

April 2019

HEALTH-RELATED QUALITY OF LIFE AMONG ADOLESCENTS ATTENDING PRIVATE SCHOOLS IN NORTH LEBANON

Rosy Mitri

Faculty of Health Sciences, Beirut Arab University, Lebanon, r.mitri@bau.edu.lb

Fouad Ziade

Lebanese University, Lebanon, fouadziade@hotmail.com

Follow this and additional works at: <https://digitalcommons.bau.edu.lb/hwbjournal>



Part of the [Architecture Commons](#), [Business Commons](#), [Life Sciences Commons](#), and the [Medicine and Health Sciences Commons](#)

Recommended Citation

Mitri, Rosy and Ziade, Fouad (2019) "HEALTH-RELATED QUALITY OF LIFE AMONG ADOLESCENTS ATTENDING PRIVATE SCHOOLS IN NORTH LEBANON," *BAU Journal - Health and Wellbeing*. Vol. 1 : Iss. 2 , Article 8.

Available at: <https://digitalcommons.bau.edu.lb/hwbjournal/vol1/iss2/8>

This Article is brought to you for free and open access by Digital Commons @ BAU. It has been accepted for inclusion in BAU Journal - Health and Wellbeing by an authorized editor of Digital Commons @ BAU. For more information, please contact ibtihal@bau.edu.lb.

HEALTH-RELATED QUALITY OF LIFE AMONG ADOLESCENTS ATTENDING PRIVATE SCHOOLS IN NORTH LEBANON

Abstract

Health-related quality of life (HRQoL) describes a person's subjective evaluation of his health and well-being. The HRQoL and its associated factors have not been investigated among Lebanese adolescents. The aim of this study is to examine the association between socio-demographic characteristics, eating habits, physical activity, adherence to Mediterranean diet, and HRQoL among Lebanese adolescents. A total of 283 students (158 males, 125 females), between ages 11 to 18, were randomly chosen from private schools in the city of Tripoli, North Lebanon. Standard anthropometric measurements were taken. The participants completed questionnaires on Mediterranean diet (KIDMED), physical activity (physical activity questionnaires for older children [PAQ-C] and adolescents [PAQ-A]), and health-related quality of life (KIDSCREEN-27). Results of this study reveal that obese adolescents tend to express a poorer HRQoL. In Contrast, being physically active improves their HRQoL scores.

Keywords

Quality of life, adolescents, physical activity, Mediterranean diet

HEALTH-RELATED QUALITY OF LIFE AMONG ADOLESCENTS ATTENDING PRIVATE SCHOOLS IN NORTH LEBANON

R. MITRI¹ and M.F. ZIADE²

¹ Rosy Mitri, Faculty of Health Sciences, Beirut Arab University, Lebanon

² Fouad Ziade, Lebanese University, Lebanon

ABSTRACT: *Health-related quality of life (HRQoL) describes a person's subjective evaluation of his health and well-being. The HRQoL and its associated factors have not been investigated among Lebanese adolescents. The aim of this study is to examine the association between socio-demographic characteristics, eating habits, physical activity, adherence to Mediterranean diet, and HRQoL among Lebanese adolescents. A total of 283 students (158 males, 125 females), between ages 11 to 18, were randomly chosen from private schools in the city of Tripoli, North Lebanon. Standard anthropometric measurements were taken. The participants completed questionnaires on Mediterranean diet (KIDMED), physical activity (physical activity questionnaires for older children [PAQ-C] and adolescents [PAQ-A]), and health-related quality of life (KIDSCREEN-27). Results of this study reveal that obese adolescents tend to express a poorer HRQoL. In Contrast, being physically active improves their HRQoL scores.*

KEYWORDS: *Quality of life, adolescents, physical activity, Mediterranean diet*

1. INTRODUCTION

Adolescence is a transitional phase during which an individual's life is affected by a constellation of physical, cognitive, psychological and emotional changes that influence his health-related quality of life (HRQoL) (Frisen, 2007). It is a critical phase in acquiring healthy eating habits which help form future food choices that persist into adulthood (Pearson & Bridgell, 2011). Adherence to the Mediterranean diet (MD), characterized by high consumption of fruits, vegetables, whole grains, moderate to high of consumption of fish and dairy products while restricting the intake of meat and its derivatives, has been correlated with weight loss, reduction of abdominal adiposity and lower incidences of metabolic disorders such as diabetes and cardiovascular diseases (Kafatos, Verhagen, Moschandreas, Apostolaki, & Van Westerop, 2000). Adolescents with high adherence to the MD diet are more likely to gain physical benefits, and tend to report higher levels of HRQoL, possibly improving their psychological health as well (Costarelli, Koretsi, & Georgitsogianni, 2013).

Both developing and developed nations are facing the consequences of childhood and adolescent obesity having doubled in the past decade (Wang & Lobstein, 2006). Among its neighborhood, Lebanon has been experiencing a nutrition transition characterized by a westernized lifestyle and food habits translated into escalating obesity levels among its teenagers (Nasreddine et al, 2012). Adolescents with a low level of adherence to the MD have reported a lower HRQoL (Costarelli, Koretsi, & Georgitsogianni, 2013).

The adolescence phase has also been characterized by a decline in the level of physical activity (PA) (Dumith, Gigante, Domingues, & Kohl, 2011). Engaging in regular PA has been correlated to some major metabolic benefits including lower incidences of metabolic syndromes and premature deaths among adolescents (Janssen & LeBlanc, 2010). Higher levels of PA have been associated with better HRQoL among teenagers (Muros, Pérez, Ortega, Sánchez, & Knox, 2017). Other factors that were positively related with HRQoL among this age group were the mother's educational level and the number of meals consumed with the family (Costarelli, Koretsi, & Georgitsogianni, 2013), whereas a higher Body Mass Index (BMI) predicted a lower HRQoL (Muros, Pérez, Ortega, Sánchez, & Knox, 2017).

A review of the current available literature indicates that there is scarcity of data on the risk factors associated with adolescents' HRQoL in North Lebanon. Therefore, this study was carried out in order to investigate the risk factors associated with poor HRQoL among adolescent school students in Tripoli, the capital city of North Lebanon governorate. This study may provide guidance on policies to develop that aim to improve the HRQoL of Lebanese adolescents.

2. METHODS

2.1. Study Design and Participants

A cross-sectional study was conducted in Tripoli during the period of January and February 2019.

The study participants were students aged 11-18 years attending private schools in the area.

2.2. Sampling Procedure

Based on a previously published study, a sample size of 125 students in each group allowed for the detection of a 6.25% decrease in HRQoL (KIDSCREEN-27) with a 5% significance level and a 90% study power (Costarelli, Koretsi, & Georgitsogianni, 2013). A request to conduct the study was sent to private mixed high schools (boys and girls) in Tripoli. The directors of these schools were contacted, and four of them agreed to participate in the current study. The school principals worked as mediators, reaching out to the parents of the students in these schools to gain their permission to allow their children to participate in the study. The exclusion criteria comprised the presence of physical disabilities and absence on the days of the recruitment.

2.3. Data Collection

The measurement instrument was a questionnaire that was used to assess the HRQoL, sociodemographic characteristics, physical activity, and adherence to the Mediterranean diet among the participants. The questionnaire was followed by anthropometric measurements. All questionnaires were filled in the classrooms under the supervision of trained researchers who had participated in previous training to standardize the data collection procedures. Privacy was maintained as much as possible during the interview.

2.4. Measures

2.4.1 Health-related quality of life (HRQoL)

The HRQoL of the participants was assessed using the KIDSCREEN-27 instrument. This tool is composed of 27 questions which measure five dimensions of well-being: physical well-being (5 items), psychological well-being (7 items), parent relations and autonomy (7 items), social support and peers (4 items), and school environment (4 items). The HRQoL is an internationally validated questionnaire. The instrument has been found to have excellent cross-cultural comparative validity. Each item is scored on a 5-point scale (1 = "not at all", 2 = "a little", 3 = "moderately", 4 = "much", and 5 = "very much"). Certain items are reversed when scoring the questionnaire. For each of the five dimensions, a scoring algorithm is used to calculate T-scores scaled with a mean of 50 and a standard deviation of 10. The total KIDSCREEN score is generated by summing up all item responses. Higher scores indicate better quality of life (Ravens-Sieberer et al., 2007).

2.4.2 Sociodemographic characteristics

The sociodemographic characteristics of the students include: age, gender, grade level, and parent's educational status (primary, complementary, secondary or university).

2.4.3 Physical activity

Physical activity was assessed using the physical activity questionnaires for children (PAC-C) and adolescents (PAC-A) which evaluate the level of activity of participants below the age of fourteen and at the age of fourteen and above respectively (Kowalski, Crocker, & Faulkner, 1997).

2.4.4 Eating habits

The KIDMED index was used in order to assess the adherence to the Mediterranean diet among participants. The index is composed of 16 yes-or-no questions. The questions with negative aspects (skipping breakfast, going to a fast food restaurant more than once per week, consuming pastries or baked goods for breakfast, eating sweets or candies several times every day) were assigned a value of -1, while the rest were given a score of +1. The final score ranges from -4 to 12 and is divided into 3 levels: ≤ 3 , poor diet quality; 4–7, an improvement is needed to adjust intake in order to follow a Mediterranean-style diet; and ≥ 8 –12, Mediterranean-style diet is optimal (Kontogianni et al., 2008). In addition, participants were questioned about the number of meals consumed daily and with their families. The frequency of skipping meals was also reported.

2.5. Anthropometric Measurements

Anthropometric measurements which included weight, height, and waist circumference (WC) were assessed using standardized techniques (WHO). Height was measured in a standing position to the nearest 0.1 cm without shoes, using a stadiometer. Participants were weighed with light clothing using a calibrated electronic scale to the nearest 0.1 kg. WC was measured in a standing position with nonstretchable flexible tape to the nearest 0.1 cm. Body mass index (BMI) was calculated using the following formula: weight (kg)/ height (m²). Obesity degree was then estimated according to the Center for Disease Control and Prevention age-and gender-specific growth charts

which define overweight or obesity as having a BMI-for-age greater than the 85th percentile (Department of Health and Human Services). Abdominal obesity was assessed using waist-to-height ratio (WHtR). The WHtR index for central obesity was calculated by dividing WC by height, both measured in centimeters, and the cut-off point of ≥ 0.5 was used to identify children with elevated WHtR (McCarthy & Ashwell, 2006).

2.6. Statistical Analysis

The collected data were analyzed using descriptive statistics for calculating the means and standard deviations of continuous variables and the frequencies and percentages of categorical variables. Correlations between HRQOL with adherence to the MD, specific dietary behaviors, physical activity, levels of obesity and socio-demographic variables were conducted using the Spearman's Rho correlation coefficient. Multiple linear regression analysis was also used in order to investigate associations between specific variables and HRQOL. Data were analyzed by using the Statistical Package for the Social Sciences (SPSS/PC version 22.0) software. All the analysis were two tailed, and a P-value < 0.05 was considered statistically significant. Regression model assumptions such as test for normality using Shapiro-Wilk test, tests for linearity of the covariates using residual scatter plot and normality of residuals using P-P plot were assessed.

3. RESULTS

The baseline characteristics of the students are presented in Table 1. The median age of the participants is 13 years old. Students were randomly distributed between complementary (61.8%) and secondary classes (38.2%). The results of this study showed that the overall prevalence rate of generalized overweight/obesity (according to BMI-for-age) was 47.9%, and those of central obesity (evaluated by WHtR) was 45.6%. The average adherence score to MD among the participants was 4.87 (± 2.72) suggesting that an improvement is needed in the diet quality of Lebanese adolescents. Girls scored significantly lower in the physical well-being subscale of the HRQoL, and were significantly less active than boys according to the IPAQ questionnaire. Moreover, they had a higher tendency toward skipping meals, and consuming fewer number of meals with their families ($P < 0.05$).

Table 1: Characteristics of the adolescents by HRQoL, adherence to MD, physical activity, sociodemographic and anthropometric measurements (n=283)

| | Boys (n=158) | Girls (n=125) | Total (n=283) | P |
|---------------------------------|----------------|---------------|----------------|-----------|
| Age | 13 [12-15] | 14 [12-16] | 13 [12-15] | 0.033 |
| Grade | | | | |
| Complementary | 104 (65.8%) | 71 (56.9%) | 175 (61.8%) | 0.078 |
| Secondary | 54 (34.2%) | 54 (43.2%) | 108 (38.2%) | |
| Father's education level | | | | |
| Primary/Complementary | 34 (21.5%) | 28 (22.4%) | 62 (21.9%) | 0.859 |
| Secondary/University | 124 (78.5%) | 97 (77.6%) | 221 (78.1%) | |
| Mother's education level | | | | |
| Primary/Complementary | 40 (25.3%) | 21 (16.8%) | 61 (21.6%) | 0.084 |
| Secondary/University | 118 (74.7%) | 104 (83.2%) | 222 (78.4%) | |
| Weight | 61.29 (17.74) | 58.60 (14.18) | 60.10 (16.29) | 0.169 |
| Height | 161.06 (12.54) | 156.62 (8.35) | 159.10 (11.09) | 0.001 |
| IPAQ total score | 2.69 (0.74) | 2.34 (0.69) | 2.54 (0.74) | < 0.001 |
| KIDMED diet total score | 4.80 (2.70) | 4.96 (2.76) | 4.87 (2.72) | 0.626 |
| KIDSCREEN-27 total score | 44.79 (4.94) | 45.28 (4.25) | 45.0 (4.65) | 0.381 |
| Physical wellbeing | 47.51 (8.26) | 44.31 (8.18) | 46.10 (8.36) | 0.001 |
| Psychological wellbeing | 37.17 (4.57) | 37.70 (3.88) | 37.41 (4.28) | 0.303 |
| Parents & autonomy | 49.41 (9.35) | 50.72 (9.98) | 49.99 (9.64) | 0.257 |
| Social support & peers | 47.34 (12.19) | 50.24 (10.20) | 48.62 (11.42) | 0.337 |
| School environment | 42.49 (4.84) | 43.44 (4.92) | 42.91 (4.89) | 0.106 |
| BMI-for-age | | | | |

| | | | | |
|--|---------------|---------------|---------------|--------|
| Underweight(<5 th percentile) | 4 (2.5%) | 4 (3.2%) | 8 (2.8%) | 0.878 |
| Normal weight (5 th -84 th percentile) | 76 (48.1%) | 64 (51.2%) | 140 (49.3%) | |
| Overweight(85 th -94 th percentile) | 31 (19.6%) | 25 (20.0%) | 56 (19.7%) | |
| Obese (\geq 95 th percentile) | 47 (29.8%) | 32 (25.6%) | 76 (28.2%) | |
| Waist | 79.90 (12.00) | 77.35 (12.35) | 78.81 (12.20) | 0.034 |
| Waist to height ratio (WHtR) | | | | |
| Normal | 86 (54.4%) | 68 (54.4%) | 154 (54.4%) | 0.996 |
| High | 72 (45.6%) | 57 (45.6%) | 129 (45.6%) | |
| Skipping meals | | | | |
| Never | 37 (23.4%) | 18 (14.4%) | 55 (19.4%) | 0.041 |
| Sometimes | 105 (66.5%) | 84 (67.2%) | 189 (66.8%) | |
| Always | 16 (10.1%) | 23 (18.4%) | 39 (13.8%) | |
| Number of meals (day) | 3.27 (1.04) | 2.85 (0.69) | 3.08 (0.92) | <0.001 |
| Number of meals with family(day) | 2.16 (0.84) | 1.95 (0.85) | 2.07 (0.85) | 0.042 |

Data presented as mean (standard deviation) or number (percentage) as appropriate, apart from age, which is presented as median [Interquartile range]. Comparison between boys and girls using the Mann-Whitney U test or chi-square test as appropriate.

Table 2 represents the factors associated with the total score and the five subscales of the HRQoL among Lebanese adolescents. Mother's educational level had a positive significant association with the physical well-being of the participants. On the other hand, a higher BMI-for-age was negatively correlated with physical, psychological well-being, and with the total score of HRQoL ($P<0.05$). Obesity degree expressed as a higher WHtR seemed to be negatively linked to the physical well-being category among teenagers. Moreover, adolescents who reported consuming more frequent meals with their family enjoyed a better HRQoL ($P<0.05$) which tended to be reflected with an improvement in their psychological well-being ($P<0.01$). In addition, students who expressed a better adherence to the MD benefited from an enhanced physical well-being, parent relationship, as well as a higher total score of HRQoL. Moreover, engaging in regular physical activity tended to exhibit a significantly positive relation with all components and the total score of the HRQoL among adolescents.

Table 2: Factors associated with HRQoL among Lebanese adolescents (n=283) Table 2: Factors associated with HRQoL among Lebanese adolescents (n=283)

| | Physical well-being | Psychologic al well-being | Parents & autonomy | Social support & peers | School environmen t | KIDSCREEN-27 Total score |
|------------------------------------|---------------------|---------------------------|--------------------|------------------------|---------------------|--------------------------|
| Father's Education level | | | | | | |
| Mother's Education level | .126* | | | | | |
| BMI for age | -.130* | -.125* | | | | -.136* |
| WHtR | -.114* | | | | | |
| Number of meals (daily) | | | | | | |
| Number of meals(daily with family) | | .166** | | | | .132* |
| Adherence to the MD | .130* | | .134* | | | .127* |
| Skipping meals | | | | | | |
| IPAQ total score | .391** | .171** | .196** | .132* | | .311** |

Insignificant correlations not reported, ** $P<0.01$, * $P<0.05$

Multiple linear regression analysis has revealed that obesity among adolescents, expressed as a higher BMI-for-age, predicted a lower HRQoL. In addition, a higher level of PA remained the strongest factor that improve HRQoL among these students (Table 3). The dependent variable Kids-screen was normally distributed with p-value =0.201 and normal Q-Q plot. The regression residuals using the P-P plot indicated that all the dots conform to the diagonal normality line. The scatterplot of the residuals shows a well scattered distribution of the points and it does not have an obvious pattern. The points are equally distributed above and below zero on the X axis, and to the left and right of zero on the Y axis. Hence we conclude that the assumption of linearity holds.

Table 3: Factors associated with KIDSCREEN-27 (total score) – multiple regression (n=283)

| | Beta | t | P | VIF |
|---|-------------|----------|----------|------------|
| BMI for age | -.659 | -2.291 | .023 | 1.009 |
| Number of meals(daily with family) | .460 | 1.464 | .144 | 1.055 |
| Adherence to the MD | .130 | 1.339 | .182 | 1.042 |
| IPAQ total score | 1.831 | 5.041 | .000 | 1.028 |

Adjusted R² = 0.128 F= 10.088 P < 0.0001

4. DISCUSSION & CONCLUSIONS

The current study was carried out in order to examine the factors that predict the HRQoL among a small sample of Lebanese adolescents attending private schools in North Lebanon. This study demonstrated that excess body weight was associated with impaired physical and psychological well-being among adolescents. This result is in agreement with other studies which revealed that overweight and obesity in children and adolescents tends to negatively influence their HRQoL (Keating, Moodie, & Swinburn, 2011). Obese adolescents suffer from peer victimization and are at greater risk of aggression compared to their normal-weight peers (Janssen, Craig, Boyce, & Pickett, 2004). The psychological consequences of bullying may delay the social development of overweight and obese youth since this period is considered a critical period for social maturation among most adolescents (Geckova, Pudelsky, & Tuinstra, 2000).

The present study, in agreement with other cross-sectional studies, also identified that PA was strongly correlated with the HRQoL (Spengler & Woll, 2013; Muros, Pérez, Ortega, Sánchez, & Knox, 2017). An intervention program targeting obesity among adolescents revealed that engaging in regular PA improved significantly the HRQoL among these teens (Daniels, 2014). This can be explained by the beneficial effect of PA on psychological and social functioning, as well as on fighting depression (Hallgren et al., 2016). Therefore, PA should be considered as the primary focus of any intervention targeting HRQoL in adolescents.

The success of any intervention strategy aiming to improve HRQoL among obese and overweight adolescents is conditioned by the assessment of possible risk factors of impaired quality of life and communicating these findings with the health care providers, as well as with the parents and teachers of those children. One limitation of this study is the cross-sectional design which inhibits the investigation of causal relationships. Therefore, longitudinal studies are needed to further explore the association between those components in regards to HRQoL. Another limitation is that the perception of HRQoL by age have not been studied considering that the number of adolescents in some age groups was low. At the same time, the study cannot be considered as a representative of the HRQoL among all adolescents in North Lebanon since public schools were excluded. The majority of Lebanese private schools include students from medium to high-socioeconomic status who probably benefit from a better quality of life compared to students in public schools. A subsequent study, can be conducted in public schools, therefore allowing the generalization of the results.

ACKNOWLEDGEMENT

The authors would like to thank the directors of the schools in Tripoli and the students for their participation in the study.

REFERENCES

- Costarelli, V., Koretsi, E., & Georgitsogianni, E. (2013). Health-related quality of life of Greek adolescents: the role of the Mediterranean diet. *Quality of Life Research*, 22(5), 951-956.
- Daniels, S. R. (2014). Physical activity and quality of life. *The Journal of Pediatrics*, 165(4), 647-649. <https://doi.org/10.1016/j.jpeds.2014.07.055>
- Department of Health and Human Services. Centers for Disease Control and Prevention, USA. CDC Growth Charts for the United States. Retrieved from <http://www.cdc.gov/nchs/data/nhanes/growthcharts/zscore/bmiagerev.xls>.
- Dumith, S. C., Gigante, D. P., Domingues, M. R., & Kohl III, H. W. (2011). Physical activity changes during adolescence: a systematic review and a pooled analysis. *International Journal of Epidemiology*, 40(3), 685-698.
- Frisen, A. (2007). Measuring health-related quality of life in adolescence. *Acta Paediatrica*, 96(7), 963-968.
- Geckova, A., Pudelsky, M., & Tuinstra, J. (2000). Peer contacts, social network, and social support from adolescents' point of view. *Psychologia a Patopsychologia Dietata*, 35(2), 121-136.
- Hallgren, M., Herring, M. P., Owen, N., Dunstan, D., Ekblom, Ö., Helgadottir, B., ... Forsell, Y. (2016). Exercise, physical activity, and sedentary behavior in the treatment of depression: broadening the scientific perspectives and clinical opportunities. *Frontiers in Psychiatry*, 7, 36.
- Janssen, I., Craig, W. M., Boyce, W. F., & Pickett, W. (2004). Associations between overweight and obesity with bullying behaviors in school-aged children. *Pediatrics*, 113, 1187-1194.
- Janssen, I., & LeBlanc, A. G. (2010). Systematic review of the health benefits of physical activity and fitness school-aged children and youth. *International Journal of Behavioral Nutrition and Physical Activity*, 7(1), 40.
- Kafatos, A., Verhagen, H., Moschandreas, J., Apostolaki, I., & Van Westerop, J. J. (2000). Mediterranean diet of Crete: foods and nutrient content. *Journal of the American Dietetic Association*, 100(12), 1487-1493.
- Keating, C. L., Moodie, M. L., & Swinburn, B. A. (2011). The health-related quality of life of overweight and obese adolescents—a study measuring body mass index and adolescent-reported perceptions. *International Journal of Pediatric Obesity*, 6(5-6), 434-441.
- Kontogianni, M. D., Vidra, N., Farmaki, A. E., Koinaki, S., Belogianni, K., Sofrona, S., ... Yannakoulia, M. (2008). Adherence rates to the Mediterranean diet are low in a representative sample of Greek children and adolescents. *The Journal of Nutrition*, 138(10), 1951-1956.
- Kowalski, K. C., Crocker, P. R., & Faulkner, R. A. (1997). Validation of the physical activity questionnaire for older children. *Pediatric Exercise Science*, 9(2), 174-186.
- McCarthy, H. D., & Ashwell, M. (2006). A study of central fatness using waist-to-height ratio in UK children and adolescents over two decades supports the simple message—'keep your waist circumference to less than half your height'. *International Journal of Obesity*, 30(6), 988.
- Muros, J. J., Pérez, F. S., Ortega, F. Z., Sánchez, V. M. G., & Knox, E. (2017). The association between healthy lifestyle behaviors and health-related quality of life among adolescents. *Jornal de Pediatria (Versão em Português)*, 93(4), 406-412.
- Nasreddine, L., Naja, F., Chamieh, M. C., Adra, N., Sibai, A. M., & Hwalla, N. (2012). Trends in overweight and obesity in Lebanon: evidence from two national cross-sectional surveys (1997 and 2009). *BMC Public Health*, 12(1), 798.
- Pearson, N., & Biddle, S. J. (2011). Sedentary behavior and dietary intake in children, adolescents, and adults: a systematic review. *American Journal of Preventive Medicine*, 41(2), 178-188.
- Ravens-Sieberer, U., Auquier, P., Erhart, M., Gosch, A., Rajmil, L., Bruil, J., ... European KIDSCREEN Group (2007). The KIDSCREEN-27 quality of life measure for children and adolescents: psychometric results from a cross-cultural survey in 13 European countries. *Quality of Life Research*, 16 (8), 1347-1356.
- Spengler, S. & Woll, A. (2013). The more physically active, the healthier? The relationship between physical activity and health-related quality of life in adolescents: the MoMo study. *Journal of Physical Activity and Health*, 10(5), 708-715.
- Wang, Y., & Lobstein, T. I. M. (2006). Worldwide trends in childhood overweight and obesity. *International Journal of Pediatric Obesity*, 1(1), 11-25.
- World Health Organization. (1995) Physical status: the use and interpretation of anthropometry: a report of a WHO expert committee. Retrieved from <https://apps.who.int/iris/handle/10665/37003>.