



**UNIVERSITI PUTRA MALAYSIA**

***FACTORS ASSOCIATED WITH BODY MASS INDEX AND HEALTH-RELATED QUALITY OF LIFE AMONG HIGH SCHOOL STUDENTS IN TEHRAN***

**SARA JALALIFARAHANI**

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**By**

**SARA JALALIFARAHANI**

**Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia, in  
Fulfillment of the Requirements for the Degree of Master of Science**

**September 2013**

## DEDICATION

**I dedicate this dissertation to:**

My dear parents for their endless love, support and encouragement,

My dear brother Sohail who helped and supported me in all steps of the way,

My supervisory committee Dr. Chin, Dr. Amiri, Dr. Nasir who have generously given their time and expertise to improve my research.

Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfillment of the requirement for the degree of Master of Science

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**September 2013**

**Chair: Chin Yit Siew, PhD**

**Faculty: Medicine and Health Sciences**

This cross-sectional study was conducted to determine factors associated with body mass index-for-age (BMI-for-age) and health-related quality of life (HRQOL) among high school students in Tehran. A total of 465 high school students (227 girls and 238 boys) aged between 14 to 17 years old and their parents who were residing in Tehran, participated in this study. Body weight and height of the students were measured by trained researchers. Body weight status (BMI-for-age) was determined using world health organization growth standard (WHO 2007). The students completed a set of self-administered student-version questionnaire that assessed HRQOL, dietary practices, body image and physical activity of the students. In addition, the students were interviewed by researcher on their dietary intake using two 24-hour dietary recalls. Besides, a self-administered parent-version questionnaire that comprised socio-demographic information, self-reported parental body weight and height, parental

perception of student body weight status and parental perception of student HRQOL were completed by parent of the students.

Based on the WHO Growth standard (2007), the prevalence of overweight and obesity was higher than thinness. The highest and the lowest subscale scores of HRQOL were reported in social functioning and emotional functioning subscales respectively. BMI-for-age of the students was significantly associated with BMI of mother, BMI of father, parental perception of student's body weight status, parental perception of student's HRQOL, total daily intakes of energy, carbohydrate and protein, meal skipping, disordered eating, body image and physical activity. On the other hand, BMI-for-age of the students was not significantly associated with age and gender of student, marital status of parent, working status of mother, occupation of father, number of year of education completed by parents, snacking, eating companion, daily hours of sleeping and daily hours of screen time viewing.

The HRQOL of students was significantly associated with gender of student, BMI of mother, BMI of father, parental perception of student's body weight status, parental perception of student's HRQOL, total daily intakes of energy, carbohydrate and protein, meal skipping, eating companion, disordered eating, body image and daily energy expenditure. On the other hand, the HRQOL of the students was not significantly associated with age of student, marital status of parent, working status of mother, occupation of father, number of year of education completed by parents, snacking, physical activity, daily hours of sleeping and daily hours of screen time viewing. BMI-

for-age was inversely and significantly correlated with HRQOL. The one-way ANOVA indicated that mean of HRQOL total score was significantly different by body weight status. Normal weight students had better HRQOL compared with both overweight and obese students. There was no significant difference in HRQOL between thin and normal weight students.

Result of multiple linear regression analysis showed that negative body image, low level of physical activity, high energy intake and high parental BMI were factors which significantly contributed towards high BMI-for-age in high school students in Tehran. Body image, physical activity level, energy intake and parental BMI explained 54.9% of variances in BMI-for-age model. Among these factors, body image was the strongest factor that could explain 38.3% of the variation in BMI-for-age model.

Further, multiple linear regression analysis showed that poor parental perception of student HRQOL, negative body image, being female, being overweight and obese, not having eating companion, low level of daily energy expenditure and incorrect parental perception of student body weight status significantly contributed towards poor HRQOL in high school students in Tehran. In addition, 57.7% of variances in HRQOL model were explained by parental perception of student HRQOL, body image, gender of student, overweight-obesity, eating companion status, daily energy expenditure and parental perception of student body weight status. Among these factors, parental perception of student HRQOL was the strongest factor that could explain of 45.4% of the variation in HRQOL model.

Hence, intervention programs should incorporate factors associated with BMI-for-age in the current study to overcome overweight and obesity problem in high school students of Tehran. Moreover, factors associated with HRQOL of students should be included in intervention programs to improve HRQOL of high school students in Tehran. Attention should be focused on body image since negative body image contributed to high BMI-for-age and poor HRQOL in high school students in Tehran. Considering parental influences on both BMI-for-age and HRQOL regression models, parents should be involved in future intervention programs that aim to combat overweight-obesity and improving HRQOL of high school students in Tehran.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk Ijazah Master Sains

**FAKTOR-FAKTOR BERKAITAN DENGAN INDEKS JISIM TUBUH DAN KUALITI HIDUP BERKAITAN KESIHATAN DALAM KALANGAN PELAJAR SEKOLAH MENENGAH TINGGI DI TEHRAN**

Oleh

**SARA JALALIFARAHANI**

**September 2013**

**Pengerusi: Chin Yit Siew, PhD**

**Fakulti: Perubatan dan Sains Kesihatan**

Kajian keratan rentas ini dijalankan untuk menentukan faktor-faktor yang berkaitan dengan indeks jisim tubuh-untuk-umur (BMI-untuk-umur) dan kualiti hidup berkaitan kesihatan (HRQOL) dalam kalangan pelajar sekolah menengah tinggi di Tehran. Seramai 465 pelajar sekolah menengah tinggi (227 perempuan dan 238 lelaki) berusia antara 14 hingga 17 tahun dan ibu bapa mereka yang tinggal di Tehran, telah mengambil bahagian dalam kajian ini. Berat badan dan tinggi pelajar diukur oleh penyelidik yang terlatih. Status berat badan (BMI-untuk-umur) ditentukan dengan menggunakan piawai pertumbuhan Pertubuhan Kesihatan Sedunia (WHO 2007). Pelajar-pelajar melengkapkan borang soal selidik isi-sendiri versi-pelajar yang menilai HRQOL, amalan pemakanan, imej tubuh dan aktiviti fizikal pelajar. Di samping itu, pelajar-pelajar telah ditemubual oleh penyelidik tentang pengambilan makanan mereka



menggunakan dua 24-jam imbas kembali pengambilan makanan. Selain itu, borang soal selidik isi-sendiri versi-ibubapa yang mengandungi maklumat sosio-demografi, berat badan dan tinggi ibubapa yang dilapor sendiri, persepsi ibubapa terhadap status berat badan pelajar dan persepsi ibubapa terhadap HRQOL pelajar telah dilengkapkan oleh ibubapa pelajar.

Berdasarkan piawai pertumbuhan WHO (2007), prevalens berat badan berlebihan dan obesiti adalah lebih tinggi daripada kekurangan berat badan. Skor tertinggi dan terendah bagi subskala HRQOL adalah subskala fungsi sosial dan sub-skala fungsi emosi masing-masing. BMI-untuk-umur pelajar adalah berkait secara signifikan dengan BMI ibu, BMI bapa, persepsi ibubapa terhadap status berat badan pelajar, persepsi ibubapa terhadap HRQOL pelajar, pengambilan tenaga harian, karbohidrat dan protein, melangkau waktu makan, gangguan pemakanan, imej tubuh dan aktiviti fizikal. BMI-untuk-umur pelajar adalah tidak berkait dengan umur dan jantina pelajar, status perkahwinan ibubapa, status pekerjaan ibu, pekerjaan bapa, bilangan tahun pendidikan dilengkapkan oleh ibubapa, snek, teman makan, jam tidur sehari dan jam waktu tontonan skrin sehari.

HRQOL pelajar adalah berkait secara signifikan dengan jantina pelajar, BMI ibu, BMI bapa, persepsi ibubapa terhadap status berat badan pelajar, persepsi ibubapa terhadap HRQOL pelajar, pengambilan tenaga harian, karbohidrat dan protein, melangkau waktu makan, teman makan, gangguan pemakanan, imej tubuh dan penggunaan tenaga harian. HRQOL pelajar adalah tidak berkait dengan usia pelajar, status perkahwinan ibubapa,

status kerja ibu, pekerjaan bapa, bilangan tahun pendidikan dilengkapkan oleh ibubapa, snek, aktiviti fizikal, jam tidur sehari dan jam waktu tontonan skrin sehari. BMI-untuk-umur berkait secara songsang dan signifikan dengan HRQOL. Ujian satu-hala ANOVA menunjukkan bahawa min skor keseluruhan HRQOL adalah berbeza dengan status berat badan secara signifikan. Pelajar yang berat badannya normal mempunyai HRQOL yang lebih baik berbanding dengan pelajar berat badan berlebihan dan obes. Tiada perbezaan yang signifikan dalam HRQOL pelajar antara pelajar kekurangan berat badan dan berat badan normal.

Keputusan analisis regresi linear berganda menunjukkan bahawa imej tubuh negatif, tahap aktiviti fizikal yang rendah, pengambilan tenaga yang tinggi dan BMI ibubapa yang tinggi merupakan faktor-faktor penyumbang yang signifikan kepada BMI-untuk-umur yang tinggi dalam kalangan pelajar sekolah tinggi di Tehran. Imej tubuh, tahap aktiviti fizikal, pengambilan tenaga dan BMI ibubapa menjelaskan 54.9% daripada variasi dalam model BMI-untuk-umur. Antara faktor-faktor ini, imej tubuh adalah faktor yang paling kuat yang boleh menjelaskan 38.3% daripada variasi dalam model BMI-untuk-umur.

Seterusnya, analisis regresi linear berganda menunjukkan bahawa ibubapa yang berpersepsi rendah terhadap HRQOL pelajar, imej tubuh negatif, jantina perempuan, berat badan berlebihan dan obes, tidak mempunyai teman makan, tahap rendah dalam penggunaan tenaga harian dan persepsi ibu bapa yang tidak betul terhadap status berat badan pelajar menyumbang secara signifikan terhadap HRQOL yang rendah dalam kalangan pelajar sekolah tinggi di Tehran. Di samping itu, 57.7% daripada variasi

dalam model HRQOL dijelaskan oleh persepsi ibubapa terhadap HRQOL pelajar, imej tubuh, jantina pelajar, berat badan berlebihan-obesiti, kehadiran/ketidakhadiran teman makan, penggunaan tenaga harian dan persepsi ibubapa terhadap status berat badan pelajar. Antara faktor-faktor ini, persepsi ibubapa terhadap HRQOL pelajar merupakan faktor yang paling kuat yang boleh menjelaskan sebanyak 45.4% daripada variasi dalam model HRQOL.

Oleh itu, program intervensi perlu menggabungkan faktor-faktor yang berkaitan dengan BMI-untuk-umur dalam kajian ini untuk menangani masalah berat badan berlebihan dan obesiti dalam kalangan pelajar sekolah menengah di Tehran. Selain itu, faktor-faktor berkaitan dengan HRQOL pelajar perlu diambil kira dalam program intervensi untuk meningkatkan HRQOL pelajar sekolah tinggi di Tehran. Perhatian perlu menumpu kepada imej tubuh, memandangkan sumbangan imej tubuh negatif kepada BMI-untuk-umur dan HRQOL yang lemah adalah tinggi dalam kalangan pelajar sekolah tinggi di Tehran. Mempertimbangkan pengaruh ibubapa dalam kedua-dua model regresi BMI-untuk-umur dan HRQOL, ibubapa perlu terlibat dalam program-program intervensi yang bertujuan untuk menangani berat badan berlebihan-obesiti dan meningkatkan HRQOL pelajar sekolah tinggi di Tehran pada masa depan.

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I certify that a Thesis Examination Committee has met on 13/9/2013 to conduct the final examination of Sara Jalalifarahani on her thesis entitled "Factors Associated with Body Mass Index and Health-Related Quality of Life among High School Students in Tehran" in accordance with the Universities and University Colleges Act 1971 and the Constitution of the Universiti Putra Malaysia [P.U.(A) 106] 15 March 1998. The Committee recommends that the student be awarded the Master of Science.

Members of the Thesis Examination Committee were as follows:

**Asmah Rahmat, PhD**

Professor  
Faculty of Medicine and Health Sciences  
Universiti Putra Malaysia  
(Chairman)

**Zaitun Yassin, PhD**

Associate Professor  
Faculty of Medicine and Health Sciences  
Universiti Putra Malaysia  
(Internal Examiner)

**Mary Huang Soo Lee, PhD**

Associate Professor  
Faculty of Medicine and Health Sciences  
Universiti Putra Malaysia  
(Internal Examiner)

**Norimah A. Karim, PhD**

Professor  
Universiti Kebangsaan Malaysia  
Malaysia  
(External Examiner)

---

**NORITAH OMAR, PhD**

Associate Professor and Deputy Dean  
School of Graduate Studies  
Universiti Putra Malaysia

Date: 20 November 2013

This thesis was submitted to the Senate of Universiti Putra Malaysia and has been accepted as fulfilment of the requirement for the degree of Master of Science. The members of the Supervisory Committee were as follows:

**Chin Yit Siew, PhD**

Senior Lecturer  
Faculty of Medicine and Health Sciences  
Universiti Putra Malaysia  
(Chairman)

**Mohd Nasir Mohd Taib, PhD**

Associate Professor  
Faculty of Medicine and Health Sciences  
Universiti Putra Malaysia  
(Member)

**Parisa Amiri, PhD**

Obesity Research Center, Research Institute for Endocrine Sciences  
Shahid Beheshti University of Medical Sciences  
(External Member)

---

**BUJANG BIN KIM HUAT, PhD**

Professor and Dean  
School of Graduate Studies  
Universiti Putra Malaysia

Date:

## DECLARATION

I declare that the thesis is my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously, and is not concurrently, submitted for any other degree at Universiti Putra Malaysia or at any other institution.

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**SARA JALALIFARAHANI**

Date: 13 September 2013



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## LIST OF ABBREVIATIONS

BIA	Bio-electric Impedance Analysis
BMI	Body Mass Index
BMR	Basal Metabolic Rate
BRFSS	Behavioral Risk Factor Surveillance System
CDC	Centers for Disease Control and Prevention
CFA	Confirmatory Factor Analysis
CFI	Comparative Fit Index
DEE	Daily Energy Expenditure
DEE/kg	Daily Energy Expenditure per Kilogram body weight
DRI	Dietary Reference Intake
DXA	Dual energy X-ray Absorptiometry
EAT-26	Eating Attitudes Test
EBQ	Eating Behaviors Questionnaire
HAQ	Habitual Activity Questionnaire
HR	Hazard Ratio
HRQOL	Health-Related Quality Of Life
IOTF	International Obesity Task Force
LC	Lower Class
MBIS	Multi-dimensional Body Image Scale
MC	Middle Class



MLR	Multiple Linear Regression
PedsQL	Pediatric Quality of Life Inventory
OR	Odds Ratio
QAPACE	Quantification de l'Activite Physique en Altitude Chez le Enfants
QOL	Quality Of Life
SES	Socio-Economic Status
SPSS	Statistical Package for the Social Sciences
TLGS	Tehran Lipid and Glucose Study
UC	Upper Class
UPM	Universiti Putra Malaysia
WHO	World Health Organization

## CHAPTER 1

### INTRODUCTION

#### 1.1 Background

The issues related to overweight and obesity have become a public health concern in recent years. The prevalence of overweight and obesity increased from 15% in 1971 to more than 30% in 2000 among children in United States (Schwarzenberg, 2005). In England, the prevalence of overweight among children increased from about 13% to 20% between 1994 and 1998 (Lobstein, James & Cole, 2003). In China the prevalence of overweight and obesity in children and adolescents (7-17 years old) were 1.4%, 4.6% and 5.3% in 1982, 1992 and 2002, respectively (Li et al., 2008). Similarly, high prevalence of overweight and obesity (21.5% and 13.7% respectively) is reported among 5-17 years old children and adolescents in United Arab Emirate (Malik & Bakir, 2007). These studies showed that the prevalence of overweight and obesity was high among children and adolescents over past three decades and the trend of prevalence of overweight and obesity shows continuous rise in all regions and countries over the years.

Although overweight and obesity are not considered as health threat by some people; however, it has a great number of negative effects on health. Previous studies have shown that obesity and excess body weight increased risk of developing several chronic diseases such as hypertension, type 2 diabetes, cancer and

cardiovascular diseases during adolescence (Aronne & Isoldi, 2007; Gallagher & LeRoith, 2010). In addition to the physical consequences on health, obesity creates a massive social burden. Several weight-based stigma, discrimination, and negative outcomes in areas of education, employment, healthcare, interpersonal relationships, and psychological health have been reported among obese individuals (Puhl & Brownell, 2003; Puhl & Latner, 2007). Besides, overweight and obesity and their associated health problems have a significant economic impact on health care system. For instance, obesity-related direct and indirect healthcare costs in US were estimated to be about 147 billion US dollar annually (Finkelstein, Trogon, Cohen & Dietz, 2009). In Western European countries, obesity-related costs estimated ranged from 0.09% to 0.61% of total annual gross domestic income (Müller-Riemenschneider, Reinhold, Berghöfer, & Willich, 2008).

In addition to mental and physical aftermaths of obesity and its enormous economic and personal costs, overweight and obesity have been linked with reduced life expectancy and poorer quality of life (Tsiros et al., 2009; Visscher et al. 2004). Visscher et al. (2004) reported that obese subjects have a reduced life expectancy and an increased number of unhealthy life years. Moreover, in a review study conducted by Tsiros et al. (2009), results of pooled analysis showed that higher body weight status was related to poorer HRQOL among children and adolescents.

The term quality of life (QOL) is a broad concept which refers to general well-being of individuals and societies (Gregory, Johnston, & Pratt, 2009). Based on WHO (1998) definition, QOL is a multidimensional concept which commonly assesses both negative and positive aspect of life (WHOQOL group, 1998). Standard

indicators of quality of life include wealth and employment, built environment, physical and mental health, education, recreation and leisure time, and social belonging (Gregory, Johnston & Pratt, 2009). One of the most important dimensions of quality of life is physical and mental health.

Since the 1980s, the concept of health-related quality of life (HRQOL) and its determinants have been evolved to comprise the aspects of overall quality of life that influence physical or mental health. Improvement of quality of life is important and it is considered as a central public health goal by Healthy People 2000, 2010, and 2020. HRQOL is related to both self-reported chronic diseases such as diabetes, breast cancer, arthritis, and hypertension, and their risk factors including body mass index (BMI), physical inactivity, and smoking status (Centers for Disease Control and Prevention (CDC), 2000). The relationship between BMI and HRQOL was documented by previous researches (Tsiros et al., 2009); hence, body weight status is one of the important determinants of HRQOL.

## **1.2 Problem statement**

Adolescence is a particularly critical developmental period of life. In current research, a specific focus on adolescence is considered because unhealthy patterns that are learned at adolescence can continue throughout lifetime and increase risk of development of chronic diseases. Obesity in adolescents has lots of mental and physical consequences. Evidence shows that obesity in adolescence is associated with an increased incidence of adulthood obesity (Engelund, Bjorge, Tverda, & Sogaard, 2004). In addition, adolescent obesity is associated with development of

several diseases such as type 2 diabetes, cardiovascular risk factors, obstructive sleep apnea, asthma and some kind of cancers (Daniels, 2006). Besides, there is an association between adolescent obesity and psychosocial problems such as low self-esteem, depressed mood, body dissatisfaction, negative stereotyping, discrimination and social marginalization. These psychosocial problems have a potential to affect happiness and success of adolescents' future life (Puhl, & Latner, 2007).

As mentioned before, obesity has adverse impacts on adolescents' physical and mental health. In addition, based on previous researches, several acute and chronic diseases had lowering effect on HRQOL score. It was shown that overweight and obesity can decrease HRQOL score in adolescents (Tsiros et al., 2009). While previous studies have shown the association between obesity and lower HRQOL score in adolescents (Tsiros et al., 2009); there is lack of evidence regarding existence of association between obesity and HRQOL among Iranian adolescents. Hence, this study attempts to answer whether there is any correlation between BMI-for-age and HRQOL among high school students in Tehran.

Based on the results of previous studies (Gargari, Behzad, Ghassabpour, & Ayat, 2004; Kelishadi et al., 2008; Maddah & Nikooyeh, 2010; Mohammadpour-Ahranjani, Rashidi, Karandish, Eshraghian, & Kalantari, 2004), overweight and obesity are relatively prevalent among Iranian children and adolescents. Using Iranian national cut-offs, Kelishadi et al. (2008) showed that prevalence of overweight (10.1%) and obesity (4.8%) were higher compared to underweight (5.0%) among Iranian children and adolescents (aged 6-18 years old). Although underweight remain among Iranian adolescents; however, current prevalence of

overweight and obesity is increasing alarmingly (Hosseini-Esfahani, Mousavi-Nasl-Khameneh, Mirmiran, Ghanbarian, & Azizi, 2011). The prevalence of overweight and obesity has increased from 21% in 1999-2001 to 34% in 2006-2008 (Hosseini-Esfahani et al., 2011). Kelishadi et al. (2008) also showed a higher prevalence of overweight and obesity among urban boys compared to rural boys (Kelishadi et al., 2008). The overall prevalence of overweight and obesity were 21.1 and 7.8% among Tehranian adolescents (11-16 years) (Mohammadpour-Ahramjani et al., 2004). Moreover, Tehran Lipid and Glucose Study (TLGS) showed increasing trend of overweight and obesity among Tehranian adolescents (Hosseini-Esfahani et al., 2011). Considering high prevalence of overweight and obesity in urban areas and increasing trend of overweight and obesity among adolescents of Tehran, there is a need to conduct a study to determine factors associated with overweight and obesity.

In addition, as mentioned before overweight and obesity are highly prevalent among adolescents, it is important to develop intervention that prevents adolescents from gaining excess weight. Hence, determining risk behaviors which contribute to obesity in adolescents is essential. Based on previous researches, some behaviors are known to be associated with overweight and obesity. Obesity is the result of imbalance between energy intake and energy expenditure (Christiansen, & Garby, 2002). On the energy expenditure side, inadequate physical activity and high rates of sedentary behaviors (screen viewing) account for development of obesity (Elgar, Roberts, Moore, & Tudor-Smith, 2005; Hancox, Milne, & Poulton, 2004; Kaur, Choi, Mayo, & Harris, 2003; Kautiainen, Koivusilta, Lintonen, Virtanen, & Rimpelä, 2005). On the other hand, high level of intake of certain food groups such as high intake of energy dense foods, sweetened beverage and fast foods, unhealthy

eating behaviors (skipping meals) contributes to weight gain process (D'Addesa et al., 2010; Matthews, Wien & Sabaté, 2011; Moreno & Rodríguez, 2007). Moreover, it was shown that having eating companion is another factor which can influence dietary intakes of adolescents (Story & Neumark-Sztainer, 2005). Disordered eating and body image are other factors that were shown to be associated with overweight and obesity (Desai, Miller, Staples, & Bravender, 2008; Makara-Studzińska, & Zaborska, 2009; Mori, Sekine, Yamagami, & Kagamimori, 2009).

In addition to lifestyle-related factors such as dietary practice and physical activity, other factors such as socio-demographic characteristics, parental body weight status and parental perception of adolescent body weight status were associated with overweight and obesity in adolescents (Doustmohammadian, Abdollahi, Bondarianzadeh, Houshiarrad & Abtahi, 2012; He & Evans, 2007; Keane, Layte, Harrington, Kearney, & Perry, 2012; Shrewsbury & Wardle, 2008). Several factors have the potential to contribute to high prevalence of overweight and obesity among high school students in Tehran; hence, this study aims to investigate which factors contribute to high BMI-for-age of high school students in Tehran.

Moreover, obesity and its related factors have the potential to contribute to poorer HRQOL in obese adolescents. Results of a few researches have shown that dietary intake, physical activity, disordered eating and body image were associated with HRQOL in adolescents (Boyle, Jones, & Walters, 2010; Dalton, Schetzina, Pfortmiller, Slawson, & Frye, 2011; Haraldstad, Christophersen, Eide, Natvig, & Helseth, 2011; Herpertz-Dahlmann et al., 2008). There is lack of evidence about which factors contributed the most to poorer HRQOL in overweight/obese

adolescents in Tehran. Therefore, this study aims to determine the factors which contribute to variation in HRQOL of high school students in Tehran.

### **1.3 Significance of the study**

Results of this study provided baseline information about HRQOL and the prevalence of thinness, overweight and obesity among high school students in Tehran. In addition, results of this study provided information about factors associated with BMI-for-age and HRQOL among high school students in Tehran. Furthermore, possible correlation between BMI-for-age and HRQOL as well as determinants of BMI-for-age and HRQOL among high school students in Tehran were investigated. Therefore, the results of this study provided beneficial information for researchers, policy makers, schools and parents.

First, researchers can use results of this study to compare prevalence of thinness, overweight and obesity with results of previous researches in this area, to show the trend of thinness, overweight and obesity and consequently the priority of these problems in the society. In addition, the information from this study can provide baseline data for future studies. Researchers can use results of this study as reference data to make comparison in order to get more informative results. Besides, this information will be useful for conducting interventional and cohort studies. Moreover, identifying factors associated with BMI-for-age provides beneficial information for policy makers in order to plan and design effective interventions to overcome overweight and obesity problem in adolescents. In addition, investigating factors associated with HRQOL would provide beneficial information for policy



makers in order to design intervention program for improving HRQOL in adolescents. The schools and parents also can use the results of this study to provide appropriate environment that support lifestyle modification in adolescents.

## **1.4 Objectives**

### **1.4.1 General objective**

To determine factors associated with body mass index and health-related quality of life among high school students in Tehran

### **1.4.2 Specific objectives**

1. To determine the socio-demographic factors, parental perception of student's body weight status, parental perception of student's HRQOL, dietary practices, body image, physical activity, BMI-for-age and HRQOL among high school students in Tehran
2. To determine the association between selected factors and BMI-for-age among high school students in Tehran
3. To determine the association between selected factors and HRQOL among high school students in Tehran

4. To determine the association between BMI-for-age and HRQOL total score among high school students in Tehran
5. To determine the contribution of selected factors towards BMI-for-age among high school students in Tehran
6. To determine the contribution of selected factors towards HRQOL among high school students in Tehran

### **1.5 Hypothesis**

**H<sub>01</sub>:** There is no significant association between selected factors and BMI-for-age among high school students in Tehran

**H<sub>02</sub>:** There is no significant association between selected factors and HRQOL among high school students in Tehran

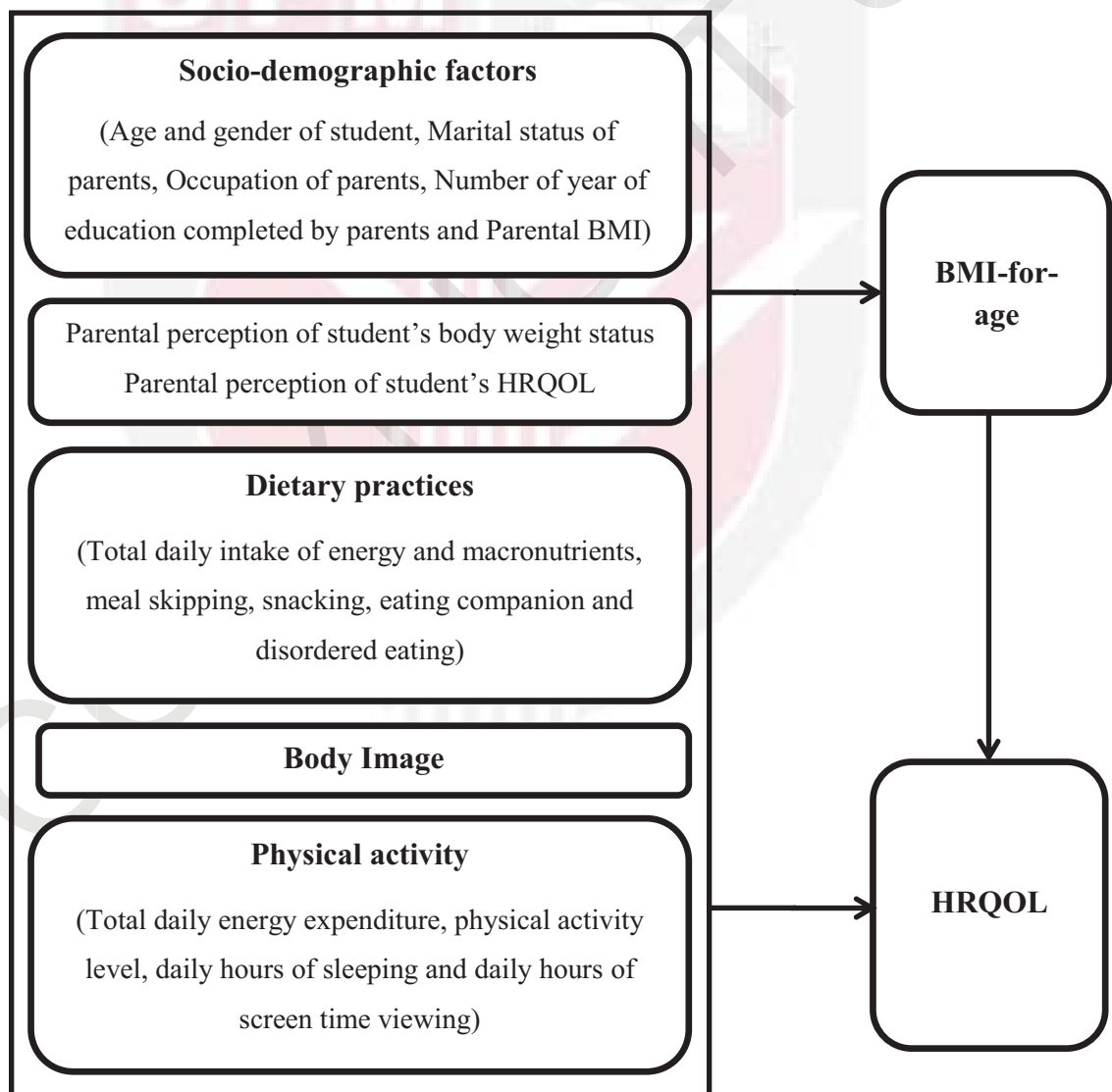
**H<sub>03</sub>:** There is no significant association between BMI-for-age and HRQOL total score among high school students in Tehran

**H<sub>04</sub>:** There is no significant contribution of selected factors towards BMI-for-age among high school students in Tehran

**H<sub>05</sub>:** There is no significant contribution of selected factors towards HRQOL among high school students in Tehran

## 1.6 Conceptual frame work

Figure 1.1 shows the conceptual framework of this study. In this study, the independent variables included were socio-demographic factors, parental perception of student's body weight status, parental perception of student's HRQOL, dietary practices, body image and physical activity. The dependent variables in this study were BMI-for-age and HRQOL.



**Figure 1.1. Conceptual framework of the study**

Previous studies have shown that socio-demographic factors, energy and macronutrient intakes, eating companion, meal skipping, disordered eating, body image, physical activity and screen time viewing were associated with BMI (Arenz et al., 2004; Jimenez-Pavon et al., 2010; Newby et al., 2007; Marshall et al., 2004; Moreno et al., 2007; Yu et al., 2011). In addition, previous studies revealed that dietary intake, disordered eating, body image and physical activity were associated with HRQOL (Boyle et al., 2010; Dalton et al., 2011; Haraldstad et al., 2011; Tozun, Unsal, Ayranci, & Arslan, 2010). Hence, in this study firstly, the association between all independent variables and BMI-for-age was assessed. Second, the association between all independent variables and HRQOL was assessed. In addition, the association between BMI-for-age and HRQOL was assessed.

### **1.7 Definition of terms**

**Socio-demographic factors:** Socio-demographic factors characterized by combination of factors related to sociology and factors related to populations characteristics. In the current study, socio-demographic factors referred to age and gender of the student, number of year of education completed by parents, marital status of parents, occupation of parents and parental BMI.

**Parental perception of student's body weight status:** Parental perception of student's body weight status refers to how parent perceives the body weight status of the student and whether parent correctly or incorrectly perceived the body weight status of the student. This variable was assessed based on comparison between

parent perception about student body weight status and actual body weight status of student.

**Parental perception of student's HRQOL:** Parental perception of student's HRQOL refers to how parent perceives the HRQOL of the student. This variable was assessed using parent proxy-report of HRQOL questionnaire.

**Dietary practices:** Term "practice" refers to "a habitual or customary action or way of doing something". Using the definition for term "practice", dietary practices refers to habits of an individual and choices he/she makes regarding food consumption. In this study, dietary practices referred to energy and macro-nutrient intakes, meal skipping, snacking, eating companion and disordered eating.

**Body Image:** In this study, body image referred to a subjective picture of student's own physical appearance which established by self-observation and reaction of the others.

**Physical activity:** Based on WHO definition, physical activity is "any bodily movement produced by skeletal muscles that requires energy expenditure". In this study, physical activity referred to total daily energy expenditure, physical activity level, mean daily hours of sleeping and screen time viewing.

**Selected factors:** In the current study, selected factors referred to all variables that were studied as independent variables. These factors were including socio-demographic factors, parental perception of student's body weight status, parental perception of student's HRQOL, dietary practices, body image and physical activity.

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