their wellness perception. However, people facing adverse life circumstances did not necessarily have poor wellness perception. As pointed out by Travis (n.d.-a), wellness was not static. It was a dynamic process. A person with physical or intellectual disabilities could still have a positive outlook and moved in the direction of high-level wellness. On the contrary,

a physically healthy person who was always complaining and worrying would be approaching premature death. Therefore, helping university students develop a correct concept of wellness may be the first step to work for in order to enhance their overall wellness perception.

Results from this study showed significant gender difference in wellness perception among university students. Males reported higher level of wellness in physical domain while female students had higher wellness perception in social domain. The results obtained did not come as a surprise. It had been well documented that males generally engaged in more physical activities than females (Lee & Loke, 2005; Reed & Phillips, 2005; Steptoe & Butler, 1996; Subasi et al., 2006). Male students in the present study also reported a higher mean score in LTPA. Their active lifestyle might help them develop a positive perception and expectation of their physical health. This was supported by a study conducted by Bezner et al. (1999) who reported a significant correlation between physical activity levels and perceived wellness scores among their hospital employee sample. The present study also found that female students perceived themselves as having more support from friends and family than male students. This was consistent with the finding reported by Tamres et al. (2002) that women sought social support from others more frequently than men. This helped to explain why female students in the present study had

higher wellness perception in social domain.

The supplementary analyses of the study showed that spiritual, psychological, and intellectual wellness were the most significant indicators of overall wellness conception of university students. According to Adams et al. (1997), spiritual wellness was “a positive perception of meaning, and purpose in life” (p. 210); psychological wellness was “a general perception that one will experience positive outcomes to the events and circumstances of life” (p. 210); and intellectual wellness was defined as “the perception of being internally energized by an optimal amount of intellectually stimulating activity” (p. 211). In short, these three domains measured individuals’ perception of having suitable amount of intellectually enriching activities, a positive and optimistic attitude towards life. For most university students, they spent much of their time and effort on their studies. They worked hard to gain better academic achievement in order to equip themselves for future employment. This explained why spiritual, psychological, and intellectual wellness being the most important indicators of overall wellness conception among university students. Based on this finding, university faculty staff should plan their teaching content and assessment methods carefully in order to give students the correct amount of intellectual challenges. At the same time, university counselors and student affair supporting staff can launch some training programmes to help students develop a

positive attitude towards their studies and future.

Important Contributors to Wellness

When the magnitude of the contributing effects of leisure satisfaction, PPSA, and academic stress to wellness among male and female students was examined, it was found that all of them had significant contribution to the wellness perception of the students. In this section, the role of each contributor to wellness and its implications to male and female students was discussed.

PPSA

In this study, university students reported moderate problem solving ability ($M = 3.80$, $SD = 0.41$). The PPSA among male and female students were similar. This finding was consistent with previous studies (Beckham, Carbonell, & Gustafson, 2001; Izgar, 2008; Turkum, 2011). Results from the present study showed that PPSA was an important common contributor to wellness among university students. It had a significant positive direct effect on the wellness of university students with coefficients of .41 for males and .49 for females. However, the magnitude of the impact of PPSA on wellness ranked first for female students but it only ranked second, following leisure satisfaction, among male students. This implies that when

organizing programmes to enhance the overall wellness of university students, problem solving workshops are more suitable for female students while provision of satisfying leisure activities may work better for male students.

The present study also found that PPSA had a significant indirect effect via academic stress on wellness of both male and female students. This implied that higher PPSA could offset the negative effects of academic stress on the wellness of students. By the same token, lower perceived problem solving ability could intensify the negative effects of academic stress on their overall wellness. The negative correlation between PPSA and perceived stress was discussed earlier in this chapter. Based on this finding, wellness professionals and university staff can help students develop better problem-solving ability so as to reduce their academic stress and at the same time enhance their overall wellness.

Supplementary analyses of this study showed that problem solving confidence, personal control were significant predictors of wellness of male students while problem solving confidence, personal control, and approach avoidance style were all significant predictors among female students. However, when the magnitude of the effect size of the three variables was examined, the most significant predictor among both groups of students was problem solving confidence (coefficients of .53 for males and .52 for females). This implied that students who trust and believe in their own

problem solving abilities would have better perceived wellness. Studying at universities was a big challenge for most young people. They have to handle their studies, interpersonal relationships, finance and daily living on their own (Larson, 2006; Rickinson, 1998; Ross et al., 1999). This explained why the belief in one's competence in handling problems was the most significant indicator of the perceived wellness of the students.

Leisure Satisfaction

Generally, university students in this study had moderate to high level of leisure satisfaction ($M = 3.61$, $SD = 0.54$). Male students had notably higher leisure satisfaction in the subscales of psychological, physiological, and aesthetic. This suggested that male students found their leisure activities more enjoyable, pleasing and interesting, and they perceived that taking part in leisure activities helped them stay healthy. This was consistent with the results obtained by Misra and McKean (2000) who also found that males benefited more than females from leisure activities among their college student sample. This study found that leisure satisfaction was another common contributor to wellness among male and female university students. It had significant positive direct effect with coefficients of .44 for males and .32 for females. The only difference was the magnitude of the impact of leisure satisfaction

on wellness ranked first for male students but it only ranked second among female students. This implied that leisure satisfaction was a more effective predictor of wellness among male students.

The positive relation between leisure satisfaction and wellness perception had been reported. Ragheb (1993) conducted a study among 219 private firm employees and found that leisure participation and leisure satisfaction were positively associated with perceived wellness. He reported that individuals who found their leisure to be meaningful and fulfilling had higher level of wellness. In another study to examine the relationship between leisure participation and wellness among Taiwanese adults, Tsai (2004) also found correlations between leisure participation and each dimension of wellness and overall perceived wellness.

The benefits of leisure activities had been widely reported. A literature search showed that quite a number of studies have focused on the topic of leisure and life satisfaction. A positive relationship between leisure satisfaction and life satisfaction among individuals with physical disabilities (Kinney & Coyle, 1992), adolescents (Wang et al., 2008), and college students (Huang, & Carleton, 2003) had been reported. This suggested that regardless of an individual's background, having more satisfaction from leisure activities could enhance his/her life satisfaction.

Research findings also indicated that leisure could serve as a buffer to life's

stressful events. Iwasaki, Mackay, Mactavish, Ristock, and Bartlett (2006) conducted a qualitative study on stress and coping among 78 adults from three marginalized groups (Aboriginal peoples with diabetes, individuals with disabilities, and gays and lesbians) in Canada. They found that meaningful leisure pursuits provided an opportunity for individuals to gain perseverance and strength both physically and psychologically. They also found that both physical and less physical forms of leisure could help the marginalized groups cope with stress. In another qualitative study which examined how individuals used leisure in coping with a traumatic injury or the onset of a chronic illness, Hutchison, Loy, Kleiber, and Dattilo (2003) confirmed that leisure served to buffer effects of immediate life circumstances and it sustained individuals' coping efforts in different ways. Raj et al. (2006) examined the nature and prevalence of common mental disorders among informal carers of people with Spinal Cord Injury (SCI) and the association with their leisure satisfaction. They reported a significant relationship between leisure satisfaction and psychiatric morbidity among carers of people with SCI.

Results from the supplementary analyses also indicated that leisure satisfaction gained from psychological aspect ($t = 6.38, p < .05$) was the most important predictor of wellness among male students. For female students, the more important predictors were satisfaction gained from social ($t = 4.38, p < .05$) and educational

domains ($t = 3.97, p < .05$). This implied that taking part in some enjoyable leisure activities could enhance the wellness perception of male university students. However, for female students, leisure activities that involved social interaction and enabled them to learn something would be more beneficial. Wellness professionals and related university staff should make use of this finding and provide more suitable leisure activities for university students.

Academic Stress

Results from this study showed that academic stress was a common factor that contributed to wellness perception among the university students. It had significant negative direct effect on wellness of both male and female students. This suggested that students who had more academic stress would perceive themselves as having poorer wellness status. The negative effects of academic stress on health had been widely acknowledged. MacGeorge et al. (2005) reported that academic stress was positively associated with depression and symptoms of physical illness. In a more recent study, Hystad, Eid, Laberg, and Johnson (2009) also found that academic stress was positively associated with reported health complaints. Academic stress not only affected the health status of college students, it also had a negative impact on their academic performance (Akgun & Ciarrochi, 2003). Therefore, to enhance the

wellness perception of university students, university counselors and student affairs professionals should help them cope with academic stress effectively. Literature showed that different kinds of coping strategies could be used to deal with stress. For example, deep breathing is a simple but widely used method when people face with stress. Based on Benson's Relaxation Response, Paul, Elam and Verhulst (2007) developed the Deep Breathing Meditation (DBM) technique by using diaphragmatic breathing. They implemented the technique as a regular part of a course component and found that it helped students by increasing concentration, decreasing test anxiety, nervousness, and self-doubt during examinations.

LTPA

The mean score of LTPA based on Godin Leisure-Time Exercise Questionnaire among university students in the present study was 30.58 (SD = 20.80). The score was much higher than that of sport and recreation managerial staff (Du, 2009) who reported a mean score of 19.30. However, the results were similar to the findings of Ng, Cuddihy, and Fung (2003) who obtained a mean score of 30.79 among university PE students and 28.65 among non PE students. In another study conducted by Hayes, Crocker and Kowalski (1999), they reported LTPA mean scores of 52.79 and 55.76 for female and male college students respectively. Chung and Phillips (2002) reported

LTPA mean scores of 58.8 and 46.8 for males and females in Taiwan, 81.5 and 78.4 for males and females in U.S. in their high school student sample. Results from the above studies indicated that university students in Hong Kong were less active when compared with their overseas counterparts. This was in agreement with many previous studies which found that most of the people in Hong Kong were not active enough to obtain health benefits. In a survey conducted by Hong Kong Polytechnic University in 2006, it was found that only 24.6% of the young and 21.6% of the adults took part in physical exercise for 3 times or above per week and spending 30 minutes or above in each occasion (Hong Kong Polytechnic University, 2006). In another study conducted by Hong Kong Baptist University in 2007, only 16% of the respondents reported meeting the same exercise guideline (Hong Kong Baptist University, 2007). In an earlier study undertaken by Cheng et al., (2003), they reported that only 19.2% of their female adolescent sample had the recommended amount of physical activities. Hui and Morrow (2001) conducted a study among Chinese adults and found that only 23.7% of the respondents were physically active enough to achieve health benefits.

To promote health and prevent disease, the Centers for Disease Control and Prevention (CDC) and the American College of Sports Medicine (ACSM) recommended that every adult should accumulate 30 minutes or more of

moderate-intensity physical activity on most, preferably all, days of the week (Pate et al., 1995). Following this recommendation, an individual should obtain a weekly LTPA score of 35 (based on the formula provided by Godin and Shephard (1985). This implied that only 247 participants (35.7%) of this study could observe the guidelines and engage in an adequate amount of physical activities. Although university students in the present study were relatively more active than the general public, majority of them did not take part in adequate LTPA to the level that could contribute to their health. There is a need to help them develop an active lifestyle by taking part in more physical activities.

Surprisingly, LTPA was not a significant contributor to the academic stress and wellness of university students who took part in this study. Therefore, in the revised proposed model, namely the New Total Sample Model, LTPA was dropped. One possible explanation for the insignificant contribution of LTPA is that the university students did not take part or did not enjoy taking part in physical activities. This was well reflected by the relative low scores obtained by the sample in physical dimension of the Perceived Wellness Survey (Adams et al., 1997) and LTPA. In fact, for students who are inactive and unmotivated to do physical exercise, participating in physical activities would create undue stress and anxiety rather than helping them relax. This was supported by a study conducted by Hutchison et al. (2003) that

sports were one of the most frequently reported perceived stressors among their adolescent sample. In a study conducted by Tsai and Coleman (2007), they also reported that university students in Hong Kong were generally less active than those in Australia. Besides, they had lower intention to become more active and had lower preferences for active recreation.

Although LTPA was not a significant contributor to the academic stress and wellness of the university sample, the health benefits of physical activities had been widely reported (Bezner et al., 1999; Milne, Gordan, Guilfoyle, Wallman, & Courneya, 2007; Scully, Kremer, Meade, Graham, & Dudgeon, 1998; Valois, Zullig, Huebner, & Drane, 2004) and physical activities had long been used as a tool to combat stress (Azar, Ball, Salmon, & Cleland, 2011; Carmack et al., 1999; Mackey, McKinney, & Tavakoli, 2008; Yin, Davis, Moore, & Treiber, 2005). For the benefit of the students, wellness professionals and university staff should help them develop an active lifestyle and take part in regular exercise. Meeting the CDC-ACSM guidelines of accumulating 30 minutes or more moderate-intensity physical activity on most, preferably all, days of the week (Pate et al., 1995) should be a goal for all university students to work for.

Summary and Recommendations for Future Studies

Achieving optimal wellness is a lifelong pursuit. Wellness is dynamic and multidimensional. What we do, think, feel, eat everyday can have a direct impact on our overall wellness. For university students, their wellness could be affected by factors like academic stress, leisure satisfaction, and PPSA. In this study, a new empirically tested student wellness model incorporating these factors was established. It can be used to identify at-risk students and facilitate early interventions. It can also be used to prepare future students for academic challenges and university lives.

The present study found that PPSA contributed significantly to both academic stress and wellness of university students. Specifically, problem solving confidence was a contributing predictor of the wellness of university students. Studying at university provides a chance for young people to meet new challenges and be more independent. The findings of the present study suggested that having self-confidence in tackling problems was very important. University staff should consider offering different problem solving training programmes and workshops to students. This is especially important for female students. Emphasis should be made to enhance students' problem solving confidence.

Similar to previous studies, the present study found that leisure satisfaction was closely related to wellness (Ragheb, 1993; Tsai, 2004). Some earlier studies also

showed that leisure satisfaction had a significant correlation with life satisfaction (Huang & Carleton, 2003; Kinney & Coyle, 1992; Wang et al., 2008). By encouraging university students to take part in different kinds of rewarding leisure activities, it could enhance both their life satisfaction and wellness level. Results from the present study suggested that fun and enjoyable leisure activities are more suitable for male students, while leisure activities that involve social interaction and allow participants to learn something work better for female students. University counselors and student affair supporting staff should make good use of this finding and provide suitable leisure activities for their students. They should also educate their students about the importance and benefits of leisure, provide them with information of different leisure opportunities, and help them make leisure a priority in their lives.

Other than strengthening the PPSA and leisure satisfaction of university students, some approaches at university level should also be considered in order to enhance the wellness of university students. Most universities will organize talks or workshops on problem solving, time management, coping strategies, or stress management during orientation in order to help students cope with college stress. However, without opportunities to practise regularly, it would be doubtful whether the students could master those skills and apply them effectively in real life situations. The benefits of

continuous practice were well supported by previous studies (Deckro et al., 2002; Dolbier & Rush, 2012; Iglesias et al., 2005; Paul et al., 2007). Therefore, other than offering one off workshops, related staff of universities should also consider integrating wellness programs into the curriculum by offering credit-bearing wellness courses that include problem solving training and leisure activities. Although the different needs of male and female students have to be addressed, caution should be taken to avoid gender stereotyping. For the benefits of the students, a more holistic approach should be adopted to help them develop an active healthy lifestyle.

Results from this study indicated that most of the university students did not take part in enough LTPA to the level that could help them gain any health benefits. Education is far more than simply providing students with professional knowledge. To provide whole person education, it is necessary to help students lead an active healthy lifestyle. To achieve this, university staff should consider offering required physical education courses and healthy living programmes to their students. To encourage students to engage in more physical activities, bonus points could be awarded to students taking part in regular LTPA. More support at university level could also be given to the students by providing them free use of facilities, longer opening hours of sports facilities and free training courses.

In order to promote wellness among university students effectively, wellness

centres should be set up in all local universities. In Hong Kong, most of the wellness workshops and programs of the universities are conducted by Student Development Centre or Counselling Centre. Usually, assistance will only be given to students who actively approach the centre staff. By setting up wellness centres in local universities, some outreach wellness programs can be offered. Research can also be conducted to identify needs of the students, evaluate wellness programs offered by universities, as well as monitor and evaluate government policies on wellness. Wellness centres can also work with different student societies and university departments to organize wellness programs for students and even the general public.

The purpose of the present study was to examine the contributors to academic stress and wellness among university students in Hong Kong. Although some important results were found, some recommendations were made in order to gain more knowledge about this area:

1. In the present study, only full-time undergraduate students from the 8 local universities receiving grants from the University Grant Council were included. Nowadays, more and more students are taking full-time self-financed sub-degree or undergraduate programmes offered by local universities. Future studies can be conducted to compare the academic stress and wellness of students taking self-financed and UGC-funded programmes. Researchers may also expand the

study to include Mainland and overseas students pursuing undergraduate degree programmes in Hong Kong as well.

2. The present study examined the effects of academic stress on wellness among university students. Future studies can identify the sources of their stress other than academic stress and their impacts on their academic performance
3. Intervention research can be conducted to explore the effectiveness of the wellness enhancement strategies proposed.
4. Other determinants such as social support, resilience, coping strategies, self-efficacy, socioeconomic status, and academic achievement can be examined.
5. Use of convenience sampling was one of the limitations of the present study. Large-scale research with participants recruited by random sampling method can be applied to the model developed in this study.
6. Longitudinal study can be conducted to assess the stability of the participants' responses throughout their four years of study at the university.

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APPENDIX

Questionnaire

A Survey on

“Academic Stress and Wellness of Tertiary Students in Hong Kong”

Dear Student,

I am a Ph.D. student of Department of Physical Education, Hong Kong Baptist University. My study is on academic stress and wellness of tertiary students in Hong Kong. You are cordially invited to participate in the study by completing this questionnaire.

The purpose of the study is to understand academic stress, problem solving ability, leisure satisfaction, wellness, and the relationships among these factors. I hope this study can provide me with further understanding about academic stress so that I can help develop some recommendations for students to cope with academic stress and enhance wellness.

The questionnaire is composed of 7 sections. It will take you about 20 minutes to complete. Upon completion, please return it to the person from whom you receive the questionnaire or mail it back using the enclosed stamped envelope in 10 working days.

This is an anonymous survey. All information you provided will be kept strictly confidential and will be used for research purpose only. Therefore, please indicate your true perception or feeling about issues described in the questionnaire.

Your valuable contribution to this study is highly appreciated. If you have any question about this questionnaire, please feel free to contact me at 3411 3102 or by email: jpang@hkbu.edu.hk.

Many thanks and best wishes with your studies!

Sincerely,
Jofy Pang

Perceived Wellness

The following statements are designed to provide information about your wellness perceptions. Please read carefully and thoughtfully each statement, then select ONE response option with which you most agree.

	Very Strongly Disagree					Very Strongly Agree
	1	2	3	4	5	6
1. I am always optimistic about my future.	1	2	3	4	5	6
2. There have been times when I felt inferior to most of the people I knew.	1	2	3	4	5	6
3. Members of my family come to me for support.	1	2	3	4	5	6
4. My physical health has restricted me in the past.	1	2	3	4	5	6
5. I believe there is a real purpose for my life.	1	2	3	4	5	6
6. I will always seek out activities that challenge me to think and reason.	1	2	3	4	5	6
7. I rarely count on good things happening to me.	1	2	3	4	5	6
8. In general, I feel confident about my abilities.	1	2	3	4	5	6
9. Sometimes I wonder if my family will really be there for me when I am in need.	1	2	3	4	5	6
10. My body seems to resist physical illness very well.	1	2	3	4	5	6
11. Life does not hold much future promise for me.	1	2	3	4	5	6
12. I avoid activities which require me to concentrate.	1	2	3	4	5	6
13. I always look on the bright side of things.	1	2	3	4	5	6
14. I sometimes think I am a worthless individual.	1	2	3	4	5	6
15. My friends know they can always confide in me and ask me for advice.	1	2	3	4	5	6
16. My physical health is excellent.	1	2	3	4	5	6
17. Sometimes I don't understand what life is all about.	1	2	3	4	5	6
18. Generally, I feel pleased with the amount of intellectual stimulation I receive in my daily life.	1	2	3	4	5	6
19. In the past, I have expected the best.	1	2	3	4	5	6
20. I am uncertain about my ability to do things well in the future.	1	2	3	4	5	6
21. My family has been available to support me in the past.	1	2	3	4	5	6

		Very Strongly Disagree					Very Strongly Agree
				←		→	
22.	Compared to people I know, my past physical health has been excellent.	1	2	3	4	5	6
23.	I feel a sense of mission about my future.	1	2	3	4	5	6
24.	The amount of information that I process in a typical day is just about right for me (i.e., not too much and not too little).	1	2	3	4	5	6
25.	In the past, I hardly ever expected things to go my way.	1	2	3	4	5	6
26.	I will always be secure with who I am.	1	2	3	4	5	6
27.	In the past, I have not always had friends with whom I could share my joys and sorrows.	1	2	3	4	5	6
28.	I expect to always be physically healthy.	1	2	3	4	5	6
29.	I have felt in the past that my life was meaningless.	1	2	3	4	5	6
30.	In the past, I have generally found intellectual challenges to be vital to my overall well-being.	1	2	3	4	5	6
31.	Things will not work out the way I want them to in the future.	1	2	3	4	5	6
32.	In the past, I have felt sure of myself among strangers.	1	2	3	4	5	6
33.	My friends will be there for me when I need help.	1	2	3	4	5	6
34.	I expect my physical health to get worse.	1	2	3	4	5	6
35.	It seems that my life has always had purpose.	1	2	3	4	5	6
36.	My life has often seemed void of positive mental stimulation.	1	2	3	4	5	6

Sources of Academic Stress

The following are some stressful situations for students. Please read through them carefully and select ONE response option with which you most agree.

	Not at all Stressful	←————→				Extremely Stressful
1. Examinations	1	2	3	4	5	
2. Unprepared to respond to questions	1	2	3	4	5	
3. Boring classes	1	2	3	4	5	
4. Announced quizzes	1	2	3	4	5	
5. Unannounced quizzes	1	2	3	4	5	
6. Final grades	1	2	3	4	5	
7. Projects	1	2	3	4	5	
8. Non-major classes	1	2	3	4	5	
9. Classes with open discussion	1	2	3	4	5	
10. Excessive homework	1	2	3	4	5	
11. Peer evaluations	1	2	3	4	5	
12. Note-taking in class	1	2	3	4	5	
13. Forgotten assignments	1	2	3	4	5	
14. Incomplete assignments	1	2	3	4	5	
15. Presentations	1	2	3	4	5	
16. Arriving late for class	1	2	3	4	5	
17. Late dismissals of class	1	2	3	4	5	
18. Noisy classrooms	1	2	3	4	5	
19. Hot classrooms	1	2	3	4	5	
20. Cold classrooms	1	2	3	4	5	
21. Crowded classrooms	1	2	3	4	5	
22. Poor classroom lighting	1	2	3	4	5	
23. Learning new skills	1	2	3	4	5	
24. Missing classes	1	2	3	4	5	
25. Buying textbooks	1	2	3	4	5	
26. Studying for examinations	1	2	3	4	5	
27. Non-native language lectures	1	2	3	4	5	
28. Reading wrong material	1	2	3	4	5	
29. Fast-paced lectures	1	2	3	4	5	
30. Forgetting pen/pencils	1	2	3	4	5	
31. Unclear assignments	1	2	3	4	5	
32. Unclear course objectives	1	2	3	4	5	
33. Incorrect answers in class	1	2	3	4	5	
34. Attending wrong class	1	2	3	4	5	
35. Waiting for tests	1	2	3	4	5	

Leisure Satisfaction

Below are some statements on how people feel about and perceive their leisure activities. Please read through them carefully and select **ONE** response option that best represents the way you feel **in the past 6 months**. There are no right or wrong answers.

	Almost Never True				Almost Always True
		←		→	
1. My leisure activities are interesting to me.	1	2	3	4	5
2. My leisure activities give me self-confidence.	1	2	3	4	5
3. My leisure activities give me a sense of accomplishment.	1	2	3	4	5
4. I use many different skills and abilities in my leisure activities.	1	2	3	4	5
5. My leisure activities increase my knowledge about things around me.	1	2	3	4	5
6. My leisure activities provide opportunities to try new things.	1	2	3	4	5
7. My leisure activities help me to learn about myself.	1	2	3	4	5
8. My leisure activities help me to learn about other people.	1	2	3	4	5
9. I have social interaction with others through leisure activities.	1	2	3	4	5
10. My leisure activities have helped me to develop close relationships with others.	1	2	3	4	5
11. The people I meet in my leisure activities are friendly.	1	2	3	4	5
12. I associate with people in my free time who enjoy doing leisure activities a great deal.	1	2	3	4	5
13. My leisure activities help me to relax.	1	2	3	4	5
14. My leisure activities help me to relieve stress.	1	2	3	4	5
15. My leisure activities contribute to my emotional well being.	1	2	3	4	5
16. I engage in leisure activities simply because I like doing them.	1	2	3	4	5
17. My leisure activities are physically challenging.	1	2	3	4	5
18. I do leisure activities that develop my physical fitness.	1	2	3	4	5
19. I do leisure activities that restore me physically.	1	2	3	4	5
20. My leisure activities help me to stay healthy.	1	2	3	4	5
21. The areas or places where I engage in my leisure activities are fresh and clean.	1	2	3	4	5
22. The areas or places where I engage in my leisure activities are interesting.	1	2	3	4	5
23. The areas or places where I engage in my leisure activities are beautiful.	1	2	3	4	5
24. The areas or places where I engage in my leisure activities are well designed.	1	2	3	4	5

How you react to problems

The following statements are about how people react to personal difficulties and problems in their day-to-day life. Please respond to the items as honestly as possible so as to most accurately portray how you handle such personal problems. Your responses should reflect **what you actually do** to solve problems, **not how you think you should** solve them.

		Very Strongly Disagree					Very Strongly Agree
				←	→		
1.	When a solution to a problem has failed, I do not examine why it didn't work	1	2	3	4	5	6
2.	When I am confronted with a complex problem, I don't take the time to develop a strategy for collecting information that will help define the nature of the problem	1	2	3	4	5	6
3.	When my first efforts to solve a problem fail, I become uneasy about my ability to handle the situation	1	2	3	4	5	6
4.	After I solve a problem, I do not analyze what went right and what went wrong	1	2	3	4	5	6
5.	I am usually able to think of creative and effective alternatives to my problems	1	2	3	4	5	6
6.	After following a course of action to solve a problem, I compare the actual outcome with the one I had anticipated	1	2	3	4	5	6
7.	When I have a problem, I think of as many possible ways to handle it as I can until I can't come up with any more ideas	1	2	3	4	5	6
8.	When confronted with a problem, I consistently examine my feelings to find out what is going on in a problem situation	1	2	3	4	5	6
9.	When confused about a problem, I don't clarify vague ideas or feelings by thinking of them in concrete terms	1	2	3	4	5	6
10.	I have the ability to solve most problems even though initially no solution is immediately apparent	1	2	3	4	5	6
11.	Many of the problems I face are too complex for me to solve	1	2	3	4	5	6
12.	When solving a problem, I make decisions that I am happy with later	1	2	3	4	5	6
13.	When confronted with a problem, I tend to do the first thing that I can think of to solve it	1	2	3	4	5	6
14.	Sometimes I do not stop and take time to deal with my problems, but just kind of muddle ahead	1	2	3	4	5	6
15.	When considering solutions to a problem, I do not take the time to assess the potential success of each alternative	1	2	3	4	5	6
16.	When confronted with a problem, I stop and think about it before deciding on a next step	1	2	3	4	5	6
17.	I generally act on the first idea that comes to mind in solving a problem	1	2	3	4	5	6
18.	When making a decision, I compare alternatives and weigh the consequences of one against the other	1	2	3	4	5	6
19.	When I make plans to solve a problem, I am almost certain that I can make them work	1	2	3	4	5	6
20.	I try to predict the result of a particular course of action	1	2	3	4	5	6
21.	When I try to think of possible solutions to a problem, I do not come up with very many alternatives	1	2	3	4	5	6
22.	When trying to solve a problem, one strategy I often use is to think of past problems that have been similar	1	2	3	4	5	6
23.	Given enough time and effort, I believe I can solve most problems that confront me	1	2	3	4	5	6

		Very Strongly Disagree					Very Strongly Agree
				←		→	
24.	When faced with a novel situation, I have confidence that I can handle problems that may arise	1	2	3	4	5	6
25.	Even though I work on a problem, sometimes I feel like I'm groping or wandering and not getting down to the real issue	1	2	3	4	5	6
26.	I make snap judgments and later regret them	1	2	3	4	5	6
27.	I trust my ability to solve new and difficult problems	1	2	3	4	5	6
28.	I use a systematic method to compare alternatives and make decisions	1	2	3	4	5	6
29.	When thinking of ways to handle a problem, I seldom combine ideas from various alternatives to arrive at a workable solution	1	2	3	4	5	6
30.	When faced with a problem, I seldom assess the external forces that may be contributing to the problem	1	2	3	4	5	6
31.	When confronted with a problem, I usually first survey the situations to determine the relevant information	1	2	3	4	5	6
32.	There are times when I become so emotionally charged that I can no longer see the alternatives for solving a particular problem	1	2	3	4	5	6
33.	After making a decision, the actual outcome is usually similar to what I had anticipated	1	2	3	4	5	6
34.	When confronted with a problem, I am unsure of whether I can handle the situation	1	2	3	4	5	6
35.	When I become aware of a problem, one of the first things I do is to try to find out exactly what the problem is	1	2	3	4	5	6

Leisure-Time Exercise

1. Considering a 7-Day period (a week), how many times on the average do you do the following kinds of exercise **for more than 15 minutes** during your free time (write on each line the appropriate number).

Times Per Week

- a) **Strenuous exercise (Quite exhausting & heart beats rapidly)**

(i.e., running, jogging, rugby, football, squash, basketball, judo, vigorous swimming, vigorous long distance bicycling)

- b) **Moderate exercise (Not exhausting & heart beats quickens)**

(i.e., fast walking, tennis, easy bicycling, volleyball, badminton, easy swimming, popular and folk dancing)

- c) **Mild exercise (Minimal effort & change in heart beat not noticeable)**

(i.e., yoga, archery, fishing, bowling, golf, easy walking)

2. Considering a 7-Day period (a week), during your leisure-time, how often do you engage in any regular activity long enough to work up a sweat (heart beats rapidly)?

Often Sometimes Never/Rarely
1 2 3

Personal Information

Please tick/fill in the corresponding answer.

1. Gender: ☐ Male ☐ Female
2. Age: _____
3. Present place of study:
☐ HKU ☐ CUHK ☐ PolyU ☐ HKBU
☐ CityU ☐ HKUST ☐ LU ☐ HKIEd
4. Programme: ☐ degree ☐ diploma ☐ others (please specify) _____
5. Major area of study: _____
6. Nature of program: ☐ UGC-funded ☐ Self-financed
7. Mode of study: ☐ Full-time ☐ Part-time
8. Year of study: ☐ 1st ☐ 2nd ☐ 3rd ☐ 4th ☐ 5th

The End

~Thank you very much for your participation~

CURRICULUM VITAE

Academic qualifications of the thesis author, Miss PANG Sau Lin, Jofy:

1. Received the degree of Bachelor of Education (Physical Education) from Chinese University of Hong Kong, 1994.
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