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Faculty of Nursing and Health Sciences

Screening for eating disorders in children and young adolescents

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Approval Certificate

Screening for eating disorders in children and young adolescents

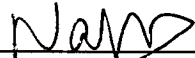Submitted by: **Jessica Dib**

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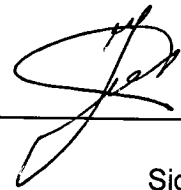|		
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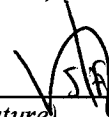
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Finally, and foremost I praise God, the almighty for providing me this opportunity and granting me the capability to proceed successfully.

DEDICATION

This thesis is dedicated to my family and husband
who have supported me all the way since the beginning of my studies.

Also, this thesis is dedicated to my friends
who have been a great source of motivation and inspiration.

Finally, this thesis is dedicated to all those
who believe in the richness of learning.

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LIST OF ABBREVIATIONS

ADA: American Dietetic Association
AN: Anorexia Nervosa
APA: American Psychological Association
BED: Binge Eating Disorder
BMI: Body Mass Index
BN: Bulimia Nervosa
BPSU: British Pediatric Surveillance System
CAPS: Child and Adolescent Psychiatric Surveillance System
ChEAT: Children Eating Attitudes Test
ChEDE: Children's Eating Disorder Examination
CI Crowding Index
CPSP: Canadian Pediatric Surveillance Program
DAWBA: Development and Well-Being Assessment
DSM-5: Diagnostic and Statistical Manual for mental disorders
EAT: Eating Attitude Test
ED: Eating disorder
EDDS: Eating Disorder Diagnostic Scale
EDE-Q: Eating Disorder Examination-Questionnaire
EDI: Eating disorder Inventory
LNL: Lycee National Libanais
MEPSs: Medical Expenditure Panel Surveys
MUAC: Mid upper arm circumference
MUAMC: Mid-upper arm muscle circumference
NHANES National Health and Nutrition Examination Survey
NIMH National Institute of Mental Health
NGO: Non-Governmental Organizations
OSFED: other specified feeding or eating disorder
SCID-5: Structured Clinical Interview for DSM-5
SDQ: Strengths and Difficulties Questionnaire
SES: socioeconomic status
SPSS: Statistical Package for the Social Sciences
TRAILS: Tracking Adolescents' Individual Lives Survey
TSF: Triceps Skin Folds
UFED: unspecified feeding or eating disorder
WHO: World Health Organization

ABSTRACT

Introduction: Eating disorders (ED) are one of the most common psychiatric illnesses that may lead to physical and psychosocial morbidity in children and young adolescents. The aim of this study was to assess the prevalence of eating disorders symptoms and its associated risk factors among children and young adolescents in Lebanese schools.

Methods: This was a cross-sectional study including 253 students aged between 8-13 years old, living in Lebanon. Participants were recruited from private schools located in Mount Lebanon. Each student were interviewed to collect information related to sociodemographic and mediconutritional characteristics. Prevalence of ED symptoms and its correlation with other risk factors were calculated.

Results: Almost one third (36.4%) of students had a positive SCOFF screening, with the highest proportion for the age group 8 to 9 years old (47.9%, p=0.029), for obese (55.6%, p=0.01), and for hypo-energetic students (75%, p=0.017).

Conclusion: The high prevalence of ED symptoms among Lebanese students at early age points out the urgent need for further diagnosis and intervention.

Key Words: Eating Disorders, adolescents, children, screening tools, nutritional assessment, SCOFF.

BACKGROUND AND RATIONALE

Definitions

Eating disorders (EDs) are psychiatric illnesses that affect health and psychosocial functioning, characterized by a persistent disturbance of eating habits (American Psychiatric Association, 2016). EDs include Anorexia Nervosa (AN), Bulimia Nervosa (BN), Binge Eating Disorder (BED), Other Specified Feeding or Eating Disorder (OSFED), Unspecified Feeding or Eating Disorder (UFED), and other disorders such as Avoidant/Restrictive Food Intake Disorder, Pica, and Rumination Disorder.

According to DSM-5 (2013), the criteria for diagnosing AN are persistent restriction of energy intake leading to significantly low body weight, an intense fear of gaining weight, disturbance in the way one's body weight is experienced, undue influence of body shape and weight on self-evaluation and persistent lack of recognition of the seriousness of the current low body weight.

However, criteria for diagnosing BN are recurrent episodes of binge eating characterized by eating in a discrete period of time an amount of food that is large with lack of control. Binge-eating episodes must be associated with recurrent inappropriate compensatory behavior such as self-induced vomiting and episodes must occur at least once a week for three months.

Criteria for diagnosing BED are recurrent episodes of binge eating characterized by eating in a discrete period of time an amount of food that is large with lack of control and marked

distress. Episodes must occur at least once a week for three months and is not associated with the recurrent use of inappropriate compensatory behaviors.

Eating Disorders in Children

According to Nicolay & Anderson (2016), childhood and adolescence are critical periods of neural development and physical growth. Thus, the malnutrition and related medical complications resulting from ED have severe consequences on health. Every organ system is affected by ED and complications as growth retardation, pubertal delay, menstrual irregularities or amenorrhea in women, and decreased erections in men can occur. Moreover, adolescence is an important time for bone mass acquisition so malnutrition caused by eating disorders may decrease bone mineral density which may cause osteoporosis in life (Martin & Golden, 2013).

Patients with EDs often has symptoms of cardiac complications such as bradycardia, hypotension, and arrhythmias (Neumark-Sztaine et al. 2011). Secondary to malnutrition, vomiting, or binge eating gastrointestinal complications as delayed gastric emptying, constipation, mild transaminitis, dyslipidemias, superior mesenteric artery syndrome may occur. Vomiting increases risk of esophagitis, esophageal rupture, and pneumomediastinum. Abdominal bloating, nausea, and postprandial fullness may occur in patients with AN and gastric dilation or rarely gastric rupture and pancreatitis may occur in patients with BE (Zipfel et al. 2006)

Screening and Diagnostic Tools

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There are several tools to screen for or diagnose ED. However, we can only find in the literature four tools used for children: ChEAT, ChEDE, KEDS and SCOFF.

Table 1: Screening and diagnostic tools for ED

Name	Purpose	Description	Scoring	Sensitivity & Specificity	References
Structured Clinical Interview					
SCID-5[a]	Assess ED & other personality disorders	Organized into diagnostic modules.	Rate DSM5 criterion as either present or absent	93.5% & 80.8%	First 2015 Champlain 2015
Self-administered Measures of ED symptoms					
EDE-Q[b]	Diagnose ED	Consists of 33 items. Divided into four subscales (restraint, eating concern, weight concern, and shape concern)	Focuses on the past 28 days. Scored using 7-point.	83% & 96%	Sören et al. 2015 Fairburn & Beglin, 1994
EDI[c]	Diagnose cognitive and behavioral dimensions of AN and BN	Consists of 64 items grouped in 8 subscales. The first three subscales measure behavior and attitudes toward food, weight and body image The other five assess general psychological characteristics associated with ED.	Each item is scored using 6-point. The maximum total score is 192, the cut-off point is 42.	97 % & 86%	Gamer, Olmsted & Polivy, 1983
Self-Administered *DSM-IV Diagnostic* Questionnaire					
Q-EDD[d]	Diagnose AN, BN, and BED	50-item self-report questionnaire. Differentiates between those with and without an ED, and individual with ED, symptomatic, and asymptomatic ,	Respondents need to meet DSM-V criteria	97% & 98%	Mintz et al. , 2000

		and between those with AN and BN			
Self-Administered Screening Questionnaire					
SCOFF[e]	Indicate risk (screen) rather than to diagnose	It contains five questions that are related to eating habits and attitudes toward weight and body shape	Two or more positive answers are recommended as cutoff.	53.3% & 93.2%,	Morgan, Reid, & Lacey, 1999
Screening tools for children					
ChEAT[f]	Measure attitudes toward eating and dietary behavior	Self-report questionnaire. Consist of 26 questions. Used for children aged as young as 8 years old.	Each item is scored using 6-point.	17% & 91%	Smolak & Levine 1994
ChEDE[g]	Measure frequency and severity of cognitive symptoms	Semi structured clinical interview. For age between 8 and 18 years old. Consist of 22 items divided into 4 subscales	Scored using 7-point.	30% & 79%	Bryant-Waugh et al. 1996
KEDS[h]	Assess the presence/absence of symptoms of ED	Self-report questionnaire. Consist of 14 items that includes a set of 8 child figure to assess weight and body dissatisfaction	A total score of more than 16 is considered elevated.	78% & 68%	Childress et al. 1993

a- SCID-5: Structured Clinical Interview for DSM-5

b- EDE-Q: Eating Disorder Examination – Questionnaire

c- EDI: Eating Disorder Inventory

d- QEDDS: Questionnaire for Eating Disorder Diagnoses

e- SCOFF: An Arabic version (A-SCOFF) of the British SCOFF questionnaire has been validated and it has a sensitivity of 80.0%, a specificity of 72.7% (Aoun et al., 2015).

Even though SCOFF was not designed for children, however it was used in many studies as a screening tools for eating disorder in children.

f- ChEAT: Children's Eating Attitudes Test

g- ChEDE: Child Eating Disorder Examination

h- KEDS: Kids Eating Disorder Survey

Prevalence and Incidence

ED appear most frequently during the teen years but it can also develop during childhood (NIMH, 2016). Previous studies have shown that the prevalence of eating disorders in young adults with an age between 13 to 18 years old was shown to be 2.7% and that of children aged between 8 and 15 years old was found to be 0.1% (NHANES, 2006).

Table 2: Prevalence and Incidence of ED in children

Location	Year	Type of ED	Population (Age in years)	Tool	Incidence Rate/ Prevalence	References
Canada	2003-2005	ED	5-12	CPSP[a]	2.6/100 000	Pinhas et al. 2011
Australia	2002-2005	ED	5-13	DSM-IV	1.4/100 000	Madden et al. 2009
UK	2005-2006	AN EDNOS	<13	BPSU[b] & CAPS[c]	1.1/ 100 000 1.2/100 000	Nicholls, Lynn & Viner, 2011
USA	1999-2006	ED	<13	MEPSs[d]	4%	Agency for Healthcare Research and Quality 2009
Belgium	2000	BED	10-16	ChEDE	1%	Decaluwe & Braet 2003

a- CPSP: Canadian Pediatric Surveillance Program

b- BPSU: British Pediatric Surveillance System

c- CAPS: Child and Adolescent Psychiatric Surveillance System

d- MEPSs: Medical Expenditure Panel Surveys

Figure 1: Incidence of Eating Disorders
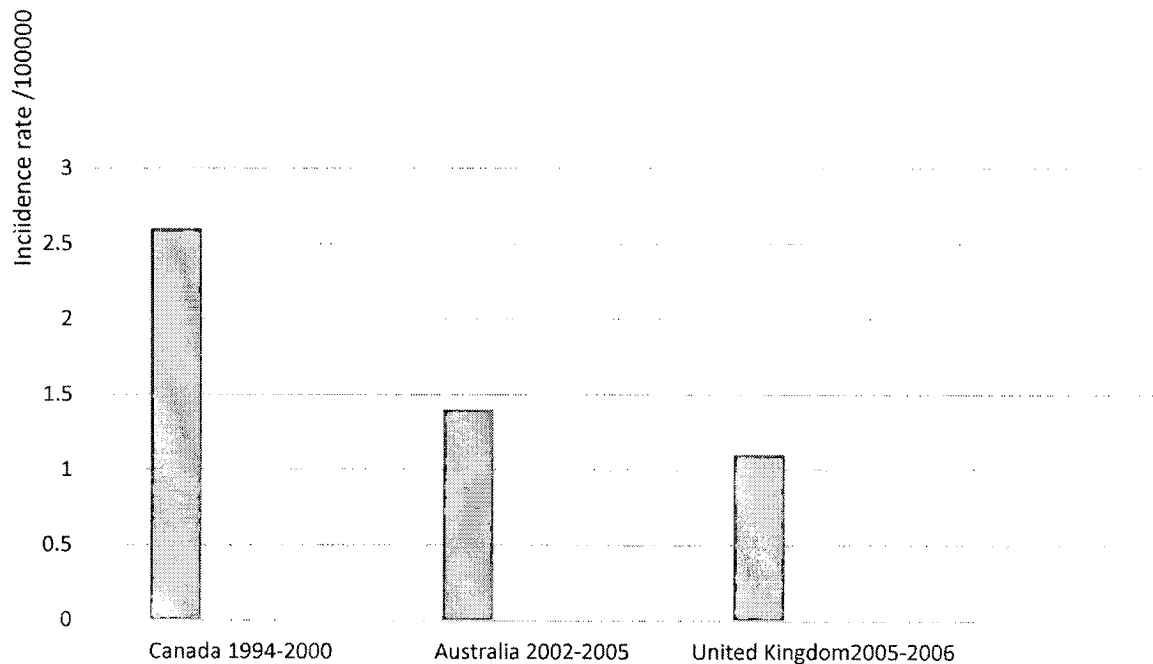
In a study that aimed to investigate the prevalence of ED in 3610 adolescents aged 10-18 years recruited from 261 Austrian school, the SCOFF questionnaire was used to determine that 30.9% of girls and 14.6% of boys are at risk for ED (Micheal et al. 2016).

Consistently, a Dutch cohort study was conducted to establish the prevalence and severity of ED based on the new DSM-5 criteria in a community cohort of 2230 adolescents approximately 11 years old. A two-stage screening approach was used. In the first stage, the group at risk of developing ED was identified using comprehensive self-report questionnaire on mental health and social functioning in addition to the composite Diagnostic Interview, and in the second stage diagnosis of ED took place using SCID-I and EDE. The lifetime prevalence of DSM-5 AN among women was 1.7%, 0.8% for BN, 0.3% for BED. ED were relatively rare among the men, and that the severity of most cases was mild to moderate (Frédérique et al. 2015).

A third study also used SCOFF as a screening tool for children in order to assess ED in children and adolescent in Germany (Hölling & Schlack, 2007). After collecting data from 7,498 children and adolescents aged 11 to 17 years, it was found that 21.9 % of the children and adolescents have symptoms of ED, being 28.9%, among girls and 15.2 % among boys. Children and adolescents with low socioeconomic status (SES) are 27.6 %, affected with ED, which is almost twice the prevalence of those with high SES (15.6 %) (Hölling & Schlack, 2007).

KEDS questionnaire was used in a study that aimed to detect the possible relationships between children's eating attitudes and behavior and the parents' beliefs about eating habits and body shape of their offspring. After screening 900 children, aged 7-12 years in Italy, the authors found out that although the prevalence of formal ED in children is low, they appear to be more preoccupied with their weight than with their body shape, and parents' beliefs about the offspring's body shape and eating habits have a relevant impact on children's eating attitudes and behavior (Valdo et al. 2010).

According to the literature review discussed above, it is evident that children and young adolescents are at risk for developing ED and its associated symptoms. However, the literature review lacks information concerning the prevalence of ED among Lebanese students. Thus, it would be of great interest to examine the prevalence of ED among children and young adolescents living in Lebanon using the appropriate method.

Figure 2: Risk of Eating Disorders
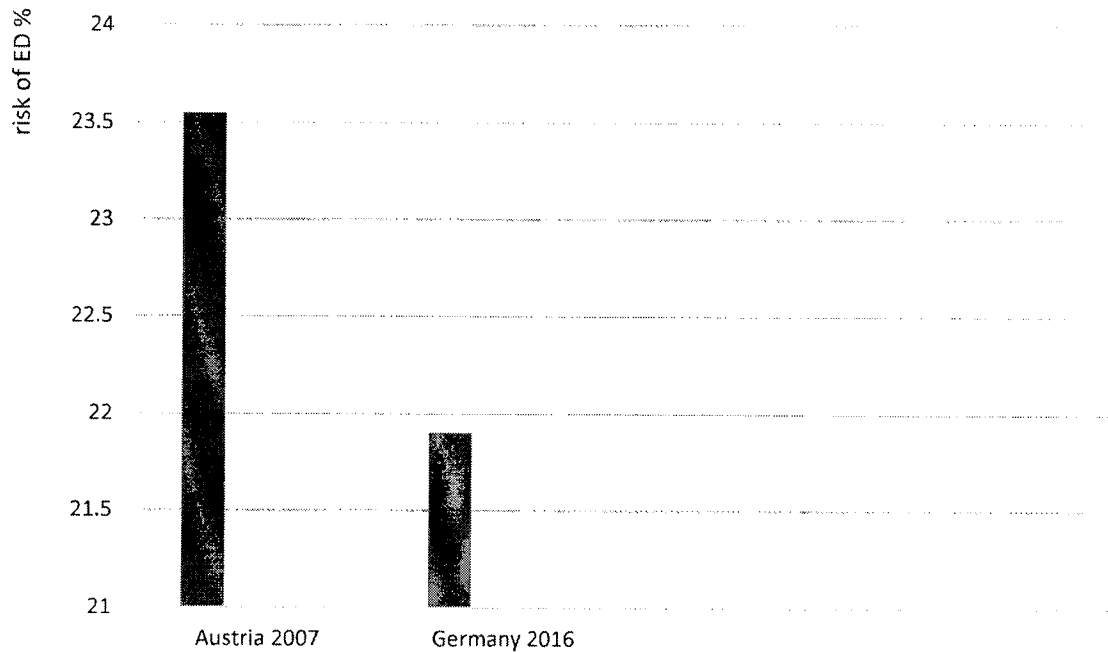
Aim of the study:

The aim of this study was to estimate the proportion of children who are at high risk of developing ED, and to examine the association of ED high risk with socio-demographic, dietary & health-related factors.

Research Question

What is the prevalence of eating disorders symptoms and its associated factors among children (8-13 years old) in Lebanese schools?

Hypotheses

More than one quarter of children have ED symptoms that may be associated with age, gender, BMI and stress factors.

MATERIALS AND METHODS

Study Design

This was a cross-sectional study assessing the prevalence of ED symptoms and its associated risk factors among children and young adolescents aged between 8 to 13 years old, living in Lebanon.

Sampling

a) Target Population:

The targeted population of this study was children of both genders, and within the age category 8-13 years old in Lebanese schools.

b) Inclusion/exclusion criteria:

All students that are younger than 8 years old or older than 13 years old, and have undergone a recent surgery (from less than one week), were excluded from the study.

c) Sample size:

The power of the study should be at least 80%, with an α (level of significance) =0.05 Based on previous studies done in Germany, Austria and Italy that aimed to evaluate the risk of ED in children and young adolescents, the sample size of this study was estimated to be 300 from 2 private schools.

However, due to the lack of time and to the difficulties in filling the questionnaire with children the sample size in this study was considered 253 children.

Study instruments

a) Interview questionnaire:

The interview questionnaire includes six parts consisting of **50 questions**, and a cover page explaining the purpose of the study and ensuring anonymity and confidentiality as well as the consent of study participants.

Part A consists of socio-demographic data (age, gender, weight, height, BMI, curve, nationality, religion, place of residence, employment status, number of families and people living in the same household...) **(Q-A.1 till Q-A13)**

Part B includes education status (school type, grade of student, method of studying...) **(Q-B.1 till Q-B.6)**

Part C includes questions related to the health status (smoking status, use of medication, energy level...) **(Q-C1.1 till Q-C.6)**

Part D contains general questions about Stressful Life Events that might have occurred in addition to a small assessment of food frequency **(Q-D.1 till Q-D.9)**

Part E is the SCOFF questionnaire used for screening of ED; it contains 5 close-ended questions **(Q-E.1 till Q-E.5)**

Part F contains different questions related to Bulimia Nervosa and Binge Eating Disorders **(Q-F.1 till Q-F.4)**

An Arabic version of the SCOFF questionnaire already validated was used.

b) Measurement tools:

The measurement tools used in this thesis were:

Anthropometric measurements: specifically weight and height. Participants were dressed in light clothes and barefoot, standing height was measured to the nearest 0.1 cm using a stadiometer. Body weight was measured to the nearest 100 g using an electronic scale. These measurements are essential for calculating the Body Mass Index (BMI) that was used to determine weight disorders in relation to height and study their relation to Eating Disorders (ED). Body Mass Index (BMI) is a measure of weight adjusted for height, calculated as weight in kilograms divided by the square of height in meters (kg/m^2) (Barlow, 2007).

BMI was plotted on the Centers for Disease Control and Prevention growth charts in order to determine the curve of each child; children having a BMI for age less than the 5th percentile were considered undernourished, between 5 and 85 percentile were considered normal , between 85 and 95 were considered overweight and more than 95th percentile were considered obese.

SCOFF questionnaire: The SCOFF questionnaire is an eating disorder screening questionnaire which contains 5 short questions regarding key aspects of eating disorders such as vomiting, concerns about losing control over how much one eats, weight loss, feeling fat and whether food dominates life. Each question should be responded by yes or no. If 2 or more questions answered by yes, this means that screening for EDs is positive (Luck, et al., 2002)

Data Collection

Ethical approval to conduct the study was obtained by the NDU-IRB (Institutional review board). Lebanese schools located in different area were contacted by telephone, and invited to participate. All the students were at participating schools were invited to participate

Permission from the Ministry of Education and Higher Education was obtained in order to be able to enter some schools and to conduct the study.
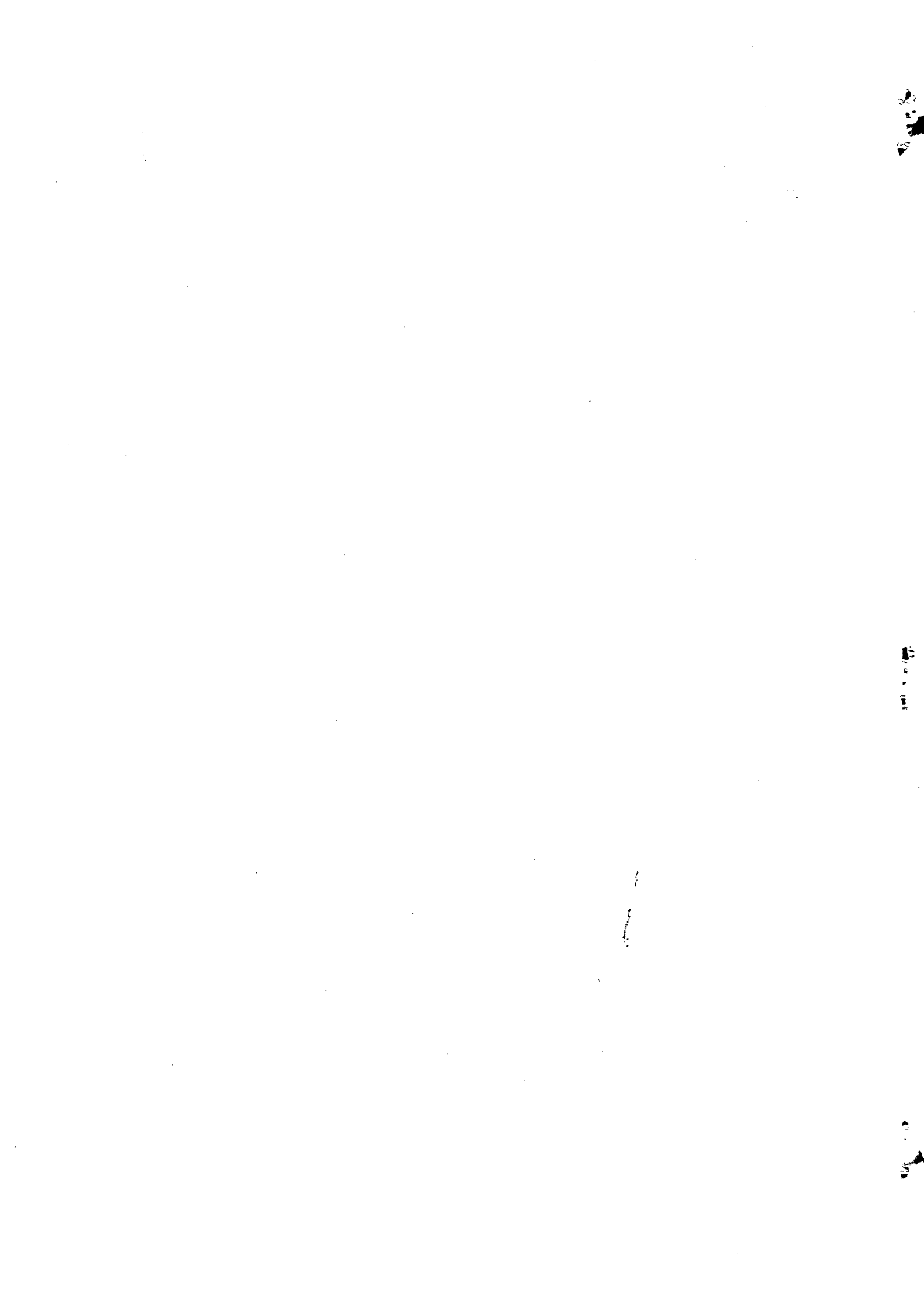
Written informed consent from the legal representatives of the children was obtained. Students aged between 8 and 11 were divided in groups of 4 and were interviewed for 40 to 50 minutes during regular school class time in order to fill the questionnaire. For students aged 12 and 13 the questionnaire was distributed in class and they were able to fill it in 40 minutes with our assistance.

Variables

Dependent Variable (DV): Eating Disorders were screened and diagnosed using SCOFF questionnaire. According to the results, subjects were classified as at risk/ or not at risk of developing EDs. The results were used for calculating the prevalence of ED.

Independent Variables (IV): Variables that are a risk factor or might lead to ED, There are two main independent variables are: Age and gender. Other variables include: BMI, crowding index, nationality, religion, absence of a family member, employment status, and average grade.

Note: *Crowding index*: Number of usual residents in a dwelling divided by the number of rooms in the dwelling (Matter, 2001).

Data analysis

Data entry and analysis was conducted using the Statistical Package for the Social

Sciences (SPSS) (version 22.0). All the variables were qualitative, hence frequencies and

percentages were calculated. Chi-square test was used to explore correlations between the

different variables as age and risk of ED. The threshold for statistical significance was set

at $\alpha = 0.05$.

Table 3: Plan for Data analysis

Dependent Variable	Independent Variable	Statistical tests
SCOFF (categorical)	Age (categorical)	Chi- square test
SCOFF (categorical))	Gender (categorical)	Chi- square test
SCOFF (categorical))	Body Mass Index (categorical)	Chi- square test
SCOFF (categorical))	Nationality (categorical)	Chi- square test
SCOFF (categorical)	Religion (categorical)	Chi- square test
SCOFF (categorical)	Absence of a close family member (categorical)	Chi- square test
SCOFF (categorical)	Crowding index (categorical)	Chi- square test
SCOFF (categorical)	Employment status of the father (categorical)	Chi- square test
SCOFF (categorical)	Employment status of mother (categorical)	Chi- square test
SCOFF (categorical)	Average Grade (categorical)	Chi- square test
SCOFF (categorical))	Self-ranking compared to class (categorical)	Chi- square test
SCOFF (categorical))	Like going to school (categorical)	Chi- square test
SCOFF (categorical))	Do you study alone at home (categorical)	Chi- square test
SCOFF (categorical)	Suspended from school (categorical)	Chi- square test

SCOFF (categorical)	Smoking parents (categorical)	Chi- square test
SCOFF (categorical)	Use of medication (categorical)	Chi- square test
SCOFF (categorical)	Hospitalized (categorical)	Chi- square test
SCOFF (categorical)	Description of energy level (categorical)	Chi- square test
SCOFF (categorical))	Time spent in front of digital devices (categorical)	Chi- square test
SCOFF (categorical))	Experiencing a serious accident or fire? (categorical)	Chi- square test
SCOFF (categorical))	Seeing someone be killed or seriously injured? (categorical)	Chi- square test
SCOFF (categorical)	Experiencing the death of a loved one? (categorical)	Chi- square test
SCOFF (categorical)	Experiencing divorce? (categorical)	Chi- square test
SCOFF (categorical)	Experiencing war? (categorical)	Chi- square test
SCOFF (categorical)	Experiencing moving from house, school or country? (categorical)	Chi- square test
SCOFF (categorical))	Being exposed to violence or abuse (categorical)	Chi- square test
SCOFF (categorical))	Experiencing major illness (categorical)	Chi- square test
SCOFF (categorical))	Number of times the student buy food from school cafeteria per week (categorical)	Chi- square test
SCOFF (categorical)	What to buy most from cafeteria (categorical)	Chi- square test
SCOFF (categorical)	Number of times the student eat from restaurants per week (categorical)	Chi- square test
SCOFF (categorical)	Number of times the student exercised per week(categorical)	Chi- square test

RESULTS

Description of the sample

The results of this study include findings concerning 253 schoolchildren from two different Lebanese schools: Lycee National Libanais (LNL) and St Joseph school. The characteristics of this population are presented in Table 1, with 54.5% males and 45.5% females. Participants were almost divided equally between the age category 10-11 years old (36.4%) followed by the age category 12-13 years old (35.5%) and the age category 8-9 (28.1%). Regarding CDC growth chart (BMI for age), almost two thirds (62.1%) of the sample had normal weight, 13.8% were overweight, 13.4% were underweight and 10.7% were obese. More than three quarters (76.3%) were Syrian nationals compared to 21.3% Lebanese nationals and 2.4% Philippinos.

Most of them (79.9%) were Muslim Sunni compared to Christians (13.4%) followed by Muslim Shia (5.9%) and Druze (0.4%). Moreover, 9.5% of students had a missing family member due to death 41.7%, travel 41.7% or divorce 16.7%. Almost three quarters (71.4%) of participants had a CI less or equal to 2.5 which is the lowest category on the CI scale.. Most of the participants (96.4%) declared that their fathers are employed and 80.2% had an unemployed mother.

Table 4: Distribution of Students by their Sociodemographic Data (n=253)

Variables	Frequency (%)
Age	
8-9	71 (28.1%)
10-11	92 (36.4%)
12-13	90 (35.5%)
Gender	
Male	138 (54.5%)
Female	115 (45.5%)
Body Mass Index	
Underweight	34 (13.4%)
Normal	157 (62.1%)
Overweight	35 (13.8%)
Obese	27 (10.7%)
Nationality	
Lebanese	54 (21.3%)
Syrian	193 (76.3%)
Other	6 (2.4%)
Religion	
Muslim Sunni	202 (79.8%)
Muslim Shia	15 (5.9%)
Christian	34 (13.4%)
Other	1 (0.4%)
Absence of a close family member	
No	229 (90.5%)
Yes	24 (9.5%)
Crowding index	
$\leq$2.5	180 (71.4%)
2.51-3.5	44 (17.5%)
$\geq$3.51	28 (11.1%)
Employment status of the father	
No	9 (3.6%)
Yes	244 (96.4%)
Employment status of mother	
No	203 (80.2%)
Yes	50 (19.8%)

Table 5 shows the distribution of students by their educational status. Concerning their grades, more than half of the participants (53%) had an average grade more than 14/20,

almost one third (31.2%) scored between 10/20 and 13/20, and only 15.9% had an average

grade below 10/20. In addition, only 6.8% of the students expressed that they don't like

going to school compared to the majority (93.2%) of their counterparts

Moreover, less than half of the schoolchildren (44.7%) mentioned that they study by

themselves and in addition, most of the students (90.1%) were not suspended from school

in comparison to 9.9% who had a history of suspension.

Table 5: Distribution of Students by their Educational Status (n=253)

Variables	Frequency (%)
Average Grade	
$\leq$5/20	9 (3.6%)
6-9/20	31 (12.3%)
10-13/20	79 (31.2%)
$\leq$14/20	134 (53%)
Self-ranking compared to class	
Excellent	105 (41.7%)
Good	85 (33.7%)
Fair	47 (18.7%)
Poor	15 (6%)
Like going to school	
No	17 (6.8%)
Yes	234 (93.2%)
Do you study alone at home	
No	140 (55.3%)
Yes	113 (44.7%)
Suspended from school	
No	227 (90.1%)
Yes	25 (9.9%)

Table 6 gives a brief description of the health status of students. More than half of the students (57.3%) claimed that their parents smoke and most of them (89.3%) do not use any medication, more than quarter (78.7%) were never hospitalized, and most of them (85.4%) do not suffer from any chronic pain. Also, more than half of the students (53.8%), declared that they have high energy level followed by normal (41.5%) and low (4.7%) energy level.

Table 6: Health status of students (n=253)

Variables	Frequency (%)
Smoking parents No Yes	108 (42.7%) 145 (57.3%)
Use of medication No Yes	226 (89.3%) 27 (10.7%)
Hospitalized No Yes	199 (78.7%) 54 (21.3%)
Description of energy level Hypo-energetic Normal Hyper-energetic	12 (4.7%) 105 (41.5%) 136 (53.8%)

Table 7 gives a brief description on the nutritional and psychological status of students. Almost half of the students (47.34%) spend less than 2 hours per day in front of digital devices however, less than one quarter of the students (20.6%) spend more than 5 hours per day. Almost one quarter of students have seen someone be killed or seriously injured (20.2%), experienced major illness (24.5%) and were exposed to violence or abuse (22.1%).Moreover, almost one third of students have experienced a serious accident, fire (29.6%) or war (31.6%), and almost half of the students (47.4%) have experienced the death of a loved one. Regarding the family status, few students (7.1%) has experienced divorce.

In addition to that, more than half of the students (55.3%) buy more than 3 times per week from school cafeteria, and almost half of the students (51.7%) buy fast food.

Table 7: Nutritional and psychological Status of students (n=253)

Variables	Frequency
Time spent in front of digital devices	
Less than 2 h	120 (47.4%)
3 to 5 h	81 (32%)
More than 5 h	52 (20.6%)
Have you ever experienced a serious accident or fire?	
No	178 (70.4%)
Yes	75 (29.6%)
Have you ever seen someone be killed or seriously injured?	
No	202 (79.8)
Yes	51 (20.2%)
Have you ever experienced the death of a loved one?	
No	133 (52.6%)
Yes	120(47.4%)
Have you ever experienced divorce?	
No	235 (92.9%)
Yes	18 (7.1%)
Have you ever experienced war?	
No	173 (68.4%)
Yes	80 (31.6%)
Have you ever experienced moving from house, school or country?	
No	92 (36.4%)
Yes	161 (63.6%)
Have you ever been exposed to violence or abuse?	
No	197 (77.9%)
Yes	56 (22.1%)
Have you ever experienced major illness?	
No	191 (75.5%)
Yes	62 (24.5%)
Number of times you buy food from school cafeteria per week	
1 and less	33 (16.8%)
2-3	55 (27.9%)
4 and more	109 (55.3%)
What do you buy most?	
Fast food	96 (51.7%)
Salty snacks	41 (22.1%)
Sweet snacks	7 (3.7%)
Beverages	4 (2.2%)
All of them	38 (20.4%)

Association between the independent variables and SCOFF

Out of the 253 participants, almost one third (36.4%) had a positive SCOFF screen. In order to study the association between the independent variables (gender, age, BMI, crowding index, nationality, religion...) and SCOFF, Chi-squared test shows significant difference in the proportion of children with a positive SCOFF screening across age groups (p=0.029), where almost half of the students (47.9%), aged 8 to 9 years old, one third of the age group 10 to 11 years old (29.3%), and 12 to 13 years old (34.4%) had positive SCOFF. In addition, a significant association of BMI (p=0.01) was observed among participants who has a positive SCOFF screening with a percentage of 14.7% for underweight, 36.9% for normal, 40% for overweight and 55.6% for obese.

Moreover, the energy level claimed by the students was statistically significant (p=0.017); three quarters (75%) of hypo-energetic students, more than one third of normal energy (35.2%) and hyper-energetic (33.8%) had positive SCOFF. Also, There was a significant association between participants that experienced a serious accident or fire (p=0.027), moving from house, school or country (p=0.010) and SCOFF in which almost half (46.7% and 42.2% respectively) had positive SCOFF

In addition to that, there was a significant association between number of times the students bought food from school cafeteria per week and SCOFF (p= 0.043), where more than one quarter (26.1%) bought less than 1 time per week , 44.4% bought between 2 to 3 times per week and 42.9 % bought more than 4 times per week had positive SCOFF. Also, there was a significant association between number of times students ate from restaurants per week and SCOFF (p= 0.013), in which one third of schoolchildren that declared eating 2 times

and less per week and almost half (45.5%) that declared eating 3 times and more had positive SCOFF.

On the other hand, gender, nationality, religion, absence of a family member, crowding index, employment status, average grade, self-ranking compared to class, like going to school, suspension from school, use of medication, smoking parents, hospitalization, time spent in front of digital devices, seeing someone killed or seriously injured, experiencing death of a loved one, divorce, war, violence or abuse, and major illness categories were not statistically significant associated with SCOFF.

Table 8: Association between the independent variables and SCOFF (n=253)

Variables	SCOFF (-) 161 (63.6) N (%)	SCOFF (+) 92 (36.4) N (%)	P-value[a]
Gender Male Female	93 (67.4) 68 (59.1)	45 (32.6) 47 (40.9)	**0.174**
Age group 8-9 10-11 12-13	37 (52.1) 65 (70.7) 59 (65.6)	34 (47.9) 27 (29.3) 31 (34.4)	**0.046**
BMI Underweight Normal Overweight Obese	29 (85.3) 99 (63.1) 21 (60) 12 (44.4)	5 (14.7) 58 (36.9) 14 (40) 15 (55.6)	**0.010**
Nationality Lebanese Syrian Other	38 (70.4) 119 (61.7) 4 (66.7)	16 (29.6) 74 (38.3) 2 (33.3)	**0.494**
Religion Muslim Sunni Muslim Shia Christian Other	130 (64.4) 12 (80) 19 (55.9) 0 (0)	72 (35.6) 3 (20) 15 (44.1) 1 (100)	**0.219**

Variables	SCOFF (-) 161 (63.6) N (%)	SCOFF (+) 92 (36.4) N (%)	P-value[a]
Absence of a close family member			0.144
No	149 (65.1)	80 (34.9)	
Yes	12 (50)	12 (50)	
Crowding index			0.231
≤2.5	119 (66.1)	61 (33.9)	
2.51-3.5	23 (52.3)	21 (47.7)	
≥3.51	18 (64.3)	10 (35.7)	
Employment status of the father			0.847
No	6 (66.7)	3 (33.3)	
Yes	155 (63.5)	89 (36.5)	
Employment status of mother			0.698
No	128 (63.1)	75 (36.9)	
Yes	33 (66)	17 (34)	
Average Grade			0.064
≤5/20	5 (55.6)	4 (44.4)	
6-9/20	26 (83.9)	5 (16.1)	
10-13/20	45 (57)	34 (43)	
≤14/20	85 (63.4)	49 (36.6)	
Self-ranking compared to class			0.599
Excellent	65 (61.9)	40 (38.1)	
Good	54 (63.5)	31 (36.5)	
Fair	30 (63.8)	17 (36.2)	
Poor	12 (80)	3 (20)	
Like going to school			0.960
No	11 (64.7)	6 (35.3)	
Yes	150 (64.1)	84 (35.9)	
Do you study alone at home			0.416
No	86 (61.4)	54 (38.6)	
Yes	75 (66.4)	38 (33.6)	
Suspended from school			0.956
No	144 (63.4	83 (36.6)	
Yes	16 (64))	9 (36)	
Smoking parents			0.164
No	74 (68.5)	34 (31.5)	
Yes	87 (60)	58 (40)	
Use of medication			0.356
No	146 (64.6)	80 (35.4)	
Yes	15 (55.6)	12 (44.4)	
Hospitalized			0.283
No	130 (65.3)	69 (34.7)	
Yes	31 (57.4)	23 (42.6)	

Variables	SCOFF (-) 161 (63.6) N (%)	SCOFF (+) 92 (36.4) N (%)	P-value[a]
Description of energy level			0.017
Hypo-energetic	3 (25)	9 (75)	
Normal	68 (64.8)	37 (35.2)	
Hyper-energetic	90 (66.2)	46 (33.8)	
Time spent in front of digital devices			0.457
Less than 2 h	73 (60.8)	47 (39.2)	
3 to 5 h	56 (69.1)	25 (30.9)	
More than 5 h	32 (61.5)	20 (38.5)	
Have you ever experienced a serious accident or fire?			0.027
No	121 (68)	57 (32)	
Yes	40 (53.3)	35 (46.7)	
Have you ever seen someone be killed or seriously injured?			0.147
No	133 (65.8)	69 (34.2)	
Yes	28 (54.9)	23 (45.1)	
Have you ever experienced the death of a loved one?			0.536
No	87 (65.4)	46 (34.6)	
Yes	74 (61.7)	46 (38.3)	
Have you ever experienced divorce?			0.817
No	150 (63.8)	85 (36.2)	
Yes	11 (61.1)	7 (38.9)	
Have you ever experienced war?			0.414
No	113 (65.3)	60 (34.7)	
Yes	48 (60)	32 (40)	
Have you ever experienced moving from house, school or country?			0.010
No	68 (73.9)	24 (26.1)	
Yes	93 (57.8)	68 (42.2)	
Have you ever been exposed to violence or abuse?			0.606
No	127 (64.5)	70 (35.5)	
Yes	34 (60.7)	22 (39.3)	
Have you ever experienced major illness?			0.097
No	127 (66.5)	64 (33.5)	
Yes	34 (54.8)	28 (45.2)	

Variables	SCOFF (-) 161 (63.6) N (%)	SCOFF (+) 92 (36.4) N (%)	P-value[a]
Number of times you buy food from school cafeteria per week			**0.043**
1 and less	68 (73.9)	24 (26.1)	
2-3	25 (55.6)	20 (44.4)	
4 and more	28 (57.1)	21 (42.9)	
What do you buy most?			**0.099**
Fast food	71 (74)	25 (26)	
Salty snacks	22 (53.7)	19 (46.3)	
Sweet snacks	5 (71.4)	2 (28.6)	
Beverages	2 (50)	2 (50)	
All of them	21 (55.3)	17 (44.7)	
How many times you eat from restaurants per week?			**0.013**
≤ 2	106 (69.7)	46 (30.3)	
≥ 3	55 (54.5)	46 (45.5)	
How many times you exercise per week?			**0.553**
≤ 2	56 (63.6)	32 (36.4)	
≥ 3	105 (63.6)	60 (36.4)	

Notes: [a]p-value for the chi-square test.

DISCUSSION

The present study provides the first epidemiological data on children and young adolescents aged 8-13 screened for ED symptoms in Lebanon.

In our study, gender differences was almost equally divided between male (54.5%) and female (45.5%), this similarity was also seen in other studies conducted in Germany and Italy were respectively 2230 child using comprehensive self-report questionnaire and 900 children using KEDS were screened. For instance, in these studies they had respectively 47.2% and 44.7% of samples as male in compare to 52.8% and 55.3% as female (Valdo et al, 2010 & Frederique et. al, 2015).

The mean age in this study was 10.74 years old which is the lowest in compare to other studies. In a study done by Micheal et al, in Austria the mean age of 3610 child was 14.53 years old (Micheal et al, 2016).

Regarding BMI classes, the percent of students that were underweight (13.4%) is almost similar (12.3%) to the study that was previously mentioned, done by Micheal et. al, however, less students were classified as normal weight (62.7% compared to 77.4%), and more students were classified as overweight (13.8% vs 6.7%) and obese (10.7% vs 3.6%) (Micheal et al, 2016).

Among the studies that used SCOFF to screen for ED in children and young adolescents as that of Micheal et al, 2016 and Holling & Schlack, 2007 we had the highest percent (36.4%) of children at risk of ED; For instance, in the study done by Holling & Schlack, the risk of developing ED in 7498 child aged between 11 to 17 years, was found to be

21.9%, almost close to the percent found by Micheal et al, (23.55%) (Hölling & Schlack, 2007, Micheal et al, 2016).

The prevalence of ED among girls in our study (40.9%) was found to be higher than the studies mentioned previously done by Holling & Schlack (28.9%) and Micheal et al (30.9%). In addition to that, the prevalence of ED among boys (32.6%) in our study was found to be almost double than these studies (15.2% and 14.6% respectively) (Frederique et. Al, 2015 & Micheal et al, 2016).

Similar to the study done by Micheal et al, we found out that there is a statistically significant (p= 0.010) linear trend with increasing prevalence of ED risk from lower to higher BMI classes (14.7% for underweight, 36.9% for normal weight, 40% for overweight and 55.6% for obesity). This pattern suggest that ED is not only a problem of underweight children but may be also a greater problem for overweight and obese children especially that overweight and obesity are a risk factor for binge eating problems (Marcus & Kalarchian, 2003).

Regarding the energy level claimed by the student, it was not surprising to find out a statistically significant relationship with risk of ED (p=0.017), especially that low energy level (75% with positive SCOFF) is one of the clinical symptoms associated with ED (Beate, 2009).

Moreover, since experiencing a serious accident or fire (46.7% with positive SCOFF) and moving from house, school or country (42.2% with positive SCOFF) were statistically associated with risk of developing ED (0.010<p<0.027) and since no other studies assessed

these 2 stressful life events, further investigations are needed to confirm if they are a risk factor for developing ED in children and young adolescents.

Strengths of the study

Despite the limitations stated previously, this study is the first in Lebanon to study the prevalence of ED symptoms in children and its related risk factors. Moreover, it adds to the literature worldwide, since very few studies exist on ED in young children.

In addition, it detected specific risk factors associated with ED as obesity, experiencing a serious accident or injury or moving from house, school and country.

Limitations of the study

Three limitations in this study have to be mentioned: the first regarding the study design, the second related the recruitment of participants and the third concerning the questionnaire

1. Since this study has a cross-sectional design, interpretation regarding temporality and causality cannot be made. Instead, interpretation on the relationship between risk of ED and independent variables was made only on a correlative level.

2. Participants were recruited only from 2 schools where CARITAS association pay half of the school tuition, which indicates that most of the students has low socioeconomic status (SES) In a previous study done mentioned previously by Holling & Sclack, children and adolescents with low SES were statistically significantly almost twice affected with ED than those with high SES (Holling & Sclack, 2007).

3. Children were not able to tell the name of medication they take, and the reason to be hospitalized, making the answers under reported.

4. The proportion of Syrian nationals students in the sample was much greater compared to Lebanese, therefore the results most likely reflected the status of the Syrian children and not the Lebanese.

CONCLUSION

Since the literature lacks studies on the prevalence of ED among Mediterranean children and young adolescents, this study aimed to estimate the proportion of children who are at high risk of developing EDs, and to examine the association of EDs high risk with socio-demographic, lifestyle, dietary & health-related factors.

The results of the present study indicate that out of 253 students, 36.4% were at high risk of developing ED and that half of the obese student had a positive SCOFF which underline the importance of further diagnosis and preventive work in this field. Moreover, this study is a cross sectional one that targeted only 2 schools, hence further advanced studies with a larger sample size and in multiple schools are needed to evaluate all the risk factors of developing ED in children and young adolescents.

EDs in children and young adolescents are serious health problems that may lead to lifetime complications, thus the findings of this study must be addressed to parents, to several Non-Governmental Organizations (NGOs), to the Ministry of education and to the Ministry of Public Health in order to plan early intervention.

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APPENDICES

Interview questionnaire

Identification number: ------------------

School:----------------

Grade:--------------

Dear parents,

We kindly inform you that researchers from the Faculty of Nursing & Health Sciences, NDU are interested in assessing the prevalence of eating disorders symptoms and its associated factors among children and young adolescents in Lebanese schools. For that, tour children will be asked some questions that include the following titles:

Socio demographic Data, Educational status, Nutritional and behavioral status and SCOFF (For more details please refer to the attached questionnaire).

For the sake of your child, we hope you agree and we insure you that there is no risk in participating in this study and that the information collected will be used only for research purpose. You will not be asked to provide your name or any other personal identifier.

Access to all collected data will be limited to parents and kids.

For any information about the study, you can contact the researcher (Mobile line: 70/123046, E-mail: jcdib@ndu.edu).

STATEMENT OF CONSENT:

Since I have been informed that any examination or procedure may pose unforeseen risks at this time, I, the ------------, confirm that my child's participation in this research study is optional. And that there would be no penalty and no benefit him if he did not participate. And that he is entitled to cease participating without any penalty or loss of any of the benefits to which he is entitled.

Date: _____   Parent Signature:--------

Research Signature: --------------

Interview Questionnaire

Part A: Socio Demographic Data:

A.1 Age: ------------years

A.2 Gender:

    1. Male   2. Female

A.3 Current Weight: Reported and measured ------------Kg

A.4 Current Height: Reported and measured ------------m

A.5 BMI (kg/m^2) = ...

A.6 Curve:

    1. Underweigth   2. Normal
    3. Overweigth   4. Obese

A.7.1 Nationality:

    1. Lebanese   2. Other:-------------

A.7.2 1If Syrian, when did you move to Lebanon?

    --------------- (Date)

A.8 Current place of residence: ----------------------------

A.9 Religion:

    1. Muslim Sunni   2. Muslim Shia
    3. Christian   4. Druze
    5. Other, specify ....

A.10.1 Absence of a family member:

    1. No   2. Yes

A.10.2 If yes specify reason: ---------------------

A.11.1 Number of persons living together: -------------

Aa.11.2 Number of room in the house: ------------------------

A.12 Parents employment status

    Working father: 1. Yes   2. No

A.13 Working Mother: 1. Yes   2. No

Part B: Educational Status

B.1 School:

1. Public   2. Private

B2. Average Grade:

1. Less than 5/20   2. Between 5-10/20
3. Between 10-14/20   4. More than 14/20

B3. How would you rank yourself compared to the class?

1. Excellent   2. Good
3. Fair   4. Poor

B4.1 Do you like going to the school?

1. No
2. Yes

B4.2 Specify reason: ------------------

B5.1 Do you study alone?

1. No   2. Yes

B5.2 If no specify who teaches you: ....

B.6 Have you ever been suspended for misbehaving in school

1. No   2. Yes

B.6.2 If yes specify why ....

B.6.3 How many times: ....

Part C: Health Status

C.1 Do you see your parents smoking?

1. No   2. Yes

C.2.1 Have you been taking any medication?

1. No   2. Yes

C.2.2 If yes specify what: ---------------------

C.4 Have you ever been hospitalized

1. No   2. Yes

C.4.2 If yes specify why: -----------

C.5.1 Do you suffer from any pain?

    1. No   2. Yes

C.5.2 If yes where: ----------

C.6 How do you describe your energy level?
    1. low   2. Normal
    3. 3High

> ## Part D: Nutritional and psychological Status (1)

D1. How much time do you spend in front of Digital devices? -------------

Do you eat more or less when you are ...?

D2. Sad

    1. More   2. Less   3. Remain the same

D3. Scared

    1. More   2. Less   3. Remain the same

D4. Happy

    1. More   2. Less   3. Remain the same

D5. Angry

    1. More   2. Less   3. Remain the same

D6. Sometimes things happen to people that are unusually or especially frightening, horrible, or traumatic. For example:

1. a serious accident or fire
2. seeing someone be killed or seriously injured
3. Death of a loved one
4. Separation in family/divorce
5. War
6. Moving (house, school, country)
7. Any violence or abuse
8. Personal or family Major illness
9. Parents job loss

D7.1Do you eat from cafeteria?

1. Yes   2. No

D7.2 If yes what?
D7.3 How many times per week?
D8 Do you have food allergy
D9 How many times per week you eat the following?

	0	1	2	3	4	5	6	7	<7
a. Fat (mayo, butter) fried food	0	1	2	3	4	5	6	7	<7
b. Oil (olive oil...)	0	1	2	3	4	5	6	7	<7
c. Dairy products	0	1	2	3	4	5	6	7	<7
d. Fruits	0	1	2	3	4	5	6	7	<7
e. Vegetables	0	1	2	3	4	5	6	7	<7
f. Bread, rice, pasta, corn	0	1	2	3	4	5	6	7	<7
g. Beans, oat, wheat ...	0	1	2	3	4	5	6	7	<7
h. Soft drinks	0	1	2	3	4	5	6	7	<7
i. Water per day	0	1	2	3	4	5	6	7	<7
j. Fish	0	1	2	3	4	5	6	7	<7
k. Meat	0	1	2	3	4	5	6	7	<7
l. Raw nuts	0	1	2	3	4	5	6	7	<7
m. Chicken	0	1	2	3	4	5	6	7	<7
n. Eggs	0	1	2	3	4	5	6	7	<7
o. Crackers and salty food	0	1	2	3	4	5	6	7	<7
p. Sweet	0	1	2	3	4	5	6	7	<7
q. Food from restaurants	0	1	2	3	4	5	6	7	<7
r. exercise	0	1	2	3	4	5	6	7	<7

Part E: SCOFF

E1. Do you ever make yourself sick (throw up) because you feel uncomfortably full?

        1. No   2. Yes
E2. Are you worried about having lost control over how much you eat?

        3. No   4. Yes
E3. Have you recently lost more than 10% of your usual weight over a 3 month period?

        5. No   6. Yes
E4. Do you feel yourself as being fat when others say you are too thin?

        7. No   8. Yes
E5.Would you say that food dominates your life, or that you are obsessed by food?

9. No   10. Yes

Part F: Nutritional and psychological status (2)

F1. Do you eat in a small period of time (2h) an amount of food that is larger than what most individuals would eat at the same period of time and under similar circumstances?
        11. No   12. Yes

F2. Do you feel that you cannot stop eating or control what or how much you are eating?
        13. No   14. Yes

F3. Do you use inappropriate compensatory behavior (ex: laxatives, diuretics, vomiting etc.) to prevent weight gain?
        15. No   16. Yes

F4. During the last 3 months, did Binge/Purge cycles occur at least, on average, once per
week:
        1. No   2. Yes