

QATAR UNIVERSITY

COLLEGE OF HEALTH SCIENCE

THE ASSOCIATION BETWEEN HEALTH INFORMATION SEEKING AND  
BEHAVIOR CHANGE RELATED TO PHYSICAL ACTIVITY AMONG QATARI

ADOLESCENTS

BY

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A Thesis Submitted to  
the Faculty of the College of Health Sciences  
in Partial Fulfillment of the Requirements for the Degree of  
Masters of Science in Public Health

June 2019

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## ABSTRACT

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Title: The Association Between Health Information Seeking and Behavior Change

Related to Physical Activity among Qatari Adolescents

Supervisor of Thesis: Manar Elhassan, Salma Khaled.

*Background:* Inadequate physical activity (PA) is a serious public health problem among adolescents worldwide and in Qatar. Seeking information on health topics such as PA is increasingly documented among teens and may provide an opportunity for PA promotion. This study aimed at assessing the influence of information obtained from different sources on PA behavior change and identifying possible correlates of this change among Qatari adolescents

*Methods:* The current secondary analysis was based on data from a nationally representative cross-sectional survey conducted in 2017 among 1050 Qatari students aged 13-19 years. Self-reported information on demographics, psychosocial factors, PA, and sources used to obtain health information were collected. Main outcome was the attempt to change PA behavior. Logistic regression analysis accounting for survey design information was carried out to examine the association between the outcome and information sources used to attempt PA change, and to find independent predictors for this attempt.

*Results:* Nearly 68% of the respondents tried to change PA behavior (65% male versus 72% female), and 46% were physically active (55% males versus 38% females). Based on information from interpersonal, traditional, online, and social media sources about 65%, 55%, 51%, and 54% of adolescents respectively attempted to change their PA behavior. Results from multivariable logistic regression showed that teens who used

information from interpersonal and online sources to try to change their behavior had 9 times ( $OR=9.35$ , 95% CI: 4.15-21.08,  $P<0.001$ ) and nearly 3 times ( $OR=2.53$ , 95% CI: 1.50-4.27,  $P=0.001$ ) higher odds of change in PA, respectively. The odds of attempt to change PA were 2 times higher among older adolescents (16-19 years) ( $OR=2.17$ , 95% CI: 1.37-3.44,  $P= 0.002$ ) and among teens who considered PA an important topic ( $OR=2.34$ , 95% CI: 1.13-4.84,  $P=0.023$ ).

*Conclusion:* The results highlight the role of interpersonal and online sources in fostering behavior change among adolescents in addition to the influence of age and personal value of PA on initiating such changes. Findings from this study may help policymakers in designing appropriate PA interventions that adapt multiple delivery approach. It is recommended that future PA-related behavior change interventions in Qatar are age- and gender- sensitive and stress the importance and relevance of PA to teen's health.

**Keywords:** adolescents; health information seeking; physical activity.

## ملخص البحث

لميس عبدالله محمد علي، درجة الماجستير في العلوم: يونيو 2019، الصحة العامة.

العنوان: العلاقة بين بحث المراهقين القطريين عن المعلومات الصحية وتغيير السلوك المرتبط بالنشاط البدني.

المشرف على الرسالة: د. منار الحسن      د. سلمى خالد

**خلفية البحث:** يعد النشاط البدني غير الكافي مشكلة كبيرة للصحة العامة بين المراهقين في أنحاء العالم وفي قطر.

البحث عن معلومات بشأن موضوعات صحية كالنشاط البدني ونّقته الدراسات بشكل متزايد في أواسط المراهقين، ومن الممكن أن يشكل فرصة للترويج لممارسة النشاط البدني. تستهدف هذه الدراسة تقييم تأثير المعلومات المستفادة من مصادر مختلفة على تغيير سلوك النشاط البدني وتحديد العوامل المحتملة لهذا التغيير بين المراهقين القطريين.

**الطريقة:** هذه الدراسة تحليل ثانوي استناداً إلى بيانات من مسح وطني أجري في عام 2017 على عينة من 1050 طالباً قطرياً أعمارهم بين 13-19 عاماً. جمعت معلومات بلغ عنها ذاتياً عن عوامل ديمografية ونفسية واجتماعية وعن سلوك النشاط البدني ومصادر المعلومات المستخدمة بين المراهقين للحصول على معلومات متعلقة بالصحة. متغير الدراسة الرئيسي كان محاولة تغيير سلوك النشاط البدني. استخدم الانحدار اللوجستي الخاص بالمسوح لاختبار العلاقة بين متغير الدراسة الرئيسي ومصادر المعلومات المستخدمة لمحاولة تغيير سلوك النشاط البدني، ولمعرفة المتغيرات المتوقعة لهذه المحاولة.

**النتائج:** أفاد قرابة 68% من المستجيبين بأنهم حاولوا تغيير سلوك النشاط البدني (65% من الذكور مقابل 72% من الإناث)، في حين أشار 46% إلى أنهم كانوا نشطين بدنياً (55% من الذكور مقابل 35% من الإناث).

استناداً إلى المعلومات المستفادة من مصادر المعلومات الشخصية والتقاليدية ومن الانترن特 ووسائل التواصل الاجتماعي حاول نحو 65% و55% و51% و54% من المراهقين تغيير سلوك النشاط البدني على التوالي.

أظهرت نتائج الانحدار اللوجستي متعدد المتغيرات أن نسبة احتمالات محاولة تغيير سلوك النشاط البدني كانت أعلى بنحو تسع مرات لدى من استخدمو معلومات من المصادر الشخصية لمحاولة تغيير سلوكيهم ( $OR=$  9.35, 95% CI: 4.15-21.08,  $P<0.001$ ). وأعلى بنحو ثلاثة مرات لدى الذين استخدمو معلومات من الانترنط لنفس الغرض ( $OR=$  2.53, 95% CI: 1.50-4.27,  $P=0.001$ ).

كما كانت نسبة احتمالات محاولة تغيير سلوك النشاط البدني أعلى بنحو مرتين لدى المراهقين في الفئة العمرية 19-16 عاما (OR=2.17, 95%CI:1.37-3.44, P= 0.002) ولدى أولئك الذي اعتبروا أن النشاط البدني مهم بالنسبة إليهم (OR=2.34, 95% CI: 1.13-4.84, P=0.023).

**الاستنتاج:** نتائج الدراسة تسلط الضوء على دور مصادر المعلومات الشخصية والإنترنت في تعزيز تغيير السلوك بين المراهقين، وعلى تأثير العمر والأهمية التي يوليهها الأشخاص للنشاط البدني على المبادرة بتغيير السلوك. هذه النتائج قد تساعد واضعي السياسات في تصميم تدخلات مناسبة للنشاط البدني تتبنى طرقاً متعددة لتوصيل المعلومات الصحية للمراهقين. ينبغي أن تراعي التدخلات المستقبلية المتعلقة بتغيير سلوك النشاط البدني في قطر العمر والجنس، مع تأكيد أهمية وصلة النشاط البدني بصحة المراهقين.

**كلمات دالة:** المراهقون؛ البحث عن المعلومات الصحية؛ النشاط البدني.

## DEDICATION

*I dedicate this work to my Parents and my daughters; Arwa and Amal, the symbol of life, inspiration, love, and giving.*

*My son Yahya; your memory will live on as long as I shall live.*

## ACKNOWLEDGMENTS

I would like to acknowledge all my professors in Public Health department-Qatar University; without the knowledge I gained from you this work wouldn't be possible. I extend my deepest gratitude and appreciation to Dr. Manar Elhassan and Dr. Salma Khaled for their supervision and guidance.

I acknowledge the Social and Economic Survey Research Institute at Qatar University, Northwestern University, and National Priorities Research Program (NPRP) for making this research possible. The survey was supported by Qatar National Research Fund (NPRP 9-038-5-003, 2016-2017). I am very appreciative to adolescents who participated in the survey. Hopefully this work may help in creating a healthier future for them. I am also thankful to Survey Clinic staff for their guidance.

I owe a deep debt of gratitude to people who share their knowledge through Internet communication, creating such fascinating community of practice. This had a great impact on my work.

Finally, I would like to express my wholehearted thanks to the most special people in my life who have always been supportive; my dearest friends Dr. Asma'a El-Heneidy and Dr. Diana Jboor, my dear professor Dr. Karam Adawi, my brothers and sisters, and my husband. Because of your unconditional love, encouragement, and prayers this work was accomplished.

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## ABBREVIATIONS

BMI	Body Mass Index
CMIS	Comprehensive Model of Information Seeking
DALYs	Disability-Adjusted Life Years
EMR	Eastern Mediterranean Region
GSHS	Global School-based Student Health Survey
NCDs	Non-Communicable Diseases
NGSE	New General Self-Efficacy
PA	Physical Activity
PSD	Psychological Distress
SE	Self-Efficacy
SESRI	Social and Economic Research Institute
TTM	Transtheoretical Model
U.S.	United States
WHO	World Health Organization
YLD	Years Lost to Disability

## CHAPTER 1: INTRODUCTION

Adolescence is one of the most rapid phases of human development in physical, psychological, and social aspects, that needs special attention (1). At 1.2 billion, adolescents comprise around a sixth of the world's population (2). They constitute one fifth of Eastern Mediterranean region population (EMR) (1), and more than 25% of Arab Gulf Countries' population (3). In Qatar, they comprises nearly 7% (4).

Although this period is considered as a healthy life period, there is an unacceptable mortality rate among adolescents with 1.2 million deaths yearly in 2015 mostly from treatable or preventable causes (2). Apart from mortality, physical inactivity, poor diet, smoking, substance abuse, and unsafe sex are some of the behaviors that may compromise current or future health status of adolescents (5).

Adequate physical activity (PA) in teens has considerable benefits for their health and wellbeing which can extend to their adulthood life (2, 6). However, an astounding majority of this segment of population worldwide do not meet the PA requirements set by the World Health Organization (WHO) (7). The highest level of insufficient activity is recorded in the EMR (88%) compared to other WHO regions (7), and Qatar has the second highest level (90%) among adolescents in the entire EMR (8). This behavior along with other major risk factors contribute to increasingly mounting non-communicable diseases (NCDs) morbidity and mortalities in this country (9).

Educating adolescents about disease prevention and healthy lifestyle behaviors is a crucial but challenging task, as it is not easy to capture their attention. Fortunately, they are information seekers by nature as part of their maturation and exploration process (10). With their information seeking behavior, they search different topics using multiple sources; from traditional to new digital technologies, which may elicit their

behavior change, as reported by western literature (11-15). The sources and topics vary according to different characteristics and correlates such as age, gender, motivation, type of information needed, and search skills (12, 13, 15, 16).

In the Arab region, and Qatar in particular, adolescents' overall level of PA was the main focus of many studies with little emphasis on how important this behavior is for them and what are its correlates (3, 17-21). Identifying these points could offer useful information on effective promotion strategies. Similarly, unlike the western literature, little information is available about sources used for health information seeking and the influence of these sources and information gained on adolescents' behavior. Addressing this gap in knowledge remains a research priority in our region where there is a knowledge-action gap and insufficient progress toward evidence-based strategies and action plans for increasing PA (22). Moreover, such evidence could expand the opportunities for intervention programs aiming at promoting PA, and input into public health efforts to curb the growing burden of NCDs (22) in Qatar and other Arab countries with a similar context.

Accordingly, the purpose of this study is to explore health information seeking behavior through the sources that Qatari adolescents report using and the influence of such search on their behavior. Furthermore, the study aims to identify characteristics and possible correlates of PA behavior change among this population in the state of Qatar.

## CHAPTER 2: LITERATURE REVIEW

### Adolescence and Health Risks

Adolescence is a sensitive life phase and a journey between childhood and adulthood, where significant biological, physical, psychological and social changes take place (1). During this period of life, the developing individual gains knowledge, learns to handle emotions and relationships, and acquires skills that will be important for successful functioning as an adult (5). The WHO defines adolescence as the period between 10 and 19 years of age (5) where significant biopsychosocial changes take place. However, because tremendous developmental discrepancy exists during this period of age, it is further broken into early, middle, and late stages with age ranges in years between 10 to 13, 14 to 16, and 17 to 19, respectively (5).

Owing to successful child survival initiatives around the world over the past decades, a dramatic increase in the adolescent population has been witnessed, with 1.2 billion adolescents comprising around one-sixth of the world's population (2), 85% of them in the developing countries (23). In the WHO's EMR, adolescents make up around a fifth of the population (1), whereas they comprise more than 25% of the population of Arab Gulf Countries (3). This is lower than other Arab countries in the region, but is far higher than that of high-income countries (3).

Although this period is considered as a healthy life period, there is an unacceptable mortality rate among adolescents, with 1.2 million deaths a year (over 3000 every day) in 2015 mostly from preventable or treatable causes (2). In the EMR, this rate is the second highest just behind WHO's African Region. The top five causes of mortality in the region are: collective violence and legal intervention, road injury, drowning, lower respiratory infections and interpersonal violence (1).

Apart from mortality, adolescents are at risk for many non-fatal conditions that contribute to DALYs burden and YLD. Nearly one-third of the global burden of disease and two-thirds of premature deaths have roots in conditions and health-related behaviors established during adolescence and youth period (24). These include physical inactivity, poor diet, overweight and obesity, tobacco, alcohol and substance abuse, and unsafe sex (24).

### Adolescents in Qatar

The total population of those between 10 to 19 years of age in Qatar were estimated at 178264 in September 2017, accounting for nearly 7% of the population (4). These figures include all the adolescents in Qatar's population (Qatari and non-Qatari) and are not restricted to Qatari adolescents. Current estimate for the size of the population of the Qatari adolescents are not available. It is worthy of note that the demographic composition of the population in Qatar is unique, largely due to foreign workforce. Based on the Qatar Statistics Authority's estimates in 2017, the population was made up of about 83% of adults ( $\geq 20$  years of age) due to huge influx of migrant workers. The non-Qataris aged  $\geq 15$  years old and those aged  $\geq 25$  years old comprised nearly 80% and 65%, respectively, of the total population, most of them were males, as shown by the Labor Force Survey in 2017 (25). This explains the imbalance in the demographic composition of the overall population.

Qatari population has witnessed significant lifestyle changes due to rapid economic development. These changes have been accompanied by the adoption of many unhealthy lifestyle behaviors, such as poor dietary intake, sedentary behaviors, and insufficient or lack of PA (26). These lifestyle choices are in turn associated with

rising incidence of NCDs, which are the leading causes of mortality and morbidity in the country (9).

Qatari adolescents, in particular, are facing serious problems with alarming levels of risk factors. The Global School-based Student Health Survey (GSHS 2011) (27), revealed that among students aged 13-15 years old in Qatar, nearly half engaged in sedentary activities, 65% of girls and 60% of boys consumed soft drinks daily, and 12% of students had no close friends as a proxy of mental health. The survey also showed that 18% of these adolescents were smokers (25% males, 11% females). Among those who had experimented with cigarette smoking, nearly 94% had done so before the age of 14. A study by Xi et al, based on GSHS (2006-13) pointed out that Qatar has one of the highest prevalence of tobacco use among adolescents, reaching almost 46% (28). A few studies also reported an overall prevalence of overweight and obesity in this population ranging approximately between 6% to 24%, and between 19 % to 24%, respectively (29, 30).

Furthermore, problematic health-related risk behaviors are prevalent among adolescents in the country. A recent cross-sectional study conducted in secondary schools in Qatar found that the most prevalent of these behaviors are unlicensed driving (44%), physical fights (38%), not wearing seat belt (31%), cigarette use (22%), exceeding the speed limit (20%), shisha smoking (19%), carrying weapons (19%), and life time use of inhalants (12%). Meanwhile, the least prevalent were the use of smokeless tobacco (7%), lifetime alcohol use (4%), and lifetime use of illegal drugs (2%) (31). Findings from the GSHS study reported that 51% of adolescent students have engaged in physical fighting (63% of males versus 38% of females), and 42 % were victims of bullying (49% of males versus 35% of female) (27).

## Why Adolescents Adopt Unhealthy Behaviors?

Some of the reasons may be gleaned by asking adolescents directly. According to the WHO global consultation initiative, the thrill of engaging in the behavior, having formed a habit that is now difficult to break, and peer pressure are some of the reasons given by adolescents (5). A recent extensive literature review found that adolescents' risky behavior is a choice teens make that is driven by a desire to explore a potentially risky behavior in favor of gaining experience (32). This is contrary to a popular neuroscience theory that attributes teenagers' seemingly impulsive and risky behavior to the slow prefrontal cortex development of the adolescent's brain (33). Adolescents tend to ignore information that may drive them to reconsider risky decisions, they show less interest in seeking such information, and can endure a lack of knowledge in favor of trying out new things and chasing new experiences (34).

## Physical Activity

The WHO defines physical activity as “any bodily movement produced by the contraction of skeletal muscle that increases energy expenditure above a basal level” (35). On the other hand, exercise is “subcategory of PA that is planned, structured, repetitive, and purposeful in the sense that the improvement or maintenance of one or more components of physical fitness is the objective” according to WHO (35). Moreover, physical fitness is defined as “a set of attributes or characteristics individuals have or achieve that relates to their ability to perform PA” (36).

Engaging in PA on a regular basis is considered an imperative component for maintaining ultimate well-being and averting numerous health conditions (37). The WHO recommends at least 60 minutes of moderate-to-vigorous intensity PA daily for those between 5 to 17 years of age and 150 minutes per week for those between 18 to

19 years of age (38). This includes daily activities, playing, doing sports or engaging in physical education, recreation activities, or practicing planned exercise within different social contexts (22).

The WHO emphasizes that PA in adolescence is linked to improving cardiovascular fitness, developing a healthy musculoskeletal system and neuromuscular awareness, reducing symptoms of anxiety and depression, controlling weight, and enhancing young people's readiness to adopt lifelong healthy behaviors (6). Promoting healthy behaviors in adolescents will contribute to a healthy and empowered adult population (2). Moreover, being active can improve adolescents' academic performance at school, and boost their social development by providing opportunities for social interaction and integration (6).

Currently, many adolescents do not meet the minimum recommended levels of physically activity. In 2010, nearly 81% of the world's adolescents between 11 to 17 years of age were insufficiently physically active (7). Females were less active than males; 84% compared to 78% did not meet the WHO recommendations. The highest level of insufficient activity among WHO regions was recorded in EMR at 88% of the adolescent population in this region (7). Qatar ranked the second in the region, with 90% of its adolescents considered insufficiently active, just behind Sudan, where this proportion reached almost 92% (8) (Figure 1).

A cross-sectional survey carried out in 2012 to assess PA levels among 1232 Qatari adolescents aged 15 to 18 years, found that the percentage of active adolescents ranged from 1% to 12% in different types of activities (17). The activities covered in the study included household, transport, fitness and sports activities. The percentage of those who were considered inactive ranged between 9% to 42% among the mentioned activities, with 65% of the adolescents mainly engaged in sedentary behaviors (17).

	Country	Prevalence (%)
	Afghanistan	No data
	Bahrain	No data
●	Djibouti	84.6 [82.6-86.5]
●	Egypt	87.3 [83.2-90.7]
	Iran (Islamic Republic of)	No data
●	Iraq	85.1 [83.1-87]
●	Jordan	85.2 [83.1-87.1]
●	Kuwait	84.9 [82.8-86.9]
●	Lebanon	76.7 [74.6-78.6]
●	Libya	84 [82-85.8]
●	Morocco	86.6 [85.1-88.1]
●	Oman	84.7 [82-87]
●	Pakistan	88.2 [82.4-92.6]
●	Qatar	90.1 [87.1-92.6]
	Saudi Arabia	No data
	Somalia	No data
●	Sudan	91.9 [89.7-93.7]
●	Syrian Arab Republic	89.6 [87.8-91.3]
●	Tunisia	81.4 [79.6-83]
●	United Arab Emirates	82.6 [79.4-85.4]
●	Yemen	84.3 [81-87.2]

Figure 1: Prevalence of insufficient physical activity among school going adolescents, ages 11-17 (crude estimates); both sexes, 2010.

(Adopted from World Health Organization prevalence of insufficient physical activity, 2010)

In other Arab countries, studies illustrated that insufficient PA among Arab adolescents is a big concern (3, 19, 21, 40). It ranges from 74% to 91% among those aged 13 -15 years (40), being more prevalent in female (85%) than males (75%) (21).

The Arab Teens Lifestyle Study estimated the level of inactivity among those aged 14 - 18 years in the range of 21% to 55% in females versus 8% to 26% in males (19).

The WHO has rated physical inactivity as one of the major risk factors of global mortality, leading to nearly 3.2 million deaths per year (38, 41). It is an important

variable in the etiology of many NCDs and conditions like obesity, diabetes, cardiovascular diseases, osteoporosis and cancer (38).

To change a complex behavior like PA, it is important to understand the determinants and correlates of such a behavior and how to promote it through theories of behavioral change (42). Many theories have been used within a context of PA and one of the most prominent among these theories is the Transtheoretical Model (42, 43).

### *Overview of the Transtheoretical Model*

The Transtheoretical Model (TTM) is an integrative, socio-behavioral model of intentional behavior change (44). It suggests that modifying an undesirable behavior is dependent on cognitive processes which unfolds over time in a sequence of stages. The model comprises four components: stages of change, processes of change, decisional balance and self-efficacy (SE) (44, 45).

The Stages of Change: this structure postulates that when changing behavior, people move through a sequence of stages. This can occur in linear and nonlinear fashion with people recycling through the stages or regressing from later stages to earlier ones. The stages are classified into (45):

- i. Pre-contemplation: Individuals do not have the intention to change their behavior in the foreseeable future (up to 6 months). Pre-contemplators are uninformed or under informed regarding the sequel of their behavior. In addition, demoralization about their ability to change can occur with multiple unsuccessful change attempts.
- ii. Contemplation: individuals have the intention to change their behavior in the far future (the next 6 months). They are aware of their behavioral problem and

- of the pros and cons of changing. The weighting between them can lead to profound uncertainty that makes a person remain in this stage for a long time.
- iii. Preparation: individuals plan to change their behavior in the near future (the next month). Prepared people have a plan of action or depend on a self-change approach.
  - iv. Action: individuals have successfully changed their behavior until 6 months. This stage needs commitment and devotion of efforts and time and requires a person to implement effective strategies to sustain the change in behavior.
  - v. Maintenance: individuals are trying to prevent a relapse after they made overt change (usually more than 6 months). In this stage there is less temptation to relapse and individuals develop more confidence about their ability to continue the changes.

The Processes Of Change: the second structure in the TTM, defined as activities, processes, and strategies people need to track to aid their progression through the stages of change and modify their experiences or surroundings in order to change behavior (45). These processes are divided into cognitive and experiential processes, in which information is designed based on individuals' actions or experiences, and behavioral processes, in which individuals use behavioral strategies to modify behavior. The cognitive and experiential processes consist of consciousness raising, dramatic relief, environmental and self-reevaluation, and social liberation, whereas the behavioral processes involve counter-conditioning, stimulus control, helping relationships, reinforcement management, and self-liberation (45).

Decisional Balance: it assesses the perceived benefits (pros) and barriers (cons) of health behavior. The assumption is that individuals do not intend to adopt the new

behavior until advantages of behavior become more than its barriers or disadvantages(45).

**Self-Efficacy:** is the ultimate structure in the model and reflects the level of confidence individuals demonstrate in maintaining the desired change and resisting temptation to relapse. Relapse often occurs when feelings of temptation exceed people's sense of SE to uphold the change (44, 45). Figure 2 displayed the constructs of TTM and their interrelationships (43).

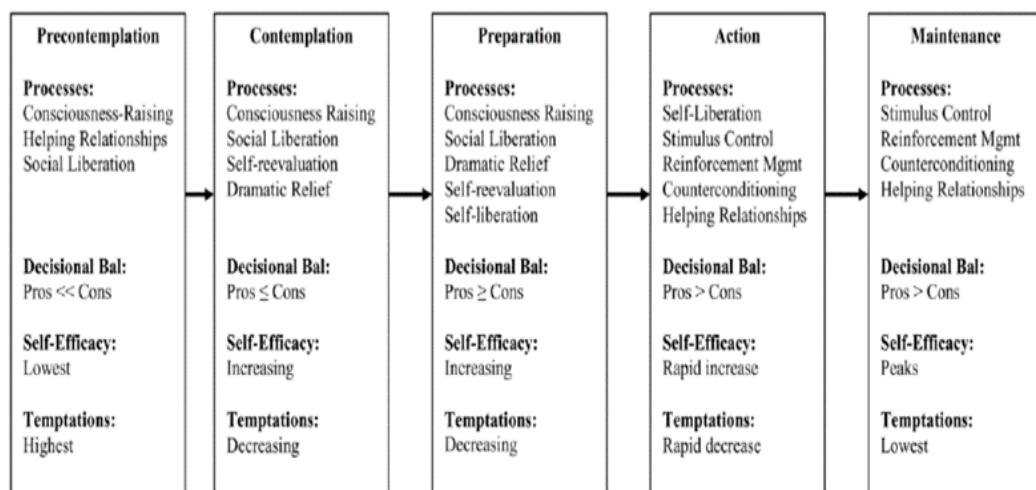


Figure 2: Theoretical relationship between components of TTM.

(Adopted from Nigg et al., 2011)

### *Correlates of Physical Activity among Adolescents*

The available studies in the literature reported that variables like age, gender, body composition, SE, psychological distress (PSD), traumatic experiences, and health

education affect the pattern of health-related behaviors, such as PA, dietary habits, tobacco use and alcohol consumption (12, 46-49).

A recent narrative review of reviews for correlates of PA by Martins et al. (2017) (50) found that participation in PA decreased with adolescents' age, which was greater among girls than boys. The review indicated that one of the most consistent positive correlates of PA is SE and reported previous participation to be a significant correlate of current PA(50). Participating in organized PA was related to higher and sustained levels of PA as many reviews suggested (50). Social support from parents and significant others (siblings, friends or adults) was also positively correlated with PA (50). Sterdt et al. (2014) in their systematic review of studies reporting on correlates of PA in adolescents (51), found that male gender, parenteral education, high socioeconomic status, and family income were positively associated with PA. Similarly, SE, perceived competence, goal orientation/motivation, attitudes, outcome expectation, parent support, and support from significant others, were also significantly associated with PA (51). Findings on age, motivational variables such as lack of interest and effort related to perceived barriers of engagement in PA were consistently inversely related to PA (50, 51) .

However, Martins et al. in their narrative review of reviews acknowledged that the studies included in the reviews were mainly cross-sectional, few were prospective studies, and were heterogenous in terms of definitions and methods used for constructs being measured (50). In particular, the decision for SE was based on two review of reviews and four reviews, two of them included only prospective studies and the other two were mainly cross-sectional. Similarly, Sterdt and colleagues mentioned that the primary studies were predominantly cross-sectional surveys with self-report nature, which precluded causation and resulted in response bias. The authors judgment on SE

was based on four systematic reviews, one of them was based on prospective studies and of good methodological quality (51). A systematic review for correlates of stages of behavior change for PA according to TTM, found females to be in “risk stages” of behavior change (defined in the review as being in precontemplation, contemplation and preparation which suggests that persons are physically inactive). For body composition, there was an association between both overweight and underweight and risk behavior stages, demonstrating that this factor appears to influence the adolescent’s readiness to participate in PA (49). The review also reported a high proportion of adolescents in the maintenance stage of PA in Belgium owing to higher levels of SE and social support (49). This indicates that SE toward PA is an important determinant of this behavior (52).

A study by Sharma et al., which was based on data from a quasi-experimental school-based study involving 718 middle school girls, found a direct and indirect significant influence of SE on PA among participants in addition to social support, highlighting the importance of these factors in promoting this behavior (53).

Obese and overweight adolescents, particularly those who are concerned about their body and appearance were more likely to evade PA (54). A longitudinal follow up study of a sample of 2516 adolescents in the United States (U.S.) found that lower body satisfaction among male and female adolescents predicted lower levels of PA (55). Furthermore, Ivana Stankov and colleagues in their systematic review of 15 qualitative studies, showed that adolescents’ negative perception of their body relative to how they appear physically was considered as a barrier to PA (56).

PSD, including depressive and anxiety symptoms, can affect health-related behaviors in adolescents. A study based on analyzing surveyed sample of 2935 adolescents in grades 9 to 12 in Canada found PSD to be significantly associated with

physical inactivity, with adolescents engaged in more sedentary behaviors being 50% more likely to report distress (57). Depressive symptoms were also shown to be associated with an increased risk of obesity and more engagement in sedentary activities among 2291 surveyed U.S. teens aged 13 to 17 years (58). It was also found that teens who were more active had reduced odds of depressive symptoms (59) and decreased risk for future increases in these symptoms (46), as shown by a cross-sectional analysis of a large population-based cohort and a longitudinal study, respectively. The former suggested that the amount rather than intensity of PA is inversely related to depressive symptoms (59). Moreover, A review of reviews by Biddle and Asare (2011) concluded that sedentary behavior was associated with adverse mental health outcomes, while PA was reported to have positive outcomes (60). However, as with SE, the authors pointed out that many reviews included cross-sectional studies, hence, “reverse causality” cannot be ruled out (60).

Traumatic experiences in childhood and adolescence (including abuse, neglect, traumatic loss of parents or siblings) can trigger traumatic stress, which has been associated with adverse effects on several neurobiological systems in charge of cognitive development and behavior regulation (47). Accordingly, adolescents who suffer from traumatic stress are prone to engaging in reckless or risk-taking behaviors and making impulsive decisions leading to unhealthy behaviors (47). Furthermore, the majority of the literature reports an inverse relationship between psychological and traumatic stress and PA behaviors (61).

Health education in schools offers adolescents valuable opportunities to learn indispensable life skills and gain knowledge which encourage them to adopt healthy behaviors, such as PA(48). It includes education on important topics such as nutrition and healthy food, exercise and PA, and how to prevent conditions like obesity, and skills

about how to practice PA and how to incorporate this behavior in one's daily routine (48). All these promote and protect all aspects of health: emotional, physical and social, and provide a platform and an environment to practice behaviors that enhance the overall health (48).

In Arab countries, it was reported that lower PA levels among adolescents could be attributed to several cultural, social, and environmental factors. Lack of motivation, social support, and lack of time attributed to school obligations were the three main reported barriers (20). Female adolescents were facing more obstacles than males in this aspect due to socio-cultural norms (19, 20). The habit of using cars in Gulf countries and among wealthy Arab families, instead of walking to nearby schools, was also a contributor to physical inactivity (19). A supportive factor for PA was having physically active peers and parents (20). In Qatar, lack of time, dissatisfaction with exercise benefits, unsuitability of the place and hesitation from others were the main reasons for physical inactivity (17).

#### Health Information Seeking Behavior

Educating and providing adolescents with health-related information is considered one of the biggest healthcare challenges because it is difficult to capture their attention (62). Although health education may not directly translate to reductions in risk behaviors (62), increasing knowledge about the importance of healthy life style behaviors can act as a first step toward health promotion. In fact, the majority of health behavior change models emphasizes that it is important to acquire information about health issues related to one's interest and to integrate this knowledge into an individual's daily life (63).

In this context, different models have been used to explain health-related information seeking. Among these models is the Comprehensive Model of Information Seeking (CMIS), which has been studied in the area of health information seeking behaviors (64).

#### *Overview of the Comprehensive Model of Information Seeking*

The CMIS model was generated from a combination of three streams of theoretical research namely: uses and gratifications researches, media exposure and appraisal model, and the health belief model (65). It has three core schemas: health-related factors or antecedents, information carrier factors, and information-seeking actions (Figure 3).

The antecedents comprise demographics (age, gender, education, and race), personal experience (individual degree of direct experience with a health condition), salience (perceived applicability of information to an issue the person faces), and beliefs (i.e. personal belief about the nature of a health condition and the efficacy of prevention and control measures), which govern a person's tendency to search for information from specific carriers.

The information carrier variables include features (such as the tone, the content and communication potentials) and utilities (the information offered by the source is related directly to the person's needs). And finally, there is the information seeking actions schema that mirrors the search nature and the purposive attainment of information from designated information carriers. Through these schemas, the CMIS postulates that antecedents afford the motive force for information seeking and determine the information field which shapes the information seeking actions (64, 65).

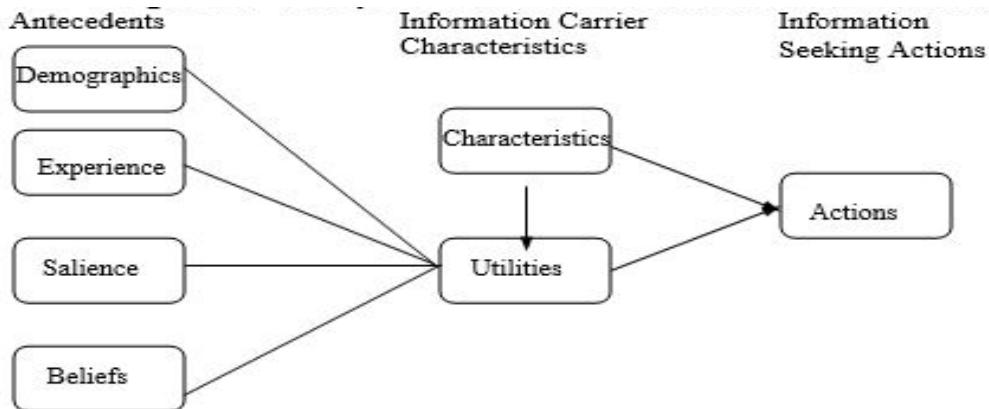


Figure 3: The comprehensive model of information seeking (CMIS).

(Adopted from Johnson, J. D., & Meischke, H., 1993)

#### *Adolescents and Health Information Seeking*

Health information seeking is part of adolescent's maturation process and exploration of themselves and the world around them (10). They tend to ask people around them like family members, friends, and teachers. However, these traditional sources may not satisfy all their needs. In fact, recent literature indicated that adolescents are progressively using digital technology like the Internet for health information seeking for its wide availability, affordability, and anonymity (12).

In the U.S., for example, 92% of surveyed teens aged 12 to 17 years old reported surfing online daily, 71% used more than one sites of social media (e.g. twitter, Instagram, Facebook, and Snapchat), and 45% used these sites daily. This access is facilitated mainly by mobile devices with nearly three-quarters of adolescents having access to a smartphone (11).

Regarding how teenagers used digital technology for health information seeking, it was found that four out of five adolescents turn to the Internet, making it the most popular media source for such information (15) .

Surprisingly, despite this dominance of the Internet, interpersonal sources still rule with 55% of teens reporting getting the majority of information from their parents, emphasizing their trustworthiness. School health classes and health care providers also ranked higher than the Internet as preferred sources, with only small numbers of adolescents reported going online to search topics they may feel uncomfortable to talk about with others (13, 15).

Topics that adolescents looked up vary by factors such as age, gender, and motivation (12, 49), and the most frequently searched topics include health conditions, nutrition, personal safety and violence, and sexual health (66) . Interestingly, literature reported that fitness and nutrition topped researched topics comprising 42%, followed by diet and nutrition, stress and anxiety, sexual and puberty, and depression (15) . Adolescents reported looking up health information online mainly for school projects, then for fitness and diet advice. A third of adolescents surfed the Internet when a health issue affected them, and a quarter did so to learn more about treating an illness or an injury (15).

Most importantly, researchers demonstrated that sources of information may elicit teen health behavior change. For instance, health information found via digital platforms such as Internet and mobile applications was found to empower adolescents to change their health behaviors in interventions that aim to help them perform positive behaviors (14), quit smoking (67), increase PA and self-monitor weight management (68, 69), and improve blood glucose monitoring (70). Nearly one in three adolescents stated that they changed their behavior as a result of information they obtained online or through apps (15). This illustrates that information seeking behavior practiced by individuals and the purposive attainment of information from designated carriers has turned out to be a critical element in embracing health behavior.

## *Health Information Seeking Behavior in the Arab Region and Qatar*

Regarding health information behavior among adolescents, the empirical evidences are fairly scarce not just from Qatar but also from other Arab states. One study in Palestine occupied territories revealed that among 99% Arab and Jewish adolescents in grade 7 to 12 who reported Internet access, 52% had sought online health information; 63% of them were Arab students and 48% were Jewish (16). The study identified gender and population-group differences in topics searched, with fitness and exercise most commonly sought across groups. It showed that skills with Internet, trustworthiness of online information and having conversation about the health problem with healthcare providers were associated with online search. The respondent cited their preference to obtain information from healthcare providers and the lack of interest in health-related issues as the most common reasons to refrain from searching for health information online (16).

In other Arab countries and Qatar, little or no information is available in particular about adolescents' health information seeking behavior and sources used. However, some evidence exists from studies about adults in the region as these studies sometimes include the age group 18-19 years (late adolescence) and their findings can be extrapolated to obtain a general idea about sources reported in the literature. For instance, in Qatar, where technology is widely accessible and utilized, with nearly 92% of the population using the Internet and 98% of households having Internet (71), 45% of Qatari youth Internet users aged 18 to 24 years reported health-related information seeking at least once daily (72). The most important sources for obtaining this information were websites (48%), personal communication (31%), whereas TV and social media constituted 6% and 5%, respectively (72). Another study by Choudhury et al. among Qataris aged 18 to 85 years (73) found that the Qatari population uses the

Internet widely for seeking health information (71%), followed by asking friends and family (38%), and primary healthcare centers (31%). The significant predictors of online search were female gender, high education level, and younger age.

Similarly, many studies reported that the vast majority of Arabs of all ages, youth and adults get health information online (74-77), and from interpersonal sources such as physicians and other healthcare providers (77, 78), family, friends, seniors and religious persons (78). These findings emphasize the dominance of online sources for health information, which facilitates anonymous searching and is characterized by accessibility and availability of information (75). The findings also underscore the importance of interpersonal sources in this region, which could be attributed to traditional values and cultural norms.

Worth to note that studies in the area of information seeking behavior were mainly cross-sectional that relied on teens' self-report, accordingly, were subject to bias as literature indicated (15, 16, 79). Teens might provide inaccurate information or might not remember the precise search behavior and the information they looked up (15, 79). Owing to social desirability, they might overreport their search behavior related to non-sensitive topics or underreport that related to sensitive ones for the fear of stigmatization, for example, if people knew what information they sought (80). Similarly, they might overreport or might not accurately recall the impact of information on their behavior (15), which in turn may bias the findings. On the other hand, literature suggested that the anonymity of investigations and the topic of health information seeking in general, which is not, overall, a sensitive issue may lessen the impact of reporting bias (16). Additionally, the pilot testing of the surveys should have alleviated these problems (79).

Currently, the existing literature from Arab countries including Qatar lacks studies related to the personal importance of the engagement in PA as a health topic for

adolescents. Furthermore, there is little information about how PA as a behavior is currently being shaped by, and may be modified by, health information seeking behaviors. Published literature on adolescents and health information sources from other countries identified this gap in knowledge, and stressed on the need to examine the link between change in specific health behaviors and these sources, the direction (positive or negative) and magnitude of such association (15, 81). Gaining insight about such link will be extremely valuable in designing intervention strategies aiming at promoting PA among this segment of population.

To our knowledge there is no study in Qatar to date that explored how existing health information sources are being utilized and in turn influence adolescents' attempts to become more physically active. The current study utilized data from a nationally representative survey of a large sample of Qatari adolescents to address these important gaps in our current knowledge on this topic.

## CHAPTER 3: OBJECTIVES AND RESEARCH QUESTION

### Aim of the Study

The aim of this study is to inform health promotion effort in Qatar by exploring health information seeking behavior and possible correlates of PA behavior change among Qatari adolescents. This could expand the opportunities for intervention programs targeting promoting PA to gain activity-associated health benefits and tackle the growing burden of NCDs in Qatar and other countries with a similar context.

### Study Objectives

The objectives of this study are:

1. To estimate the proportion of Qatari adolescents who attempted to change their behavior regarding fitness and exercise, and who recently participated in PA among Qatari teens health information seekers.
2. To assess the relationship between health information sources, age, gender, BMI, body shape satisfaction, SE, PSD, and reported traumatic events on attempts to change behavior related to fitness and exercise.
3. To explore the relationship between recent PA levels and the reported attempt to change behavior related to fitness and exercise.

### Research Questions

1. What is the proportion of Qatari adolescents who:
  - a. Sought health-related information through different sources?
  - b. Considered fitness and exercise as an important health topic?

- c. Attempted to change their fitness and exercise behavior, and those recently participated in PA, among Qatari adolescents health information seekers?
2. What is the influence of different types of health information sources on the attempt to change PA?
3. Generally, what are the predictors of behavior change related to fitness and exercise among Qatari adolescents' health information seekers?
4. Is there any association between the attempt to change fitness and exercise behavior and recent PA among those adolescents?

Hypothesis:

The hypotheses of the current study are:

1. Health information seeking is a common behavior among Qatari adolescents.
2. Online and interpersonal sources of information are the main sources used by adolescents and are significantly positively associated with their attempt to change fitness and exercise behavior.
3. Older adolescents, female gender, higher BMI, and low-level satisfaction with body shape are negatively associated with fitness and exercise behavior change.
4. Low levels of SE, high levels of PSD, and previous traumatic experiences exert negative influence on the attempt to change behavior related to fitness and exercise.
5. The attempt to change fitness and exercise behavior is positively associated with being physically active.

## CHAPTER 4: METHODOLOGY

### Study Design

This is a study involving the secondary analysis of data from a cross-sectional study. De-identified data was used, based on a cross-sectional survey involving Qatari adolescents. The survey was conducted by the Social and Economic Survey Research Institute (SESRI) - Qatar University from April 22 through May 17, 2017, under the project “QU-IRB 603-EA/16 (Qatari Adolescents: How do they use digital technologies for health information and health monitoring)”.

### Study Population

Female and male Qatari students aged 13 – 20 years in preparatory and secondary schools, from grades 8 to 12, participated in the survey. For the purpose of the current study, only students aged 13-19 years at the time of the survey were considered in our analysis.

The following inclusion and exclusion criteria, was applied by the primary study, and was, therefore, applicable through the current research:

Inclusion: female and male Qatari students ages 13 – 19 years old.

Exclusion: Non-Qataris, Qataris with intellectual disabilities, Qataris who do not speak or read Arabic, and those who refused to give consent/assent.

### The Sample Frame

SESRI developed the sampling frame based on a comprehensive list of all public and international schools in Qatar provided by the Supreme Council of Education. One hundred and fourteen schools with nearly 30000 Qatari students were eligible for the survey. A random systematic stratified sampling approach was done to select a representative sample of 43 schools, which yielded 35 schools as eight schools

denied participation, with a school response rate of 81.4%. Those schools were divided into relatively homogeneous strata in respect to the distribution of genders and grades. Then, students were randomly selected within each stratum via a two-stage sampling process. In the first stage, the research team selected schools with a probability proportionate to their size, and in the next stage, classes in each school were randomly selected.

Totally, 1698 students in those classes were supposed to take part in the study, but during the survey time 374 were absent, and 106 rejected participation. From the remaining 1218 students who participated, 1146 completed the interview in the 35 schools, among them 1115 Qataris. This yielded a response rate of 67.5% (1146/1698) and a participation rate of 94.1% (1146/1218). The processes of sampling design were illustrated in Figure 4.

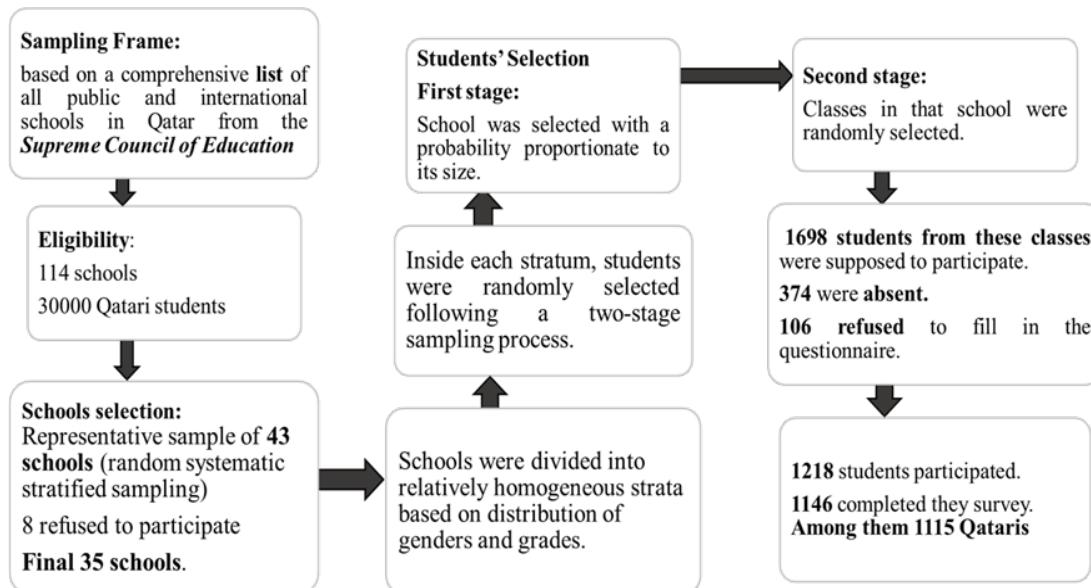


Figure 4. Sampling design process.

## Survey Design

The questionnaire use for the survey was adapted from the 2015 U.S. study “Teens, Health, and Technology” (82), and was prepared in many steps. The survey questionnaire covered the following categories of questions: sources of health information and use of health-monitoring tools, and background information about the respondents.

The questionnaire for the sources of health information and use of health-monitoring tools included: use of communication channels of all kinds for health information, trust in these sources/satisfaction with them, criteria for selecting sources of health information, reasons for/purposes of going online for health information, ways of finding health information online, encountering specific health campaigns, encountering problematic content online, the role of health classes at school, willingness to post health-related questions online, use and usefulness of health-related apps, games and health trackers, and perceived changes in one’s health behavior due to health information sources and tools.

The questions regarding background information about the respondents covered the following aspects: health issues that Qatari teens find personally important, perceptions of which health issues one’s friends find important, satisfaction with one’s body, PA and reasons for being active, eating behaviors, traumatic experiences, and perceived SE.

A questionnaire draft was developed and translated into Arabic. Twenty-four Cognitive interviews (face to face with open ended questions) were conducted with students selected from across the target age and grade range to test the validity of the questions. Then, a revised version of the questionnaire was constructed, programmed, and tested in a pilot study using a computer-aided self-administered interview. Thirty-

four pretest interviews were completed by two classes at two schools from grades 8 and 12, the respondents having been selected to represent age groups and gender distribution of the target population. Finally, the questionnaire was adjusted and shortened to take about 30 minutes to complete. The process of survey design was illustrated in Figure 5.

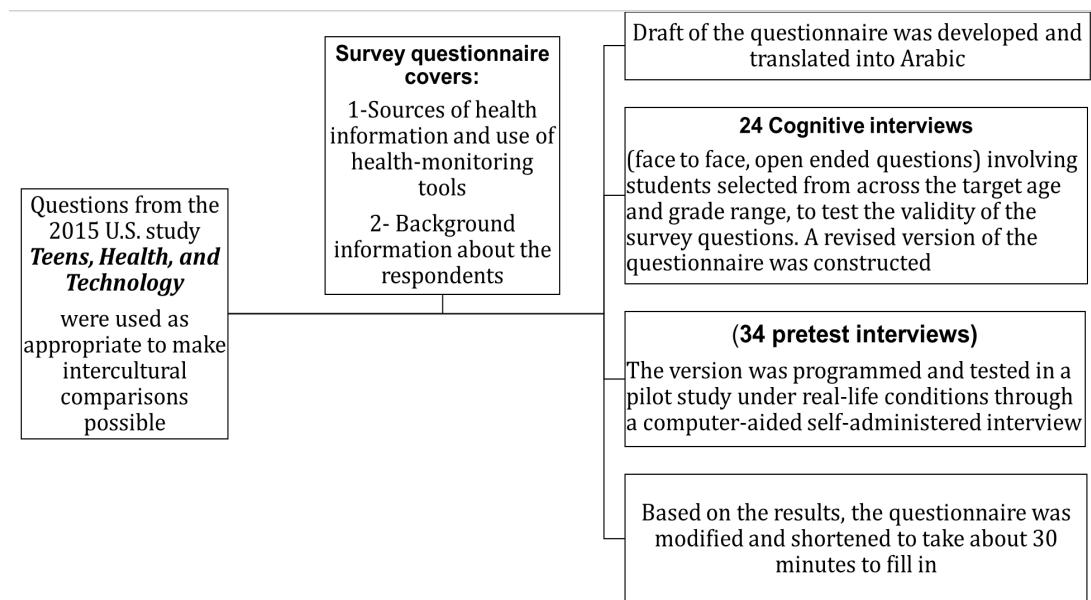


Figure 5. Process of survey design

## Data Collection

### *Survey Administration*

The data collection was carried out at the designated time and schools. The survey team provided the necessary information to the subjects prior to participation as per the protocol and consent was obtained from parents or students aged 18 years and above, while assent form was obtained from students under 18 years of age.

BLAISE platform(83) was used to program the survey, which was administered via laptop computers. Students were provided with the laptops and instructions to complete the survey.

#### *Validity and Reliability*

Validity and reliability have been assessed and audited for the survey questionnaire, tools used and the resulted data set. The “Teens & Digital Health Survey” consisted of 57 items. Procedures used to generate the survey were outlined in detail above. As was mentioned, the survey questionnaire was validated with 24 cognitive interviews and was pilot tested with 34 pretest interviews for validity and reliability. The source of the data was designed for research purposes. Full methodology by which the data collected and processed was well documented as illustrated above.

The researcher learned about the dataset, how it was collected and organized, and read the questionnaire to have an idea about wording and the skip pattern used. The researcher was aware about the sampling design used, and appropriately applied sample weights in the analysis. The researcher studied missing data patterns and handled the missing observations appropriately.

#### *Study Variables*

Dependent Variables: a) Attempt to change behavior regarding fitness and exercise as a result of finding health information (attempt to change PA), which was measured by the following question:

“Have the changes you just mentioned been related to any of the following health topics?” (list of topics among them fitness and exercise, with yes/no answer options, Q12a; Appendix A).

b) Engaging in PA in the past 30 days (recent PA), which was measured by the question: “In the past 30 days, how often have you participated in physical activities, such as playing sports, running, working out, taking a dance class, or doing yoga?” list of options included several times a day, once a day, once or more a week, once or more a month and never (Q50 Appendix A). This was categorized into “active” by combining answer options “several times a day” and “once a day”, and “inactive or insufficiently physically active” by combining the rest of the options based on the WHO recommendations of daily PA. Categorization based on meeting the current recommendations has been used in other studies and in recognized WHO surveys (84, 85), and was found to be statistically reliable producing results that inform the current methods to monitor levels of PA (84).

The study used the term “fitness and exercise” as an equivalent of PA. Besides, it considered attempt to change PA behavior with inactivity or insufficient recent PA as a surrogate of pre-action stage in TTM, and recent PA as a surrogate of being in action stage.

Main Independent Variable: Health information sources used to attempt to change health behavior. It was measured by the following two questions: “People get information about health from many different sources. For each of the following sources please indicate whether you have used them at all to get information about health topics” (list of sources, answer options were yes and no , Q7; Appendix A), and “Irrespective of whether you succeeded or not, have you ever tried to change your behavior because of any of the health-related information you’ve found from each of the following sources?” (list of the same sources with yes/no answer options, Q11; Appendix A). Based on these two questions, four sources of health information were constructed:

- a) Interpersonal sources: guardians, doctors/nurses, health classes, friends and brothers or sisters). As health classes were basically provided by teachers, we included them in this category, and were referred to hereafter as teachers in the rest of this document. Guardians were referred to as parents.
- b) Traditional sources: TV news, other TV shows, Ads on TV, newspaper articles (print version), Ads in newspaper, magazine articles (print version), Ads in magazine, radio, Ads on radio, books, leaflets/pamphlets from a hospital, clinic or medical practice, and billboards.
- c) Online sources: newspaper articles (online version), magazine articles (online version), Ads online, Wikipedia, a medical website, Sahatak Awalan website (Qatari website), and online forums about health information.
- d) Social media sources: Facebook, Snapchat, Twitter, Instagram, You Tube, and other social networking site (Reddit, Tumblr, other). A participant was classified as a source category user if he or she reported using any individual source within the same category, and not a user if he or she answered no to all elements within that category. Similarly, a respondent was classified as “attempt behavior change” if he or she reported attempting to do so due to information from any individual source within the same category, and classified as “not attempt behavior change” if he or she answered no to all elements within that category. Finally, each variable of the four sources of health information had two levels of exposure: using information from the source to attempt behavior change (Yes) and did not use information from the source to attempt behavior change (No).

Other Covariates: Participants were asked about their age, gender, height and weight, and their school grade (Appendix A). Age was categorized into early

adolescence (13-15 years) and late adolescence (16-19 years) (86). School grade was categorized into junior high school (grades 8-9), and senior high school (grades 10-12).

Self-reported height and weight were used to calculate BMI based on international WHO BMI-for-age reference standards using the following BMI z-score cut-offs: severe thinness (z-score  $<-3$ ), thinness (z-score  $\geq -3$  to  $<-2$ ), normal (z-score  $\geq -2$  to  $<1$ ), overweight (BMI z-score  $\geq +1$  to  $<+2$ , equivalent to BMI 25 kg/m<sup>2</sup> at 19 years) and obese (BMI z-score  $>+2$ , equivalent to BMI 30 kg/m<sup>2</sup> at 19 years) (87). BMI was further categorized into underweight (combining thinness and severe thinness), normal weight, overweight, and obese accordingly (87). Body shape satisfaction was assessed by question Q48 “Please mark whether you agree or disagree with each of the following statements: 1) I am satisfied with the shape of my body” using a 4-point rating scale: strongly disagree, somewhat disagree, somewhat agree, and strongly agree (Appendix A). This was categorized into satisfied combining options “strongly agree” and “somewhat agree” and dissatisfied combining the other two options.

SE was measured by question Q44 (Appendix A) using the “New General Self-Efficacy Scale”, a validated measure of a person’s overall mastery sense (88), that has been previously used among Arabic-speaking population (89). It consists of eight items, with five possible response options (‘Strongly agree’, ‘Agree’, ‘Neither agree nor disagree’, ‘Disagree’, ‘Strongly disagree’). Each response has a score, with a score of five allocated to ‘Strongly Agree’, and a score of one assigned to ‘Strongly Disagree’, and so on. All responses were added to a sum score that ranges from 8 to 40. The scores were then categorized into low and high by median split (90).

PSD was measured by question Q52 (Appendix A) using “Kessler Psychological Distress Scale” (K6), a well-validated tool (91) that has been used to measure non-specific PSD across various settings and populations including

adolescents (92) and among Arabic-speakers (93). K6 consists of six items, and each item is scored from zero (None of the time) to four (All of the time). The scores were summed, with a range from zero to 24. The scores were then grouped into tertials and categorized into low, moderate, and high based on consultation with an expert in the field referring to absence of empirical distributions of a particular reference population for Qatari adolescents.

Traumatic experience was assessed by question Q53: “Please tell me if any of these things have happened”. Options included “hospitalized, major upheaval between guardians (divorce, separation), death of a very close friend or a family member, scared, sent away, beaten up and abused by someone close like a family member or a friend” (Appendix A). This variable had two levels of exposure: yes, if a participant answered yes to any of these events, and no otherwise. Additionally, two other variables were constructed from the same question. The first one was maltreatment, including three events: sent away, beaten up and abused. The other was victimization, including beaten up and abused. These variables were evaluated separately during the analysis. This step was done based on a recommendation from an expert in the field, citing that these two variables are major events and may have a profound impact on the reported behavior as compared to the overall trauma events.

Importance of PA was measured by question Q2 (Appendix A): “Now please tell us how important each of the following health topics are to you personally?”. List of options included fitness and exercise and responses provided were “not at all important, not too important, somewhat important and very important”. The answers “somewhat important and very important” were categorized as important and the other two as not important.

Finally, importance of PA to friends was measured by Q3 (Appendix A): “How much do your friends care about each of the following health topics?”. Options included fitness and exercise, and answers were: “not at all important, only a little, somewhat, and a lot” which were grouped into two categories: “not important” by combining the first two options, and “important” by combining the other two. The categorization of all variables was based on the literature and/or distribution of the variables in addition to face validity. The steps for constructing the variables were verified by consulting the survey clinic in SESRI. Operationalization of all variables was summarized in Table 1.

All covariates were selected from the literature as indicated in the review. Variables in the study were examined for possible confounding and modifying effects on the association between main dependent and independent variables of interest.

### Statistical Analysis

**Post-Survey Adjustment (Data Weighting):** For the analysis of the data, the sample design was considered to ensure that statistical estimates are unbiased and efficient. The Statistical unit in SESRI carried out the post-survey adjustment by creating a weighting variable for the selection probability of each respondent and for non-responses. To align the results with population estimates, the weights were calibrated to adjust the weights in the sample so that the proportions of the adjusted weights for certain characteristics (e.g., proportion of students by grades) agree with the corresponding proportions of the population. For all statistical testing in the current study, normalized weights were used to account for the survey's sample design.

Normalized weights set the weights so the sample size (N) in the weighted data approximates that in the unweighted data to better estimate the error and to produce more closely correct statistical significance tests (94).

Adolescents' characteristics, and possible correlates were analyzed among participants. Continuous variables were presented as mean  $\pm$  Standard Deviation, and categorical variables were reported as a frequency and percentage of the total (unweighted and weighted). Continuous variables were categorized for further analysis when required. Distributional assumptions and multicollinearity were also assessed. Characteristics of the participants were compared using appropriate parametric or non-parametric tests for continuous data. For categorical data, the design-based Chi-square ( $\chi^2$ ) test was used as appropriate. Internal consistency reliability of NGSE and K6-PSD scales were assessed using Cronbach's alpha.

The association between independent and dependent variables in our study was examined using univariate and multivariable logistic regression models to find variables that are independent predictors for the attempt to change PA behavior after adjusting for other variables. Crude and adjusted Odds Ratios (OR), with accompanying 95% confidence intervals, were reported.

The estimated average marginal effects, also known as risk differences, were derived from the results of logistic regression model, to have a sense of the absolute effect size reflecting the difference in the probability of the outcome associated with a change in the explanatory variable, adjusting for all the other covariates.

Analysis was carried out by STATA software [version 14.2; Stata Corp, College Station, TX] (95). STATA's survey procedures were used to account for the sampling design, including weighting (96). All the statistical analyses were two-sided, with P value less than 0.05 considered significant.

Table 1. Operationalization of The Study Variables.

Variables	Measures
Dependent Variable:	
1- Attempt to change PA	Categorized (Yes/No)
2- PA (past 30 days)	Categorized (Active/ Inactive)
Main independent variable:	
Source of health information	List: % of each item.  Categorized (interpersonal, traditional, online, and social media sources)
Covariates:	
Age	In years (Categorized: early adolescents (13-15years), late adolescents (16-19years))
Gender	Categorized (Male/Female: 0/1)
Height	In centimeters
Weight	In kilograms  Body mass index (BMI): Calculated using international WHO BMI-for-age reference standards, Categorized (Underweight, Normal weight, Overweight, Obese)
School grade	Categorized (junior high school, senior high school)
Importance of PA	Categorized (important, not important)
Importance of PA to friends	Categorized (important, not important)
Self-efficacy	New General Self-Efficacy Scale  (Scores categorized low and high at the median value of 27)
Psychological distress	Kessler Psychological Distress Scale (K6) (Scores categorized into tertile: low (0-8), moderate (9-16), and high (17-24))
Traumatic event experience  (hospitalized, divorce, death, scared, sent away, beaten up, abused)	Categorized: Any traumatic event: Yes  No traumatic event: No
Maltreatment (sent away, beaten up, abused)	Categorized Yes/ No
Victimization (beaten up, abused)	Categorized Yes/ No
Body shape satisfaction	Categorized Satisfied/Not satisfied

## Model building

To investigate the association between our outcome and the covariates, multiple logistic regression with purposeful selection method, following Hosmer and Lemeshow's model building procedures (97), was used to establish a final model with statistically significant variables ( $p$ -value  $<0.05$ ). Logistic regression was used because the dependent variable was binary. All variables listed above were included as categorical variables. The main independent variable, four sources of health information used to attempt behavior change, was always kept in the model during the process of model building.

All the following steps of model building were based on recommendations by Hosmer and Lemeshow (97). To begin, univariate logistic regression was used to identify important covariates and explore unadjusted association (OR) between variables and the outcome. The significance was assessed by Wald test, and the adjusted Wald test  $p$ -value if the categorical variable had more than two levels.

Next, all variables whose  $p$ -value  $< 0.25$ , along with the variables known from literature to be of importance, were selected and the multivariable model was fitted (the initial full model). The significance of each chosen variable was assessed using its Wald statistic  $p$ -value, and the contribution of variables to the model were checked by the adjusted Wald test. Variables that did not make contribution to the model (with  $p$ -value  $>0.05$ ) were eliminated and a new smaller model was fitted. As we had different levels of missingness, the analysis was performed so that the samples used to fit the initial and new smaller models were the same.

Following that, the magnitude of the resulting estimated beta coefficients of the variables remaining in the reduced model were compared to that in the bigger one to check whether the covariates removed were confounders. If a change in betas exceeded

20%, the confounding variables that provided important adjustment of the effect of the remaining variables were added back to the model one at a time. These steps of adding, deleting variables and model fitting, refitting and checking continued until all variables excluded were insignificant, while those remaining in the model were statistically and/or practically important. Before moving to the next step, we considered several possible models by recategorizing the variables or using their continuous form to obtain a model that we feel comprises the essential variables.

After that, the resulted main effects model was checked for identification of the significant interaction terms among the variables in the model by adding interactions one at a time to the model. Their significance and contribution to the fit of the model were assessed (Wald statistics) to keep only significant interactions ( $p$ -value  $<0.05$ ). All possible interactions were explored among the main effects. The final decision as to include/exclude an interaction term was based on statistical as well as practical perspectives.

The Calibration and discrimination of the resulting final model were then assessed by summary measures of goodness of fit; Archer and Lemeshow's design adjusted test (98), classification tables and Receiver Operating Characteristics ROC curve.

In addition, specification error test and test for multicollinearity using measures of tolerance and variance inflation factor (VIF) were used. STATA commands used in the analysis were verified by consulting the “UCLA Institute for Digital Research and Education” Statistical Consulting Web Resources (99), and the STATA online forum “Statalist”.

## Multiple imputation

According to Hosmer and Lemeshow (97), missingness is an issue in complex sample surveys in which each participant or observation is carrying a unique statistical weight for the number of the population elements represented by him. If a measurement is missing for that participant even in one variable from those included in multivariable analysis, the participant will be removed, and the statistical weights sum of those remaining will be different from the size of the population we wish to make inference on. Since our data had missing values, ignoring this issue may have biased our results. We checked the percentage and pattern of missing values across variables used for our analysis. We assumed that data is missing at random (MAR), though this assumption is empirically unverifiable. The information we obtained about the data and data collection process did not indicate that the missingness may depend on the unobserved values. Accordingly, multiple imputation by chained equations (MICE) was performed to impute the missing values using “mi” commands in STATA. Continuous, binary, and categorical variables were imputed using linear regression, predictive mean matching (5 nearest neighbors), logistic regression, multinomial logistic regression, and ordered logistic regression, as appropriate. Since age was the only complete variable, it was used as an auxiliary variable. Twenty imputations were created, resulting in 20 “complete” data sets. Then imputation diagnostics were performed to check the imputation model, and analysis model was fitted again using imputed data. The process of imputation was carried out following the guidelines by Newman (100), STATA manual (96) and web resources, and STATA online forum “Statalist”.

## Ethical Approval

The study obtained approval from the Institutional Review Board (IRB) of Qatar University (Ref No: QU-IRB 850-E/17). Formal data release approval was obtained from SESRI as part of the requirements for ethical approval.

## Timeline and Resources

The activities conducted in this project were indicated in Table 2, with the corresponding months.

## Budget

This research was conducted within the “Thesis Course-PUBH 695” based on secondary data, with no allocated budget.

Table 2. Timelines.

Task	Month									
	Sep 2017	Oct 2017	Nov 2017	Dec 2017	Nov 2018	Jan 2019	Feb 2019	March 2019	April 2019	
Literature review	X	X	X	X						
CITI certificate		X								
SESRI approval			X							
Qatar University IRB				X						
Renewal of QU IRB						X				
Data analysis							X	X		
Writing up								X	X	
Final thesis submission									X	

## CHAPTER 5: RESULTS

For the purpose of this study, Qatari adolescents who reported using any source for searching health information were considered the base of the analysis. From the 1146 individuals who completed the survey, 1115 were Qataris, and eight participants didn't report their nationality. From the Qatari nations, 1100 were adolescents aged between 13-19 years old. One thousand eighty-nine participants reported using any source for health information seeking, while 34 were missing. Accordingly, our subpopulation sample of Qatari adolescents who reported using any source mentioned in the survey to search for health information was made up finally with 1050 individuals (from 1100 Qatari adolescents, 20 did not use any source and 30 had missing user status). They represented 1059 normalized weighted N in the sample, and 27394 individuals in the population. This subgroup analysis was conducted in STATA using the entire data set specifying the “subpop” option. All the reported numbers and percentages are weighted, unless otherwise indicated.

All variables in the data except age had missing values. The level of missingness varied from as low as 0.3% in the variable “gender” to as high as 20.62% in the variable “use Facebook” in the original variables. Examining the missing data pattern by relevant STATA commands showed that missingness was scattered, with no specific pattern. Skip patterns were also employed in some questions in the survey and were considered during the analysis and imputation.

### Characteristics of the Participants

Tables 3, 4 and 5 presented the weighted and unweighted descriptive statistics for variables included in the analysis with the level of missingness in each variable. The mean age of our subpopulation sample was 15.72 (SD 1.43) years (weighted mean). Half of the respondents (55%) were between 16-19 years old (late adolescents), and

nearly half (52%) were females (Table 3). Based on the WHO criteria, nearly 44% of our teens were in normal weight (nearly 52% females versus 36% males), whereas around one fifth were overweight (approximately 18 % females versus 20% males) (Figure 6). The point prevalence of obesity in our sample was about 18%, which was also higher in males (25%) relative to females (12%) (Figure 6), and the combined prevalence of overweight and obesity was almost 37% (Table 3).

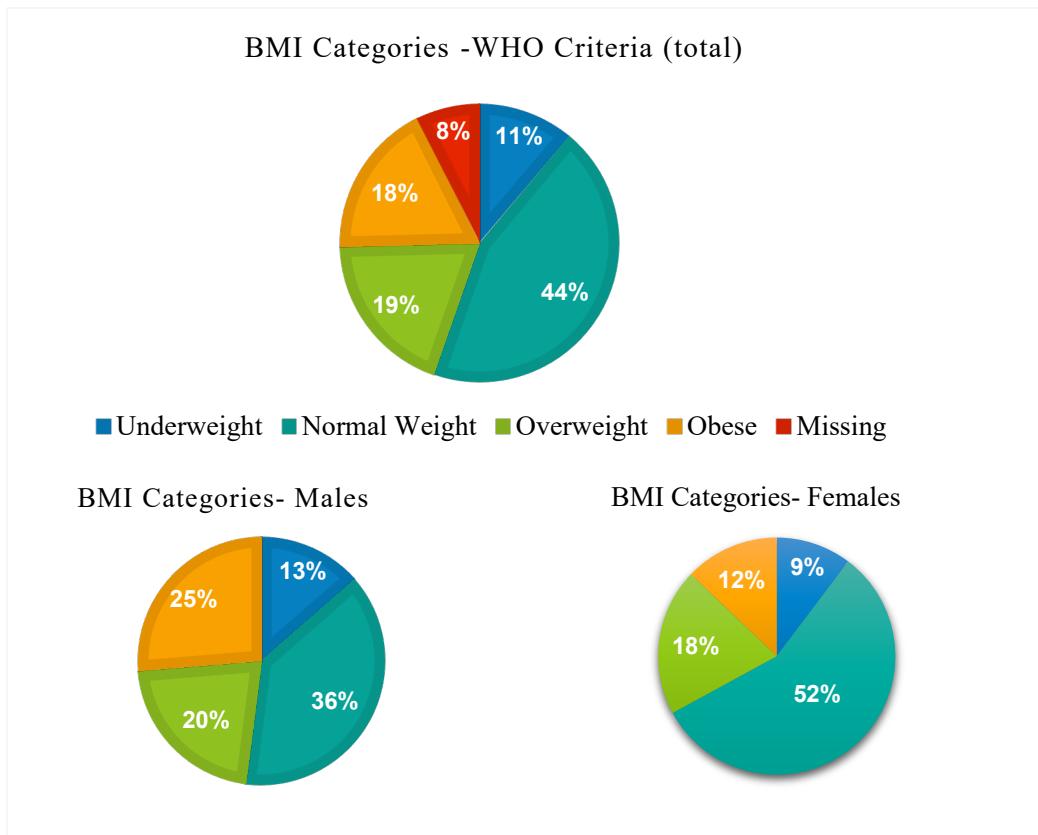


Figure 6. Estimated prevalence of overweight and obesity (body mass index from self-reported height and weight: total and by gender- weighted percentages).

About 89% of Qatari adolescents said PA is somewhat to very important to them personally, and 78% reported it is somewhat to a lot important for their friends (Table 4).

Most adolescents (59%) had moderate to high PSD, and 47% were high self-efficacious. Cronbach's alpha reliability for the Kessler K6-PSD scale demonstrated good internal consistency with value of 0.91 and the average inter-item covariance was 1.25. The scale had a Skewness value of 0.16 and Kurtosis of 1.94. For NGSE scale, Skewness = -0.25, Kurtosis=1.61, and the scale demonstrated good internal consistency with Cronbach's alpha value of 0.98 and average inter-item covariance of 2.09.

A greater proportion of the respondents (79%) indicated they suffered from traumatic events (Table 4). Particularly, half of the students surveyed reported being victims of maltreatment, of them 39% were abused and 35% were beaten up by someone close to them, like a family member or a friend. Nearly 45% of adolescents expressed their dissatisfaction with their body shape (Table 4).

Table 3. General Characteristics of the Participants.

Characteristics	Unweighted N	Unweighted %	Weighted N	Weighted %
	1050		1058.7	
<b>Age in Years</b>				
Mean (SD)	15.80 (1.43)		15.72 (1.43)	
13	49	4.67%	52.2	4.93%
14	169	16.10%	183.4	17.32%
15	218	20.76%	241.1	22.78%
16	272	25.90%	260.7	24.63%
17	221	21.05%	202.5	19.13%
18	90	8.57%	91.0	8.60%
19	31	2.95%	27.8	2.63%
Missing	0			
<b>Age Categories</b>				
Early Adolescence(13-15ys)	436	41.52%	476.6	45.02%
Late Adolescence (16-19ys)	614	58.48%	582	54.98%
<b>Gender</b>				
Female	569	54.19%	546.8	51.65%
Male	477	45.43%	508.7	48.05%
Missing	4	0.38%	3.2	0.30%
<b>Grade</b>				
Grade 8	191	18.19%	194.7	18.39%
Grade 9	184	17.52%	180.4	17.04%
Grade 10	268	25.52%	302.5	28.58%
Grade 11	215	20.48%	208.5	19.69%
Grade 12	159	15.14%	141.8	13.39%
Missing	33	3.14%	30.8	2.91%

(Continued)

Table 3. (Continued).

Characteristics	Unweighted N	Unweighted %	Weighted N	Weighted %
	1050	%	1058.7	%
<b>Grade Categories</b>				
Junior Level (8-9)	375	36.87 %	375.1	35.43%
Senior Level (10-12)	642	63.13 %	652.8	61.66%
Missing	33	3.14%	30.8	2.91%
<b>Height</b>				
Mean (SD)	162.31(10.57)		62.43(10.7)	
Missing	43	4.10%	44.9	4.24%
<b>Weight</b>				
Mean (SD)	63.96 (21.60)		64.69 (21.49)	
Missing	47	4.48%	53.0	5.01%
<b>BMI</b>				
Mean (SD)	24.22 (7.38)		24.61(8.44)	
Missing	72	6.86%	78.1	7.38%
<b>BMI-WHO Criteria</b>				
Underweight	122	11.62%	117	11.05%
Normal Weight	476	45.33%	469	44.30%
Overweight	208	19.81%	203.7	19.24%
Obese	172	16.38%	190.9	18.03%
Missing	72	6.86%	78.1	7.38%

SD: Standard Deviation; BMI: Body Mass Index; WHO: World Health Organization; PA: Physical Activity.

Table 4. Psychosocial Characteristics of the Participants.

Characteristics	Unweighted N	Unweighted %	Weighted N	Weighted %
	1050		1058.7	
<b>Importance of PA to You</b>				
Not at all important	36	3.43%	38.7	3.65%
Not too important	57	5.43%	62.3	5.89%
Somewhat important	307	29.24%	322.5	30.46%
Very important	632	60.19%	618.1	58.38%
Missing	18	1.71%	17.1	1.62%
<b>Importance of PA to Friend</b>				
Not at all	59	5.62%	64.0	6.04%
Only a little	79	7.52%	77.1	7.28%
Somewhat	280	26.67%	287.9	27.19%
A lot	536	51.05%	533.3	50.38%
Missing	96	9.14%	96.4	9.11%
<b>NGSE Scale</b>				
Mean (SD)	24.90 (11.68)		24.86(11.56)	
Missing	55	5.24%	57.9	5.47%
<b>NGSE Category</b>				
Low	477	45.43%	481.9	45.52%
High	508	49.33%	518.9	49.01%
Missing	55	5.24%	57.9	5.47%
<b>K6-Scale</b>				
Mean (SD)	12.21 (7.11)		11.99 (7.15)	
Missing	59	5.62%	59.1	5.58%
<b>Psychological Distress</b>				
Low	351	35.42%	371.4	35.09%
Moderate	325	32.80%	313.9	29.65%
High	315	31.79%	314.2	29.68%
Missing	59	5.62%	59.1	5.58%

(Continued)

Table 4. (Continued).

Characteristics	Unweighted N	Unweighted %	Weighted N	Weighted %
	1050	%	1058.7	%
<b>Trauma Experience</b>				
Yes	834	79.43%	838.8	79.23%
No	165	15.71%	167	15.78%
Missing	51	4.86%	52.9	4.99%
<b>Sent Away</b>				
Yes	232	22.10%	228.6	21.6%
No	715	68.10%	724.4	68.43%
Missing	103	9.81%	105.6	9.98%
<b>Beaten Up</b>				
Yes	366	34.86%	365.6	34.54%
No	557	53.05%	565.3	53.4%
Missing	127	12.10%	127.7	12.06%
<b>Abused</b>				
Yes	405	38.57	414	39.10%
No	482	45.90	474.1	44.78%
Missing	163	15.52	170.7	16.12%
<b>Body Shape Satisfaction</b>				
Strongly disagree	262	24.95%	265.6	25.08%
Somewhat disagree	208	19.81%	213	20.12%
Somewhat agree	219	20.86%	218.5	20.64%
Strongly Agree	276	26.29%	275.1	25.99%
Missing	85	8.1%	86.5	8.17%

SD: Standard Deviation; K6: Kessler Psychological Distress Scale-6; NGSE: New General Self-Efficacy; PA: Physical Activity

With respect to health-related information sources used (Figure 7 presented detailed individual sources), nearly all respondents reported using interpersonal sources to search health information followed by traditional sources (93%), social media (92 %) and online (88%) (Table 5). The majority (90%) of respondents using any of these sources said they attempted to change their behavior.

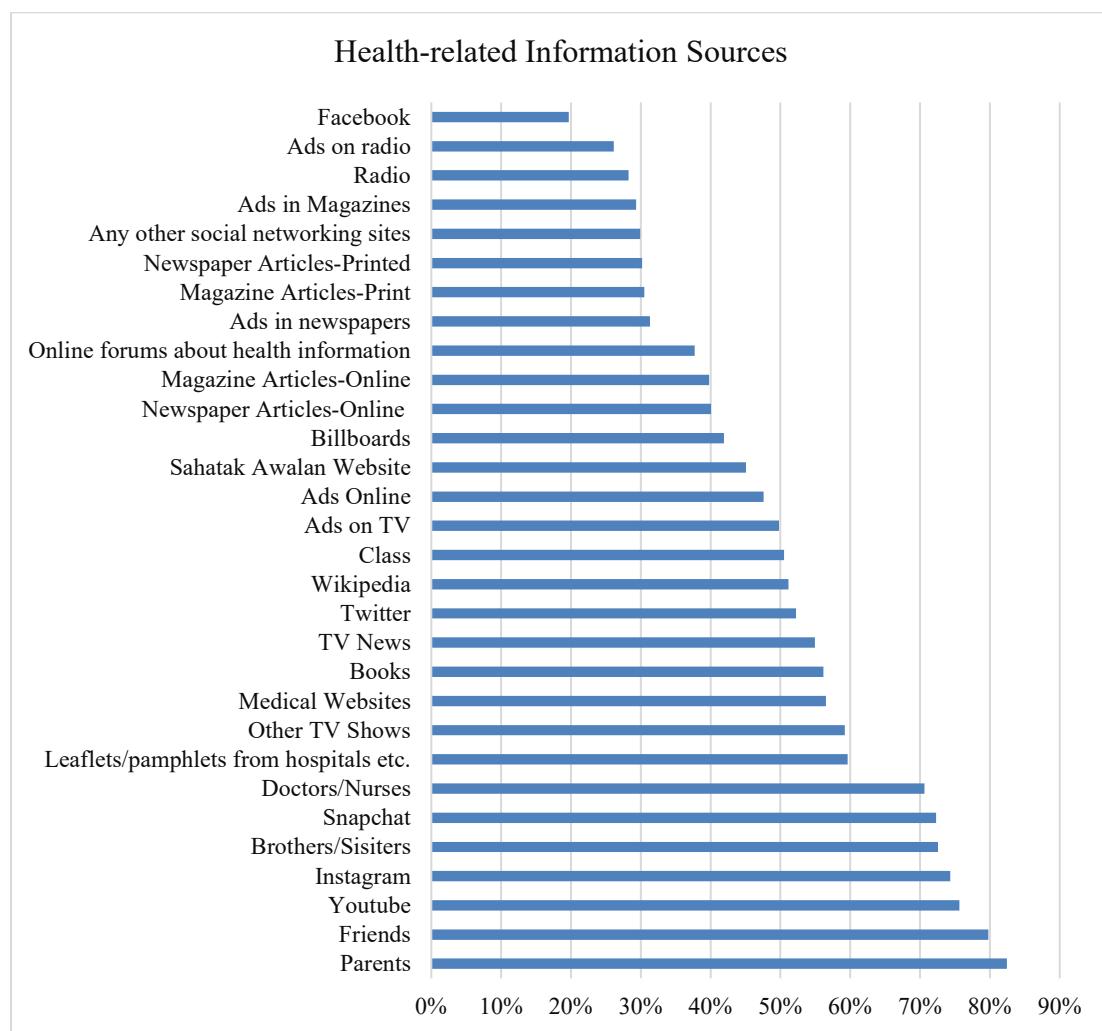


Figure 7. Health-related information sources used by Qatari adolescents (weighted percentages).

When using interpersonal sources, approximately 86% (83% from the total) reported attempting to change their health behavior as a result of information they got from these sources (Figure 8). Of those using traditional sources, nearly 76% (71% from the total) tried to change (Figure 8). Similarly, obtaining information via social and online sources caused 74% and 72% of adolescents (69% and 63% of the total), respectively, to attempt to modify their behavior among those who used these sources (Table 5) (Figure 8).

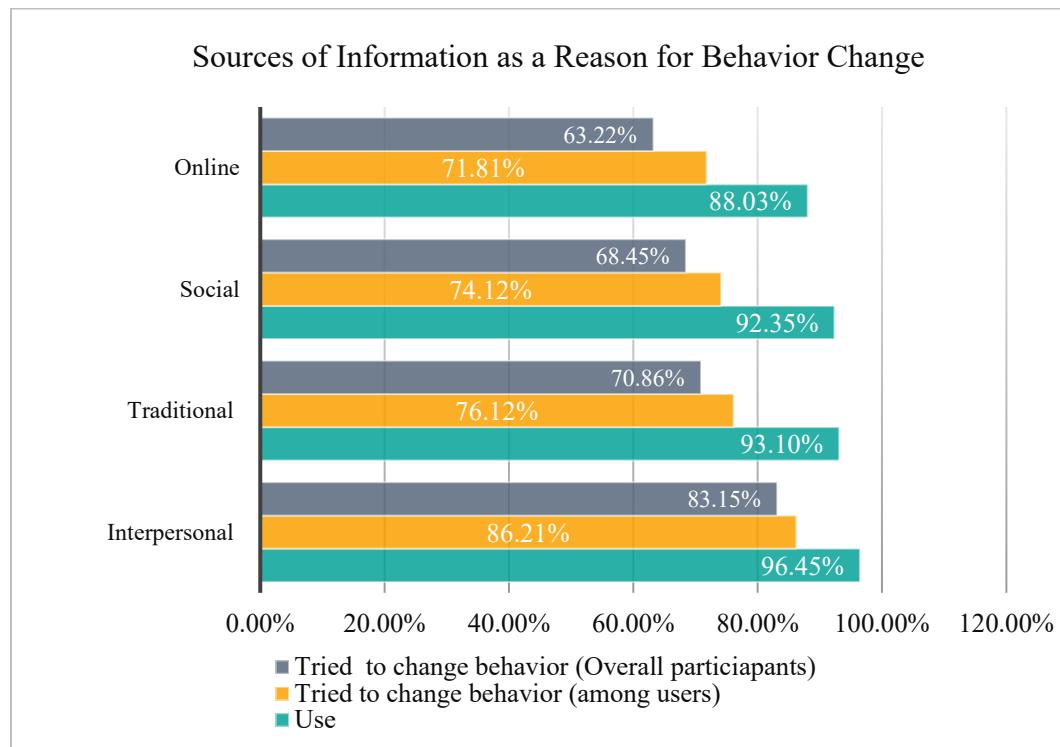


Figure 8. Sources of information as a reason for behavior change.

Among respondents who said they attempt to change their behavior due to any source used ( $N = 950$ ), approximately 76% indicated that the change was related to PA behavior. From the total ( $N=1059$ ), 68% attempt to change PA behavior ((72%

females versus 65% males) (Figure 9), 19% tried changing other behaviors and 8% did not try to change any health behavior (Table 5). In order to simplify the analysis in the regression model and because PA change was the main focus of this study, the latter two were combined into one category that represented “no attempt to change PA behavior” in our outcome variable.

Nearly 65%, 55%, 51% and 54% from all respondents attempted to change PA behavior on the basis of information found via interpersonal, traditional, online, and social media sources, respectively. A total of 484 (46%) Qatari adolescents reported they were physically active in the past month before the survey (38% females versus 55% males) (Figure 9).

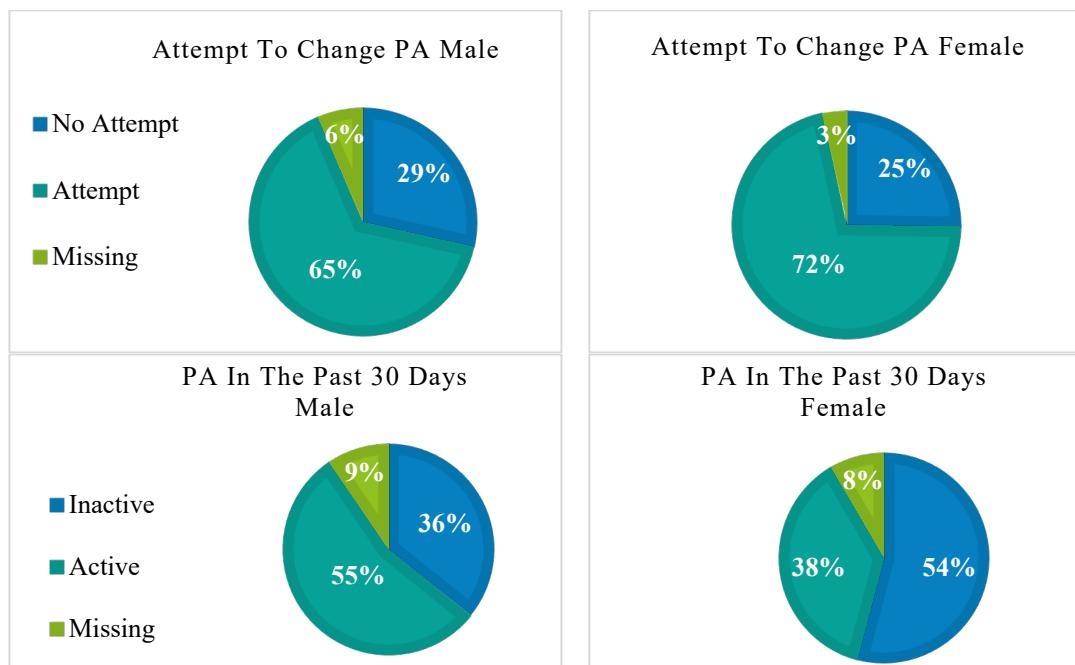


Figure 9. Attempt to change physical activity and physical activity in the past 30 days by gender.

Table 5. Characteristics According to Sources of Health-related Information and PA.

Characteristics	Unweighted N	Unweighted %	Weighted N	Weighted %
	1050	%	1058.7	%
<b>Sources of Health Information</b>				
Interpersonal				
No	26	2.48%	28.2	2.67%
Yes	1014	96.57%	1021.1	96.45%
Missing	10	0.95%	9.4	0.88%
Traditional				
No	61	5.81%	64.32	6.08%
Yes	979	93.24%	985.6	93.10%
Missing	10	0.95%	8.717	0.82%
Online				
No	114	10.86%	113.2	10.69%
Yes	920	87.62%	931.9	88.03%
Missing	16	1.52%	13.56	1.28%
Social Media				
No	66	6.29%	66.8	6.31%
Yes	969	92.29%	977.6	92.35%
Missing	15	1.43%	14.23	1.34%
<b>Sources Used to Attempt Behavior Change:</b>				
Interpersonal				
Yes	882	84%	880.3	83.15%
No	103	9.81%	110.1	10.4%
Missing	65	6.45%	68.3	6.45 %
Traditional				
Yes	754	71.81%	750.2	70.86%
No	196	18.67%	208.9	19.73%
Missing	100	9.52 %	99.53	9.4%

(Continued)

Table 5. (Continued).

Characteristics	Unweighted N	Unweighted %	Weighted N	Weighted %
	1050		1058.7	
<b>Online</b>				
Yes	652	62.10%	669.2	63.22%
No	247	23.52%	241	22.76%
Missing	151	14.38%	148.5	14.02%
<b>Social Media</b>				
Yes	714	68%	724.6	68.45%
No	234	22.29%	230.6	21.78%
Missing	102	9.71%	103.4	9.77%
<b>Attempt Behavior Change</b>				
Yes	946	90.09%	949.8	89.72
PA	733	77.48%	724.2	68.41
Other	184	19.45%	199.2	18.81
Behavior	29	2.76%	26.4	2.49
Missing	81	7.72%	84.2	7.96
No	23	2.19%	24.7	2.33
<b>Missing</b>				
<b>PA in the Past 30 Days</b>				
Several times a day	331	31.52%	321.2	30.34%
Once a day	170	16.19%	162.6	15.36%
Once or more a week	185	17.62%	188.7	17.82%
Once or more a month	109	10.38%	116.5	11.00%
Never	159	15.14%	174.6	16.49%
Missing	96	9.14%	95.2	8.99%

PA: Physical Activity

Comparing those who attempted to change PA behavior with those who did not (Table 6), adolescents who attempted were mostly in late adolescence stage and senior high school. A slightly higher percentage of them were female. Significantly higher percentage of teens acknowledged the importance of PA, suffered from traumatic events, especially abuse, and used different sources of health information to attempt behavior change. Higher proportion of those who had higher SE, moderate to high PSD, and were satisfied with their body shape attempted PA behavior change (Table 6).

Table 6. Characteristics by the Attempt to Change PA Behavior (N=1058.7).

Variables	No Attempt N (%) *	Attempt N (%) * Value**	P
	283.4 (26.77%)	724.2 (68.41%)	
Gender			
Female	137.8 (25.2%)	390.7 (71.45%)	0.269
Male	145.0 (28.5%)	331.0 (65.06%)	
Age			0.004
Early Adolescence (13-15ys)	152.4 (31.97%)	304.1 (63.8%)	
Late Adolescence (16-19ys)	131.0 (22.51%)	420.1 (72.19%)	
School Grade			0.007
Junior Level (8-9)	120.9 (32.24%)	240.2 (64.05%)	
Senior Level (10-12)	152.5 (23.37%)	465.0 (71.23%)	
BMI			0.963
Underweight	30.9 (26.42%)	83.0 (70.95%)	
Normal	123.6 (26.36%)	320.6 (68.36%)	
Overweight/Obese	101.7 (25.76%)	274.4 (69.54%)	
Importance of PA to You			0.009
Not at all/ Not too important	38.7 (38.33%)	56.5 (55.96%)	
Somewhat/ Very important	237.4 (25.24%)	660.8 (70.25%)	
Importance of PA to Friend			0.307
Not at All/ Only a little	41.91 (29.72%)	92.56 (65.63%)	
Somewhat/ A lot	205.6 (25.03%)	580.7 (70.71%)	

(Continued)

Table 6. (Continued).

Variables	No Attempt N (%) *	Attempt N (%) *	P
	283.4 (26.77%)	724.2 (68.41%)	Value**
NGSE			0.069
Low	145.2 (30.12%)	317.8 (65.94%)	
High	126.5 (24.38%)	382.6 (73.73%)	
Psychological Distress			0.596
Low	107.9 (29.06%)	252.5 (67.97%)	
Moderate	78.99 (25.16%)	226.8 (72.25%)	
High	85.5 (27.21%)	219.5 (69.86%)	
Trauma Experience			0.021
No	58.86 (35.24%)	98.71 (35.24%)	
Yes	211.8 (25.25%)	607.2 (72.39%)	
Maltreatment			0.004
No	132.6 (31.16%)	276 (64.86%)	
Yes	128.9 (23.43%)	410.4 (74.63%)	
Victimization			0.015
No	128.9 (30.05%)	286.4 (66.77%)	
Yes	124.6 (23.94%)	385.2 (74.01%)	
Body Shape Satisfaction			0.946
Not Satisfied	128.1 (26.77%)	332.4 (69.45%)	
Satisfied	132.5 (26.84%)	349.1 (70.72%)	
Sources as a reason for Behavior			
Change			
Interpersonal			<0.0001
No	87.9 (79.84%)	22.2 (20.16%)	
Yes	173.5 (19.7%)	685.6 (77.89%)	
Traditional			<0.0001
No	103.6 (49.59%)	104 (49.8%)	
Yes	145.9 (19.44%)	581.9 (77.56%)	
Online			<0.0001
No	119.6 (49.62%)	117 (48.54%)	
Yes	118.1 (17.65%)	536.3 (80.13%)	
Social Media			<0.0001
No	111.5 (48.37%)	115.9 (50.25%)	
Yes	137.2 (18.94%)	571.2 (78.82%)	

\*Weighted count and percentages. N's may not add up to the total and percentages may not add up to 100 due to missingness.

\*\* Design-based Chi-square tests P-value.

PA: Physical Activity; BMI: Body Mass Index; NGSE: New General Self-Efficacy.

## Logistic Regression Analysis

Univariate logistic regression analysis was used to assess the impact of potential predictors on the attempt to change PA behavior (Table 7). As mentioned before, the outcome variable was categorized into “no attempt to change PA behavior” (by combining those who reported no attempt to change any health behavior and those who indicated changing behaviors other than PA) and “attempt to change PA behavior” (participants who responded by saying they tried behavior change in relation to PA).

Adolescents between the age of 16-19 years had 61% increased odds of attempting to change PA behavior compared to the early adolescence age group (13-15 years old) (OR 1.61, 95% CI:1.17-2.20, P =0.004). Similarly, those who were at senior high school level (grades 11-12) had 1.53 times higher odds to attempt to change PA behavior than juniors (grades 8-10) (OR 1.53, 95% CI:1.13-2.08, P=0.007).

The estimated odds of attempt to change PA were 19% lower for male Qatari adolescents than for females. Compared to underweight, adolescents who were in normal weight or overweight/obese were only slightly less likely to attempt to change their behavior. In addition, respondents who expressed their dissatisfaction with their body shape had 2% lower odds of attempting to change PA behavior than those who were satisfied. All these results were not statistically significant (P>0.05).

The odds of trying to change PA among teens with high levels of SE were 1.38 times higher than those with low levels, while the same odds for those with moderate and high PSD were 1.23 and 1.10 times greater respectively compared to those with low distress, with no statistical significance.

Respondents who reported suffering from adverse traumatic experiences, had significantly higher odds (71%) of attempting PA change compared to non-sufferers (OR 1.71, 95% CI: 1.09-2.69, P=0.022). Remarkably, those who said they were victims

of physical and/or other types of abuse had 1.39 times higher odds of attempting to change PA than non-victims (OR 1.39, 95% CI: 1.07-1.81, P= 0.015).

With respect to information sources, those who reported using information from interpersonal sources to try to change their health behavior had 16 times increased odds of attempting PA behavior change compared to those who did not use this information to make a behavior change (OR 15.65, 95% CI: 8.93-27.42, P<0.001).

Similarly, adolescents who used online information to change their behavior had 5 times higher odds of trying to change PA than those who did not use such information for attempting behavior change (OR 4.64, 95%CI: 3.13-6.88, P<0.001). Among teens who used information from traditional and social media sources to try behavior change, the odds of attempting PA behavior change were significantly 4 times greater than the odds for those who did not (Table7).

Adolescents who considered PA somewhat to very important to them personally had significantly 91% higher odds of attempting to change PA compared to those indicated it is not at all important or not too important (OR 1.91, 95% CI 1.18-3.08, P= 0.010). Likewise, those having friends who care a lot or somewhat about PA had 1.28 times the odds of trying to change PA as those who had friends caring only a little or not at all about it, with no statistical significance (Table 7).

Table 7. Univariate Logistic Regression Analysis of the Attempt to Change PA<sup>¶</sup>.

Variables	OR *	95% CI		P Value†
Gender				
Female	1			
Male	0.81	0.54	1.19	0.270
Age				
Early adolescence(13-15ys)	1			
Late Adolescence (16-19ys)	1.61	1.17	2.20	0.004
School Grade				
Junior level (8-9)	1			
Senior level (10-12)	1.53	1.13	2.08	0.007
BMI				0.971**
Underweight	1			
Normal weight	0.97	0.53	1.75	0.905
Overweight/ Obese	1.01	0.60	1.68	0.984
Importance of PA				
Not at all/ Not too important	1			
Somewhat/ Very important	1.91	1.18	3.08	0.010
Importance of PA to Friends				
Not at all/ Only a little	1			
Somewhat/ A lot	1.28	0.79	2.08	0.308
NGSE				
Low	1			
High	1.38	0.97	1.96	0.070
Psychological Distress				0.607**
Low	1			
Moderate	1.23	0.81	1.85	0.316
High	1.10	0.72	1.68	0.658

(Continued)

Table 7. (Continued).

Variables	OR*	95% CI		P Value†
<b>Trauma Experience</b>				
No	1			
Yes	1.71	1.09	2.69	0.022
<b>Maltreatment</b>				
No	1			
Yes	1.53	1.16	2.02	0.004
<b>Victimization</b>				
No	1			
Yes	1.39	1.07	1.81	0.015
<b>Body Shape Satisfaction</b>				
Satisfied	1			
Not satisfied	0.98	0.62	1.56	0.946
<b>Sources as a Reason for Behavior Change</b>				
<b>Interpersonal</b>				
No	1			
Yes	15.65	8.93	27.42	<0.0001
<b>Traditional</b>				
No	1			
Yes	3.97	2.78	5.68	<0.0001
<b>Online</b>				
No	1			
Yes	4.64	3.13	6.88	<0.0001
<b>Social Media</b>				
No	1			
Yes	4.01	2.76	5.82	<0.0001

¶Different N due to different level of missingness in each variable.

\*Unadjusted Odds Ratio.

\*\*Adjusted Wald test for the overall significance of the variable.

†Wald test.

PA: Physical Activity; BMI: Body Mass Index; NGSE: New General Self-Efficacy; CI: Confidence Interval.

## Model Building and Multivariable Logistic Regression

The base of the subsequent analysis was individuals who had complete information on all of the four variables representing sources of health information used (missing and non-users were excluded, weighted N= 843).

Univariate logistic regression analysis revealed that variables age, grade, traumatic events, victimization, maltreatment whether PA was important for the respondents, and SE, were with p-value <0.25 so they were retained to the multivariable model. In addition, covariates identified from the literature to be important, namely: gender, BMI, body satisfaction, and PSD were also included. Age and grade were highly correlated ( $r= 0.72$ ) so only age was chosen.

Following the process of model building and fitting, SE, PSD, BMI, body shape satisfaction and trauma experience were removed from the model because they were not significant (Table 8). Adding these variables did not make any significant contribution to the fit of the model. Additionally, none of them were found to be a confounder for the relationship between any of the remaining covariates and the outcome in the context of our data.

Similarly, by checking for interaction between the sources of information and all variables remained in the main effects model (age, gender, and importance of PA), none of them were found to be significant at the 5% level when added to the model. As stated before, our main exposures of interest were always kept in the model to adjust for the attempt to change due to health-related information obtained via other sources.

Table 8. Multivariable Logistic Regression Analysis for the Attempt to Change PA:  
Complete-Case Analysis (Initial Full Model N=659.6).

Variables	OR*	95% CI		P Value†
<b>Sources as a Reason for Behavior Change</b>				
Interpersonal				
No	1			
Yes	10.97	4.21	28.55	<0.0001
Traditional				
No	1			
Yes	1.18	0.75	1.87	0.460
Online				
No	1			
Yes	2.40	1.33	4.34	0.005
Social Media				
No	1			
Yes	1.55	0.76	3.19	0.221
Age				
Early Adolescence (13-15ys)	1			
Late Adolescence (16-19ys)	2.48	1.33	4.61	0.006
Gender				
Female	1			
Male	0.56	0.33	0.95	0.033
Importance of PA to You				
Not at all / Not too important	1			
Somewhat/Very important	3.69	1.40	9.69	0.010
BMI				
Underweight	1			
Normal Weight	1.43	0.55	3.70	0.450
Overweigh/ Obese	1.67	0.64	4.34	0.285
NGSE				
Low	1			
High	0.97	0.58	1.63	0.917

(Continued)

Table 8. (Continued).

Variables	OR*	95% CI		P Value†	
Psychological Distress		0.622**			
Low	1				
Moderate	1.22	0.69	2.18	0.478	
High	0.97	0.49	1.90	0.924	
Body Shape Satisfaction					
Satisfied	1				
Not Satisfied	1.18	0.72	1.94	0.497	
Trauma Experience					
No	1				
Yes	1.20	0.57	2.54	0.615	

\*Adjusted Odds Ratio for the variables in the table.

† Wald test.

\*\*Adjusted Wald test for the overall significance of the variable. Adjusted Wald test for all Parameters: F (14,18) = 9.56, P<0.0001.

BMI: Body Mass Index, NGSE: New General Self-Efficacy, PA: Physical Activity, CI: Confidence Interval

Thus, our final model was the one shown in Table 9. Because we had different levels of missingness in the outcome as well as other covariates, the sample used to fit the initial and reduced models was equal to 660 individuals.

The overall model significance F (7,25) = 18.10, P<0.0001, and goodness of fit Archer-Lemeshow test [F (8,24) = 0.517, P= 0.832] revealed that the model fit the data well. Further, the classification table showed that 81% of the data were correctly classified, and the area under receiver operating characteristic curve (ROC) was 0.75, reflecting good discriminatory capacity. Specification error test was not significant (P= 0.102) indicating no specification error, and the test for multicollinearity using measures of tolerance and variance inflation factor (VIF) showed tolerance values more than 0.1 and VIF values less than 10.

Results from complete-case analysis multivariable logistic regression model showed that Qatari adolescents who used information from interpersonal sources to try changing their behavior had significantly (10 times) higher odds ( $OR= 10.34$ , 95% CI:4.62-23.14,  $P<0.001$ ) of attempting to change PA behavior compared to those who did not, adjusting for other variables in the model (Table 9).

Likewise, relative to adolescents who didn't try to change their behavior due to health information found from online sources, those who tried because of these sources had about twice the odds of attempting PA change ( $OR= 2.40$ , 95% CI: 1.36- 4.22,  $P= 0.004$ ) when adjusting for other covariates in the model. Being in late adolescence stage was also significantly associated with a 2.4-fold of odds of attempt to change PA when compared with early adolescence, after controlling for other variables in the model ( $OR= 2.42$ , 95% CI:1.33-4.42,  $P= 0.005$ ). With respect to gender, boys had 42% lower odds of attempting PA change than their girl counterparts ( $OR=0.58$ , 95%CI: 0.35-0.93,  $P=0.027$ ). Finally, the odds of attempting PA change among Qatari teens who considered PA important to them personally were 4 times greater as compared to those who considered it not important ( $OR=3.57$ , 95% CI: 1.45-8.80,  $P= 0.005$ ), after accounting for the effect of age, gender, and the four designated health information sources used to try behavior change (Table 9).

Table 9. Multivariable Logistic Regression Analysis of the Attempt to Change PA:  
Complete-Case Analysis (Final Model N=659.6)

Variables	OR*	95%CI		P Value**		
<b>Sources as a Reason for Behavior</b>						
<b>Change:</b>						
Interpersonal						
No	1					
Yes	10.34	4.62	23.14	0.000		
Online						
No	1					
Yes	2.40	1.36	4.22	0.004		
Traditional						
No	1					
Yes	1.18	0.76	1.82	0.449		
Social Media						
No	1					
Yes	1.57	0.78	3.16	0.194		
<b>Age</b>						
Early adolescence (13-15ys)	1					
Late adolescence (16-19ys)	2.42	1.33	4.42	0.005		
<b>Importance of PA</b>						
Not at all important /Not too important	1					
Somewhat/Very important	3.57	1.45	8.80	0.007		
<b>Gender</b>						
Female	1					
Male	0.58	0.35	0.93	0.027		

\*Adjusted Odds Ratio for the covariate in the table.

\*\* Wald test.

PA: Physical Activity; CI: Confidence Interval.

## Imputed Data Analysis

Due to the varied degree of missingness between variables involved in the analysis, the complete-case analysis was performed on 660 observations from our sample of 843 Qatari adolescent users of information sources. This implicated that around 22% of our sample was excluded from the analysis due to missingness. So, MICE was performed and resulted in 20 complete data sets. The subpopulation size of Qatari adolescents who used any source of health-related information increased to 1086 individuals (1094 weighted N) after imputing the missing nationality and information use status. Among them, 877 individuals (887 weighted N) represented those who had full information on using the four sources categories (the base for our multivariable analysis). Checking the resulting imputation data to identify variables that vary across imputations detected no problems. Imputation model diagnostics were performed using the STATA user written command “midiagplots” (101) which compares the distributions of the observed, imputed, and completed values. The distributions didn’t differ greatly, and Kolmogorov-Smirnov tests comparing observed and imputed values were not significant. For categorical variables, tabulation of the observed, imputed, and completed distributions yielded approximately similar results. Very few differences were found when comparing imputations across 2 different imputed data. Analysis was then carried out once again using the 20 imputed datasets. Table 10 illustrated the results after imputation. The overall model significance  $F(7, 28.6) = 23.17, P < 0.0001$ .

Like complete-case analysis, results after imputation showed that using information from interpersonal and online sources to try to change health behavior, late adolescence and considering PA important were significantly associated with the attempt to change PA (Table 10). Users of interpersonal and online sources who tried to change their behavior as a result of information obtained from these sources had 9 times

(OR=9.35, 95% CI: 4.15-21.08, P<0.001) and 3 times (OR= 2.53, 95% CI: 1.50-4.27, P=0.001) higher odds, respectively, of attempting to change PA behavior relative to their counterparts who got information from these sources but didn't try to change due to them, controlling for other sources and other variables in the model. The odds of attempting PA change among late adolescents were two times as high as that of early adolescents (OR=2.17, 95%CI:1.37-3.44, P= 0.002). The same odds were 2.3 times as likely among teens who considered PA important than those who did not (OR=2.34, 95% CI: 1.13-4.84, P=0.023) after accounting for other variables. Although the direction of the association for this variable remained the same as in the complete-case analysis, the magnitude of association attenuated, and the significance level reduced. Regarding the association between traditional and social media sources with the outcome, it remained insignificant for the former and became marginally significant for the latter (Table 10). For gender, by contrast, the significant negative association between males and the attempt to change PA in complete-case analysis became insignificant in the imputed data after adjusting for other covariates. Yet the magnitude and direction of the association remained similar. We retained gender in the model independently of its association because it is documented to be among factors that affect patterns of health-related behaviors, and to account for socio-cultural norms that imposed certain restrictions on Arab females in the context of PA. Figure 10 showed the differences in OR and 95% confidence intervals in imputed data and complete-case analysis.

Table 10. Multivariable Logistic Regression Analysis for the Attempt to Change PA:  
Imputed Data (Final Model, Number of imputations= 20, N= 887).

Variables	OR*	95% CI	P Value†
Sources as a reason for Behavior			
Change:			
Interpersonal			
No	1		
Yes	9.35	4.15	21.08
Online			
No			
Yes	2.53	1.50	4.27
Social Media			
No			
Yes	1.55	0.92	2.61
Traditional			
No			
Yes	1.07	0.65	1.76
Age			
Early Adolescence (13-15ys)	1		
Late Adolescence (16-19ys)	2.17	1.37	3.44
Importance of PA			
Not at all/ Not too important	1		
Somewhat/ A lot important	2.34	1.13	4.84
Gender			
Female	1		
Male	0.65	0.38	1.11

\*Adjusted Odds Ratio for the covariates in the table.

†Wald test.

PA: Physical Activity.

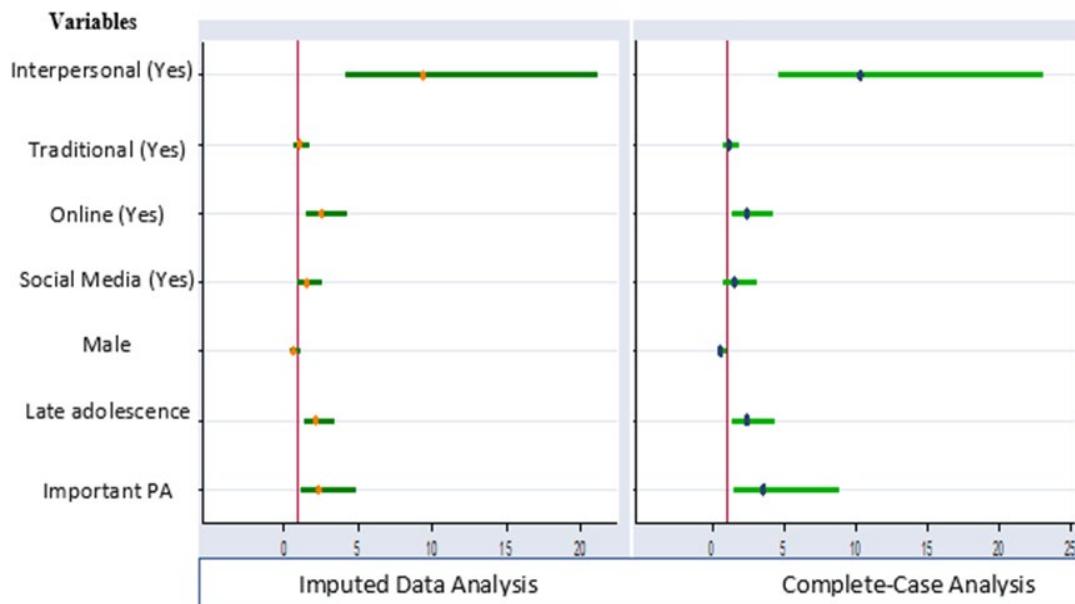


Figure 10. Odds ratio with 95% confidence intervals (imputed data and complete-case analysis).

#### Average Marginal Effects

The ORs provides relative effect of corresponding variables. To know whether these ORs represented a sizable effect, we obtained the average marginal effects from the final logistic regression model after imputation.

As Table 11 exhibited, the expected difference in probability of attempt to change PA associated with using information from interpersonal sources to change behavior was about 46-percentage point increase. This means, on average the probability of attempting PA change among teens who used these sources to change their behavior was 46 percentage points higher than it was for those who did not, controlling for other covariates in the model. This is a substantial and significant difference.

Table 11. Average Marginal Effects for the Probability of Attempting PA Change.

Variables	Average Marginal Effects (Risk Differences) *	95 % CI	P Value†
Sources as a Reason for			
Behavior Change			
Interpersonal (Yes)	0.46	0.29	0.62 <0.001
Traditional (Yes)	0.01	-0.06	0.08 0.794
Online (Yes)	0.16	0.06	0.26 0.004
Social Media (Yes)	0.07	-0.02	0.16 0.123
Gender (Male)	-0.06	-0.14	0.01 0.104
Age (Late adolescence)	0.11	0.04	0.18 0.003
Importance of PA (Important)	0.14	0.01	0.28 0.042

\*Results were adjusted for complex survey design and model covariates (imputed data, N=887).

† t Statistics.

PA: Physical Activity; CI: Confidence Interval.

Likewise, the expected difference in probability of attempt to change PA associated with using information from online sources to change behavior was a 16-percentage point increase. This means, on average the probability of attempting PA change among teens who used these sources to change their behavior was 16 percentage points higher than it was for those who did not, adjusting for other variables in the model. Again, this difference is sizable and significant.

The estimated average marginal effect (or risk difference) between older and younger adolescents was about 11 percentage points, which is also sizable and significant. Accordingly, older adolescents on average had 11 percentage points higher probability of attempting PA change as compared to younger, controlling for other

variables in the model.

For importance of PA, the estimated average marginal effects between those who considered PA important and those who did not was about 14 percentage points, which is sizable and significant. This means, on average the probability of attempting PA change among the former was 14 percentage points higher than it was for the latter. Figure 11 presented the average marginal effects with beta coefficients from multivariable logistic regression model fitted on imputed data.

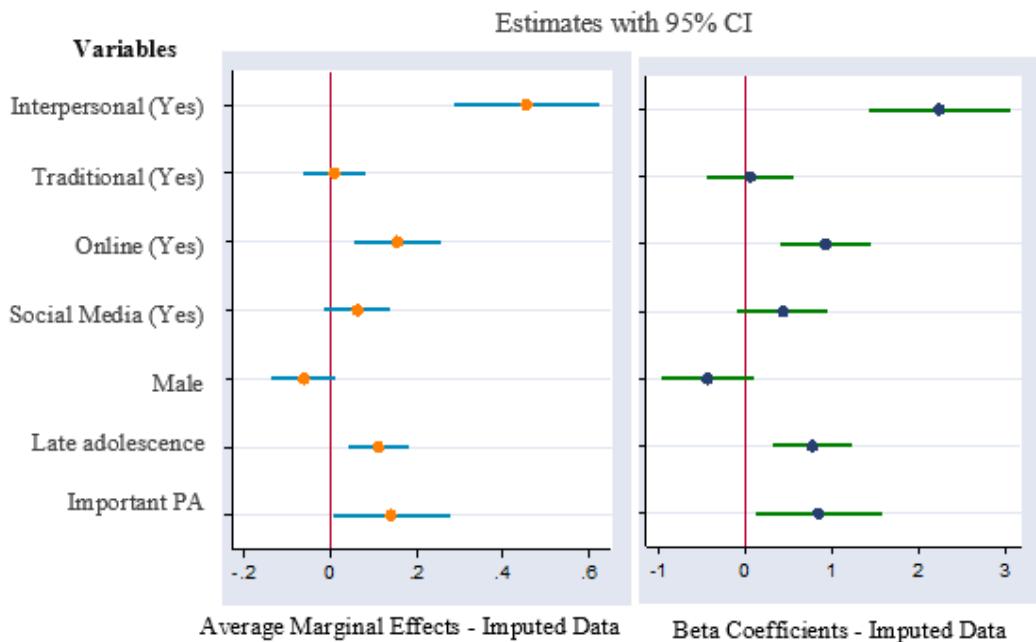


Figure 11. Average marginal effects with beta coefficients from fitted logistic regression (estimates with 95% confidence intervals- imputed data).

### Association between Attempt to Change PA Behavior and Recent PA

About 47% of teens who said they attempted to change their PA behavior reported they were physically active in the past 30 days before the survey, and almost similar proportion said they were inactive (Table 12). Likewise, among adolescents who reported no attempt for PA change, nearly 47% indicated they were active in the past month. An approximate equivalent proportion of them said they were physically inactive during the same period. From the overall sample, nearly 12% did not try to change their PA behavior and were inactive, 32% attempted to change PA but they were inactive, while 45% of those attempted and not attempted were active (nearly 14%, 36% and 50% respectively in the imputed data). By examining the relationship between the attempt to change PA behavior and the reported recent PA, no significant association was found between the two variables in the crude analysis; neither in the complete-case nor in the imputed data analysis (Table 12). This insignificant association remained even after adjusting for age, gender, importance of PA, SE, PSD, traumatic event experience, BMI, and body shape satisfaction separately (all p-values were  $>0.05$ , results not shown) or together (Table 12). This was an exploratory step; no further analysis was carried out.

Table 12. Association Between Attempt to Change PA behavior and PA in the Past 30 Days.

Attempt to Change PA	PA in the Past 30 Days							PA in the Past 30 Days						
	Complete-case analysis (N=1058.7)							Imputed data analysis (N=1093.9)						
	Inactive	Active	OR <sup>‡</sup>	P <sup>¶</sup>	OR <sup>†</sup>	P <sup>¶</sup>	N	Inactive	Active	OR <sup>‡</sup>	P <sup>¶</sup>	OR <sup>†</sup>	P <sup>¶</sup>	
No Attempt	479.7 (45.31)	483.8 (45.70)	95% CI	P value	95% CI	P value	542.9 (49.64)	550.9 (50.36)	95% CI	P value	95%CI value	P value		
No Attempt	283.4 (26.77)	44.92% 46.62%	1	0.847	1	0.604	306.9 (28.06)	49.93% 50.07%	1	0.918	1	0.917		
Attempt	724.2 (68.41)	46.47% 46.88%	0.97 0.72-1.31	0.91	787.0 (71.94)	1.02 0.74-1.40	0.98 0.68 -1.42							

\* Percentages may not add up to 100 due to missing values. N and percentages are rounded.

‡ Unadjusted Odds Ratio.

† Adjusted Odds Ratio for age, gender, body mass index, importance of physical activity, self-efficacy, psychological distress, body shape satisfaction, and traumatic event experience (N=797.9 in the complete-case analysis due to missingness)

¶ Wald test.

PA, Physical Activity; CI, Confidence Interval.

## CHAPTER 6: DISCUSSION

The present study aimed at determining the prevalence of PA and assessed the influence of information obtained from interpersonal, traditional, social media and online sources, demographic characteristics, and other factors on the PA behavior change of Qatari students aged between 13-19 years. Understanding how these factors impact the attempt to make behavior change related to PA is required to develop and implement appropriate programs that will help encourage teens to make such changes and reverse the trend of increasing inactivity rates among them.

### Prevalence of Physical Activity

The world's teenagers are not active enough, with large proportions not fulfilling the recommended one hour daily moderate to vigorous PA (7). Only 12%-26% of adolescents in the six WHO regions meet this recommendation (7).

Our study found that 68% of all teens attempted to modify their PA behavior, and 90% did so from those reported attempting to change any health-related behavior based on information they had received from different sources. In a similar study in the U.S. that surveyed 1156 American adolescents, 15% from all participants reported changing their fitness routine due to online information, and 53% did so among those who said they changed any behavior (82).

Regarding the actual current behavior, our study found similar prevalence of PA ( $\geq$  one time a day) and insufficient activity or inactivity (never to  $\geq$  once a week), with approximately 46% and 45% consecutively. Particularly, the percentage of those who never participated in PA was 17%. These findings are, in part, within the range reported by Daradkeh et al. (17) in their study which surveyed 1232 Qatari adolescents aged 15-18 years in 2012. The researchers found a prevalence of about 24% - 84% of inactivity,

defined as less than once a week for different types of activities listed in the study such as walking or running, bicycling, swimming, volleyball, and football.

Similarly, Al-Thani et al. (102), in their study, based on data from the Qatar National School Survey carried out in 2016, found that nearly 67% of Qatari adolescents were less physically active (< 3 days/week). Although this proportion is still within the range reported by Daradkeh and colleagues (17), it is higher than what we have found in our study. Al-Thani et al. study involved 5862 students aged between 12-17 years, among them 3185 Qataris, and reported a 33% prevalence of 60 minutes PA  $\geq$  3days/week (102).

In contrast to Al- Thani et al. study and to the reported 4%-18% prevalence of activity (defined as  $\geq$  5 times/week) from Daradkeh et al. (17), our study found a higher prevalence, though all results still indicate a suboptimal PA level. While social desirability can't be ruled out, these differences might be attributed to diversity in definitions and frequencies used to categorize PA, and slightly dissimilar age groups. Besides, our questionnaire for PA was a single item question and did not capture the relevant domains of activity as compared with the previous two studies. However, given that our survey was carried out in 2017, perhaps the results reflected the rising awareness about PA among this segment of the population, following the country's proactive policies. Collaborative efforts have been devoted by government and schools to promote PA among Qatari youth and children during the past years as indicated by the 2018 Qatar Active Healthy Kids (QAHK) Report Card (103). This can be mirrored by the large majority (89%) of teens in our study who rated PA as an important health topic.

Moreover, according to results from the 2018 QAHK Report Card, several indicators of PA witnessed progressive improvement compared with the previous

version of the card developed in 2016 based on the percentage of children and adolescents meeting national and international guidelines or recommendations. For instance, government and school indicators were assigned B+ and C grades respectively instead of B and INC (incomplete data) assigned in 2016 report (103, 104). Overall PA was assigned D grade instead of the lowest F grade, and organized sport participation and sedentary behavior both were assigned D+ instead of D in 2016 report, signifying that they were improving over time (103, 104). The report card indicated that 35-39% of adolescents in Qatar accrued a total of at least one hour of moderate to vigorous PA for more than three days weekly. Further, 48% of teens joined PA programs and/or organized sport, with sport club registration reaching 58% among male adolescents and 42% among females. As for schools, the percentage of teen participation in physical education classes reached 67% with almost two-thirds of schools in Qatar supporting PA programs (103).

Linking with other studies from Gulf countries, the prevalence of inactivity was similar to that found in Saudi Arabi (45%) using Youth Risk Behavior Surveillance System and the GSHS questionnaires, but lower than the estimated 84% from Kuwait and 88% from Oman using data from GSHS, as indicated by a recent review from Sharara et al. (105). Generally, the review which included national surveys and studies from different Arab countries, found inactivity levels among adolescents to exceeds 60%. It ranged between 65% (in Lebanon) to 91% (in Egypt) based on GSHS, exceeding 80% in Oman, Kuwait, United Arab Emirates, and Qatar. Whereas, in the published studies, it was between 29% (in Tunisia) to 80% (in Palestine) (105). This variation was attributed to the differences in the age of the included participants, definitions, and methods used.

Moreover, literature indicated that boys were more physically active than girls (17, 102, 105), a finding that was echoed by our study with approximately 55 % of males and 38% of females reporting they were daily active in the past 30 days. Notably, a higher percentage of girls in the present study initiated the attempt of PA behavior change relative to boys, however, they did not sustain this change and returned to being inactive.

Gender disparities in this aspect were also seen in other Arab countries. In fact, it was a consistent finding among 31of the studies included in Sharara et al. review (105). The estimated range of inactivity among male adolescents was 8%-26% versus 21%-55% among female adolescents as reported by “The Arab Teens Lifestyle Study” (19). This trend was even observed in developed countries; in the U.S., for instance, nearly 65% of male adolescents and 83% of females were not meeting the optimal recommended PA level of at least one hour daily on all days of the week, as estimated by “The Youth Risk Behavior Surveillance System” in 2017 (106).

Gender gaps exist globally as well; inactivity was less in male adolescents compared to their female counterparts (78% versus 84% respectively) according to the WHO (7). The organization attributed this high level of inactivity to numerous environmental barriers such as pollution, traffic, inappropriate and inadequate infrastructure, and outdoor safety issues related to crime and violence (37).

In the Arab region, cultural and social aspects are added to the environmental one. Extreme weather in Qatar and some Arab countries, in addition to unfavorable built environment were found to discourage outdoor PA and promote car culture (19, 105). Barriers attributed to academic burden, lack of motivation and social support from significant others, inadequate school-based PA programs for males and lack of such programs for females also hinder adolescents’ involvement in PA (20, 105). In

Qatar, adolescents cited time constraints, dissatisfaction with exercise benefits, unsuitability of the place and hesitation from others as the main reasons for physical inactivity (17). Meanwhile, maintaining good health, losing weight, meeting new friends, and competition were the reasons behind activity (17).

For females, socio-cultural norms impose further restrictions, given the conservative culture that puts special requirements on clothing, supports gender-based segregation even for types of activities that should be practiced, and considers outdoor PA unacceptable or inappropriate for girls (19, 20, 105). The latter adds financial burden if girls wish to get Gym membership to have a suitable place to exercise. One more reason for our finding in this aspect could be the narrow scope of activity options provided by the questionnaire. Apart from dance class and yoga, the other three options (playing sports, running and working out) might be viewed by female respondents as boys' types of activities which are undesirable or unsuitable for girls.

While lack of PA is a major public health concern, it contributes to the occurrence of another problem, obesity. In this study we found a combined prevalence of overweight and obesity of 37%. The prevalence of obesity alone was 18%, consistent with that reported by Al-Kaabi and colleagues among the same population (107). The study estimated an overall obesity proportion of 19% based on self-reported data from 797 Qatari adolescents surveyed in 2015. Yet, this was lower than the result of school-based surveillance “The Ministry of Public Health Growth Monitoring Program” carried out during the academic year 2015-2016. In this program, anthropometric measurements of 168011 Qatari and non-Qatari students aged 5-19 years were collected objectively (108). Combined overweight and obesity prevalence among Qataris was 45.6% (108). Nearly 28% of Qatari students in the age group 12-17 years were obese while 22% were overweight. Al-Kaabi et al. (107) found a higher prevalence of

overweight (43%), whereas in our study we found nearly a comparable result (19%) based on self-report.

Results from another study which included objectively measured BMI, found that 28% of Qatari boys and 21% of girls aged 11-18 years were obese (109). This study used data collected from 1694 students during a health assessment program carried out by “Qatar Diabetes Association” and “Qatar Supreme Council of Education” in 2012 (109). Consistently, we found comparable prevalence among males (25%), albeit lower among females (12%).

The approach of calculating BMI based on self-reported height and weight is widely used in epidemiological studies than objective measurements for logistic and practical reasons (110). However, some subpopulation groups, especially those overweight or obese, females, and teens, tend to underestimate their weight and overestimate their height, owing to social desirability, which causes BMI-misclassification (110). Yet, it was suggested that this approach remains the method of choice and may be used as a valid and simple tool in large surveys and epidemiological studies for BMI estimates of overweight and obesity (111, 112).

#### Predictors of the Attempt to Change Physical Activity Behavior

In the analysis of our dataset, we found that health information seeking behavior was common among Qatari adolescents, as we anticipated. The current study also found significant association between the adolescents’ attempt to change their PA behavior and health-related information obtained from interpersonal and online sources, which predicted the attempt better than other sources, with sizable average marginal effects. Similarly, adolescents age and the importance they attached to PA were found to be significant predictors of attempting this behavior change.

### *Interpersonal Sources*

The results of this study showed strong evidence of association between the attempt to change PA behavior and information found from these sources adjusting for other covariates. This significant positive association remained the same in the crude and adjusted complete-case analysis, and in the imputed data analysis.

Interpersonal sources are widely used by adolescents to obtain health-related information. In our data, interpersonal sources topped the other three sources, with nearly 97% of teens reported using any interpersonal source, and more than two thirds attempting PA change based on information from these sources. These findings were in line with our hypothesis and with previous studies conducted in other countries. In the U.S., parents, health classes in schools, health practitioners, and friends were the first four leading sources for health information (82). As high as 96% turned to their parents, 90% obtained information from health class with a similar percentage reported for doctors or nurses, and 84 % consulted their friends. Approximately two thirds sought information from their siblings (82).

Another study by Ybarra et al. found that 81% of adolescents in Uganda get health information by asking their parents, teachers, and other adults, even when they needed sensitive information (81). Half of the respondents turned to their siblings and friends (81). In Greece, nearly 72% of teens conferred with their family and about 52% consulted physicians for health information (113).

In the region, a study by Neumark et al. (16) reported that 69% of Arab adolescents and 46% of Jews discussed health information with their healthcare providers one to two times in the past year, whereas 75 % of Arab and 59% of Jews did so three time or more. A study from Iran, found that the primary sources preferred by adolescents were their mothers (51 %) followed by their friends (40%) (79).

These findings highlight the importance teens attached to these sources across different cultures and reflect the extent to which they are considered credible and trustworthy. This could explain the significant association found in our analysis.

Actually, consistent findings from different studies and reviews (49-53, 114-117) acknowledged interpersonal relationships as important predictors of adolescents PA. Significant others (e.g. parents, siblings, friends, teachers, etc.) play an important role in a person's behavior with the power they exert through their words and actions which influence one's attitude and choices (118, 119). They can provide adolescents with information, emotional, tangible and other kinds of support that facilitate their involvement in sport and PA behavior (118). Information may take various forms such as guidance, advice, verbal encouragement, tangible incentives, appraisals, or recognition (120, 121). It was also suggested that information provided from significant others may increase teens SE perception, which influences purposeful behavior like PA (120).

In the family setting, traditions, values and cultural beliefs that shape feelings and thoughts about PA and other health behaviors are reinforced (122). In addition to communication and monitoring which protect teens from risk behaviors, family members, like parents and older siblings, can act as a role model for the youngsters. They can provide them with information and motivational support, and resources needed to encourage and facilitate their participation in PA (116, 118, 123, 124).

For instance, Olivares et al. (125) in their study involving 23180 Chilean students found a statistically significant association between adolescents PA level and parents' encouragement. Higher percentages of completely inactive adolescents were found among those who did not get encouragement from their parents and teachers to practice PA compared with those who were encouraged. The impact of parents on PA

was greater, as the odds of engagement in PA were 2.56 times (95% CI: 2.24-2.93, P<0.001) higher among adolescents encouraged by their parents, versus 1.26 times (95% CI: 1.12-1.42, P<0.001) in teens encouraged by their teachers, compared with those who did not receive any encouragement.

Similarly, adolescents are notably influenced by what their friends and peers say and do (115, 119). With peer pressure, teens tend to adopt their friends' values, they might change their appearance, behaviors and interests to feel accepted (119, 122). This conformity can either encourage or discourage their involvement in certain health behaviors such as PA. Adolescents' participation in PA was found to be positively associated with positive friends and peers relationships and support (122). When the relationship is negative and not supportive, they might be less active, or worse, engage in risky behavior (119, 122). In a systematic review by Al-Hazzaa (126), Saudi teens were found to exercise commonly with their friends, and in agreement with the findings from Sharara et al., lack of friends' support was perceived by adolescents as a barrier for PA (105, 126). Peer norms were also suggested to influence SE, which in turn was found to mediate the association between peer norms and leisure time PA (120).

In the school environment, teachers can educate their students about a wide range of health topics including PA, highlighting the meaning and relevance of this behavior to adolescents, or can act as a counselor on an individual basis to address specific concerns or answer private questions posed by teens (123). Health education empower adolescents with valuable evidence-based knowledge and skills on how to adopt healthy behaviors such as PA, how to practice PA, and how to incorporate this behavior in daily routine (48). Moreover, stressing the meaning and relevance of a behavior to individuals was found to enhance their recognition and acceptance of the

underlying value of a behavior, promote their internalization (degree to which they adopt a behavior as their own) and make adaptive behavior change possible (127)

Furthermore, research findings indicated that teachers can play a pivotal role beyond conveying health information and emphasizing the importance of PA. A systematic review of 93 mixed studies reported that teacher's role modeling, support and encouragement were important for adolescents PA (128). Supportive teachers were found to deeply impact students' motivation to exercise and remain active (123), while lack of this support was cited as a barrier for PA (105). Verbal support and encouragement, appraising teens' skills and competencies, and matching them with activities are ways reported by studies to boost PA among adolescents in the school setting (123, 128).

Healthcare providers appeared to be an important, rich, and preferred source of quality health and medical information for adolescents (16, 82, 113, 117). Their role in evaluating and enhancing teen's access to health information was considered substantial (66, 117). In a qualitative study by Skinner et al., adolescents valued practitioners as reliable sources, expressing their readiness for interaction with them (66). They reported using many sources to get information, still, they acknowledged their limited abilities in searching, sorting, verifying information and choosing what is accurate. They were open to receive help from healthcare providers to augment their e-Health literacy skills, to direct them toward higher-quality information sources on the Internet, and to foster their critical appraisal skills on what they found (66). However, limited access to healthcare providers available only by appointment, and time limits during medical visits, in addition to hesitation to discuss sensitive health issues were barriers for using this source cited by teens in this study and other studies (16, 66, 117).

Teens in Qatar enjoyed healthy and strong interpersonal relationships, with nearly 94% having a good relationship with their parents and their teachers, and around 83% reporting no conflict with their peers (107). Accordingly involving them in health education and promotion intervention programs targeting PA could improve intervention outcomes.

### *Online Sources*

In accordance with our hypothesis, the current study found online sources to be significantly associated with the attempt to change PA behavior, while controlling for other covariates. Internet is considered by far the most popular source for health information among adolescents (11, 15, 80). Internet is widely accessible in Qatar, and this access is facilitated by mobile devices. Accordingly, it was not surprising to find that almost 88% of Qatari teens in this study reported using online health information sources. This result was comparable with the 84 % reported by a similar survey among teens in the U.S.(15), given the parallel Internet penetration (71).

On the other hand, our findings were higher than that found by Newmark et al., whereby 52% of surveyed adolescents reported seeking online health information, though this percentage was higher among Arab teens (63%) compared to Jewish (48%); both had similar Internet accessibility (16). Baheiraei and colleagues (79), and Ybarra et al. (81) found even lower percentage (38%) among Iranian and Ugandan adolescents, respectively.

A recent systematic review highlighted this variation in adolescent's online usage for health-related purpose, with the majority of studies included reporting more than 50%, while one-fifth of these studies found this percentage to be less than that (80).

This could be attributed to Internet literacy and skills (16), cultural differences and preference of other sources over the Internet (16, 79, 80), concerns about privacy (16, 80) and accuracy or trustworthiness of information found (16, 80, 117). Adding to these are language challenges (16, 79), and in resource-constrained settings, limited access, and financial costs (16, 81).

As an example, Neumark et al. speculated that difference to be due to Arab teens tendency to search information not only for themselves, but also for their family members and friends (16). The same study also found that only 15% trusted online information, as compared with 66% reported by a study from the U.S. (15, 16). Moreover, it was suggested that 60-80% from those who refrained from seeking information online did so because they prefer healthcare providers as a source of such information, symboling that online sources are not a replacement, but rather a supplementary to interpersonal sources (16, 80). Internet may also act as a venue for interpersonal contact with healthcare providers (66), teachers (117) and peers (80), and to provide support. Online support groups were preferred by more than two-thirds of teens over in-person meetings (80).

Furthermore, when looking for information about sensitive or embarrassing issues, Internet serves as a platform which offers confidentiality and anonymity (66, 79, 80). However, it carries the risk of encountering negative, inaccurate or inappropriate health information (16, 80) even when navigating for non-sensitive issues. Consequently, and based on adolescents' preferences, concerns and needs, literature emphasized the necessity for designing culturally sensitive, reliable, user-friendly, eye-catching, understandable and up to date online sites (80). The purpose is to provide high-quality information which was found to influence individuals' health outcome significantly, and with the wide accessibility and acceptability of Internet among teens,

it may offer potentials for health promotion and intervention in this segment of the population (80).

In our study, information found from online sources was significantly associated with adolescents' attempt to change their PA behavior, with half of all teens reporting doing so as a result of this information.

This influence has been documented in other studies. A systematic review demonstrated that Internet could be a successful platform to deliver tailored interventions which can effectively elicit behavior change among adolescents (129). The review also showed that online health related information can be used to change adolescent's health behavior (129). In agreement with this, Ettel et al. pointed out that 22% of teen students reported modifying their behavior based on their findings in online searches (117). Wartella et al. found that one-third of online health information users changed their behavior because of what they found, and 15% of all teens particularly changed PA behavior (15). Ethnic differences were observed. Nearly 42% of Hispanics and 40% of blacks, who sought online information, acknowledged changing their behavior on the basis of their online findings, compared with their white counterparts (29%) (15). This demographic and cultural variation can explain the difference between our study and other studies.

Moreover, as most of the studies in this field, including our study, were cross-sectional that relied on self-reported data, bias is anticipated. Teens might not accurately report or recall their exact information seeking behavior, and the influence of information obtained on their health behavior (15, 16, 79). On the other hand, giving the anonymity of these investigations and that the question of searching health information per se is not generally a sensitive issue, the problem of bias might not pose a major threat to the validity of results from these studies (16).

In general, these results lend further support to the power of online sources to impact adolescent's health behavior, and the potential this platform carries with the new possibilities it offers in this regard.

### *Social Media and Traditional Sources*

Similar to the Internet, social media has infiltrated the life of teenagers and became a popular medium of interaction widely used for self-presentation, and generating, sharing and exchanging information (130-132).

Evidence suggested that teenagers turn increasingly to these sources to look for health-related information (131). This was reflected by our study, with the large portion of teens looking for such information in this medium, which is relatively new for them as compared to their counterparts in Western countries.

These sources were found to contain an abundance of patient-generated content, which facilitated peer-peer information, healthcare and support (130). Moreover, teens' interest to receive health information through these sources has been documented (130).

Literature also acknowledged the social media potentials in adolescent's health education via their capacity for tailored messages dissemination (130) and demonstrated the impact of these sources on health behavior (131). In our study, half of the participants reported attempting to modify their PA behavior as a result of social media's information, but with marginal statistical significance in multivariable model after controlling for other sources and other covariates. In a recent study by Goodyear et al. (131) among adolescents in the United Kingdom, nearly two-thirds of teens considered social media as a good source for health information. Almost half used this medium to access information about exercise, food consumption, body image, or sleep. The study showed that 46% of adolescents have modified their behavior due to social

media content they accessed, and 43% acknowledged that this content had positive impact on their health (131).

On the other hand, social media appeared to be a less popular health information source among surveyed American teens, with 88% reporting they wouldn't turn to this source if they are to look for health information (82). Furthermore, adolescents reported that their judgement on the trustworthiness of a post or information and their choice to act upon that information is informed by number of likes and followers (131). This may indicate that social media may not solely be used for getting health information, and using such criteria reported by Goodyear et al. to gauge the credibility of information is not a guarantee for making safe or healthy choices.

In fact, studies have raised concerns about exposure to inappropriate, erroneous, deceptive or misinterpreted information (130-132). Concerns have also been raised on professionalism, privacy, and confidentiality when interacting with others online given that adolescents may be less mindful when they share personal information (130, 132). This can make them more vulnerable to victimization by cyberbullies or social media trolls, and they might also suffer from negative effects such as peer pressure, social anxiety, developing obsessive behavior, and depression (130, 132).

While traditional sources were used by our adolescents to obtain health information, these sources were not significantly associated with teens' attempt to change PA behavior in our study after adjusting for the effect of other sources and the relationship of the other variables.

One reason could be that these sources are used for other purposes like having fun, entertainment, school projects and general or cultural information not solely for obtaining health information to make healthy choices (66).

Adolescents considered these sources as unidirectional, less updated and not amenable to interaction or practicing control over the information provided (66). Further, they pointed out that printed sources depend on level of literacy, and some of them are not readily accessible and relatively slow compared to online sources. Thus it takes teens time to find them and too much time to read, which attenuate their influence on health behavior change (66).

We have discussed in the previous sections the features of each information source in relation to two factors postulated by CMIS, characteristics and utility. Based on literature's findings discussed above, we addressed some of the characteristics of each source which relate to message attributes; such as perceived trustworthiness, and communication potentials; such as comprehensibility and style of these sources. We showed how teens evaluated each source based on these characteristics and on utility, i.e. perceived usefulness and relevance of information provided by the source to the needs of adolescents, to determine the selection and utilization of a particular source. Unfortunately, our study did not capture these features as they were in the CMIS. The questionnaire used did not collect information about these features for all the sources. Furthermore, no information was obtained regarding other antecedents, like personal experience with a health issue, personal beliefs, perceived susceptibility to health issue and perceived seriousness. However, we could still see our results in light of findings from other studies.

### *Age and Importance of Physical Activity*

Personal influences such as age, gender, and what an individual considers important or of personal value can define the limits of his or her participation in PA and can have a significant impact on the way the person approaches this behavior. In line with this, age and the degree of importance given to PA were found in our study to be

significantly related to the attempt to change this behavior, with significant average marginal effects.

The unanticipated finding in this study was that individuals in late adolescence stage had 2 times higher odds of attempting PA behavior changes than their younger peers. This finding was consistent with that of Uijtdewilligen et al. (133) who reported in their systematic review of prospective studies that adolescent age was positively associated with PA. However, it came in contrary to findings from other reviews and reviews of reviews, in which participation in PA was found to decreased with adolescents' age (50, 51, 114, 134). One systematic review which reported a decrease in PA levels during adolescence, found that it was higher among males aged 13-16 years old (135), the age group that was considered 'early adolescence' in our study. Moreover, there is some evidence of no significant association between adolescents age and PA (136).

Our findings could be interpreted in several ways. First, older adolescents may be more aware than their younger peers about PA importance for their body and health, as a result of variation in maturation. They might be more anxious about their body build and physical appearance (e.g. look better, getting in shape, building muscles) as they approach the adult stage.

Second, giving that the ability to exercise was suggested to be a major drive for voluntary PA (137-139), older adolescents, whose capabilities are well developed from many aspects (e.g. physical, motor, cognitive) can meet most sports and exercise demands (140), hence be more likely to attempt or to be active.

Third, the dissimilarity could be attributed to different outcomes; the outcome measured in our study was the attempt for behavior change, while it was the actual current behavior in the above-mentioned studies. However, the attempt to change PA

implies that the person was physically active even for a short period of time, accordingly, we believe that the comparison we made throughout the document with the actual PA could be valid.

Generally, our findings and those from other studies may imply that age-based intervention strategies are important to effectively promote PA behavior.

As for the importance of PA, literature documented that increasing numbers of teens became interested in seeking fitness or PA related information online. One study in the U.S. reported that this percentage increased from 28% in 2006 to 31% in 2010 (13). Wartella et al. in their study found that fitness and exercise topped adolescents searched topics online, with 42% having sought such information (15). Neumark et al. reported a higher percentage among Arab (81%) and Jewish teens (67%) of both sexes (16). Park et al. in their systematic review reported fitness as one of the common scope of adolescents' interest when seeking online health-related information (80).

Theoretically, it was suggested that when the value of a behavior is identified, such as identifying with the importance of PA for well-being, its regulation will be more fully internalized (127). As such, the behavior would be accompanied by more commitment and performance, and is expected to be maintained (127).

The previous findings of our study regarding sources of information, age and importance of PA can be seen in the light of CMIS model (65), although we didn't capture the whole components of the model. As the model postulated, personal factors, such as age and gender, are imperative for health information seeking. It was found that these factors can predict different use of health information sources (141), while salience or personal significance of a health issue (PA in our study) may act as a motivation or cues to purposeful seek of information (65). With respect to health information medium, it was found that using Internet to search health information was

associated with the use of other information carriers such as interpersonal sources (142). Literature reported that interpersonal sources and Internet are trustworthy and credible (143). In addition, they carried potentials of communication as shown throughout the discussion of this manuscript. As CIMS posited, with more trust of the carrier, the perceived utility of this carrier will be greater. Accordingly, teens in this study might perceive the usefulness of information obtained from these sources and their relevance to their needs, which enhanced their readiness to engage in information seeking action. This in turn reflected the outcome of the search; the attempt to change PA. In this aspect, literature suggested that purposeful search of health information may result in better outcomes by improving persons' sense of control on their own health behavior (144, 145).

### *Gender*

Gender has been reported consistently among PA correlates in adolescents (50, 51); however, and opposite to what we assumed, it was not found to be statistically significantly associated with the attempt to change PA behavior in our model. This is similar to findings from the systematic review by Craggs et al. who reported no association between PA change in adolescence and gender (134).

Females in our sample had higher odds of attempting to change PA behavior relative to males, which was somewhat surprising even though the association was not significant. One possible explanation for this unexpected finding could be that girls care as much as boys, or even more, about their appearance, wanting to look attractive and to achieve the ideal body shape, and PA and/ or diet are ways that help them to look better.

Support for this came from Ingledew and Sullivan (2002) (146) who found that weight management concerns motivate girls to be active more than boys.

In addition, behavior change is different from the actual behavior. Girls might attempt to become active, but when they participated in PA, the available choices did not match their preferences, ability, or their notion of femininity, or they simply did not find the activity enjoyable (147).

To the barriers mentioned above, one could add factors such as lack of support, socio-cultural norms that imposed certain restrictions on Arab females in the context of PA, and the acceptance of dictated norms that prioritize social involvement over PA (105). Further works are needed to have better understanding about PA perception of Arab female adolescents in this socio-cultural context.

#### *BMI and Body Shape Satisfaction*

In contrast to findings from other studies and our hypothesis, the current study did not find any statistically significant association between the attempt to change PA and BMI or body shape satisfaction.

Results about BMI and body shape satisfaction or perceived body image were inconclusive. Reviews suggested either nonexistent or inconsistent association between PA and BMI (52, 133, 148) and body image perception (52, 134). One systematic review (49) found an association between physical inactivity and both overweight and underweight. Voelker et al. reported that obesity and overweight when combined with body and appearance concerns may lead to avoidance of PA (54).

In a qualitative study, body weight was found to act both as a barrier and as a motivator for PA in adolescent girls (147). Neumark-Sztainer et al. (149) in their study among 4746 adolescents found a significant positive association between body shape satisfaction and PA among male adolescents, but this association was not significant among females.

Heterogeneity in participants, methodology, outcome measures and cultural context may lead to these dissimilarities.

### *Self-Efficacy*

Despite consistent findings from literature which considered SE as a key determinant of PA among adolescents (50-52, 134, 148), we were not able to obtain this relation in our sample. While, higher odds of attempt to change PA behavior were found among highly efficacious teens in the study, the results didn't reach the statistical significance in the multivariable analysis. Further, SE was neither a confounder nor an effect modifier during model building steps in the context of our data.

Yet, the existing evidence about SE is not unanimous. A study by Shokrvash et al. (136) among adolescents in Iran did not find any statistically significant association between PA level and SE in both sexes, and even in male and female separately. Alert et al. (150) in their study aiming to examine association between PA and SE among Hispanic adolescents at baseline and two years follow up, did not find SE to be a significant correlate for PA at follow up, although it was at the baseline. The authors concluded that SE is not a predictor for PA. Craggs et al. (134) in their systematic review reported that the association between PA and SE showed by high quality studies was seemingly between change in PA and change in SE, not the baseline SE.

Other studies linked SE with social support, arguing that it might influence teens PA either directly or indirectly through perceived social support (53, 151, 152). For instance, Dishman et al. (152) in a longitudinal observational study among 195 white and black teen girls, found SE to overcome PA barriers to be neither directly nor indirectly associated with change in perceived support or PA, but it was a moderator. Females with strong perceived support had lower decrease in PA when they had high SE, while those with lower perception of support experienced more decline in PA even

if they had high SE (152).

Overall, a large body of evidence supported an association between SE and PA, and a possible explanation for the above mentioned findings came from Campbell et al. (153) who attributed the variation found in reviews to the use of different SE measures. For instance, Dishman et al. measured SE for overcoming PA barriers, and the measure used by Shokrvash et al. asked about confidence in increasing PA or decreasing sedentary behaviors. Our study, by contrast, did not use PA specific measure for SE.

Schwarzer recommended using specific SE scale if a particular behavior is to be predicated (90). In addition, using imprecise SE measures and the methodological issues associated with self-report may attenuate any observed association between behavior and SE (154).

### *Psychological Distress*

Almost two-thirds of Qatari teens in our study had moderate to high PSD. Al-Kaabi et al. have previously reported a depression prevalence of nearly 35% in this population (107).

We found insignificant association between the attempt to change PA and the level of PSD in univariate analysis; with higher odds of attempt among moderately or highly distressed teens as compared to those with low PSD.

Our findings in this regard resembled that of Hrafnkelsdottir et al. who found no significant relationship between these disorders and objectively measured PA (155).

Results of previous studies on the association between PA and psychological disorders in teens have been inconsistency. Different association has been found between different PA intensity and psychological disorders; whereby low-moderate-intensity PA was associated with lower odds of PSD, while high-intensity PA was associated with higher odds of these disorders (156).

In contrary, another study reported no association between PSD measures and self-reported mild intensity PA, whereas vigorous PA was associated with a reduction in PSD (157).

Additionally, no association was found between adolescents self-reported moderate-to-high or high intensity PA and PSD (85, 158). Intensity and duration of PA were even found to be negatively associated with anxiety, depression and psychological symptoms among college students with a mean age of 19 years (159).

These mixed results mentioned beforehand may be due to dissimilarities in the age or other characteristics of participants, psychological and PA outcome measures, and methodology (160), and warrant more investigations.

Having higher attempts of PA change in more psychologically distressed adolescents in our study can be seen in the light of findings from Wiles et al. (59) and Jerstad et al. (46) who showed that more active teens had reduced odds of depressive symptoms and lower risk for future increase in these symptoms. This implies that PA might be used by teens in our sample as a coping mechanism to alleviate depressive symptoms.

### *Traumatic Experience*

Adverse traumatic experience was not found to be a significant correlate in our model despite being a positive significant potential correlate in univariate analysis. It is noteworthy to mention that 52% of youth in the current study reported being maltreated, whereas 49% were beaten up or abused. This culturally sensitive issue has been previously tapped by Al Kaabi et al. (107). The researchers found an estimated prevalence of psychological and physical abuse to be 41 % and 25% respectively, among a representative sample of secondary school Qatari students aged 14-19 years old. Further investigation is required in this issue.

The association between posttraumatic stress disorders and PA among teens is a growing research area. Individuals were found to respond to traumatic stress, triggered by traumatic experience, by engaging in unhealthy behaviors (47, 61). PA was found to decline overtime among traumatized adult women than those who were not exposed to trauma (161). Findings from a review by Stults-Kolehmainen & Sinha (61), which included studies among adolescents and adults, showed no consensus about the association between PA and stress. While an inverse relationship was reported by the majority of literature included, an increase in PA was found to be associated or predicted by some stressful events in several studies (61).

Regarding major events and trauma, no association was found between PA and being a victim of violence or other threats, whereas a negative association was reported with trauma after a natural disaster and a positive one with trauma after a terrorist attack (61). Using exercise as a stress coping mechanism can explain this positive relation. Meanwhile, its absence may suggest an indirect relation or obscured one due to moderating effect of other variables (61). On the other hand, some studies focused on the effect of PA and exercise in trauma-related disorders, with results showing beneficial effect in reducing such disorders among teens (162).

#### Association between the Attempt to Change PA and Recent PA

As an exploratory step to find if there is any relationship between attempting to change PA behavior and the reported PA level in the last month before the survey, the study did not find any significant association neither in crude nor in adjusted analysis. Contrary to our hypothesis, slightly less than half of the adolescents who attempted PA change were inactive (contemplation-preparation stage) while the rest were active (action stage).

A similar picture was found among those who did not attempt PA change, with

slightly less than half remaining in the precontemplation stage, while the rest made it through the action stage. From the overall sample, almost 45% of teens were in the action stage, one-third were in the contemplation-preparation stage and only 12% stayed in the precontemplation stage. This was a preliminary step which did not intend to make any inference because the study did not use the optimal tool to capture the full stages of behavior change according to TTM.

A significant behavior change is rarely made all at once, as postulated by this model. The person may go through periods of no motivation (precontemplation), thinking about the change (contemplation), planning it (preparation), attempting it (action), and finally adapting the change (maintenance). This process is not always linear, as people may remain in one stage, progress to the next stage, or relapse to a prior stage if their attempts to progress were not successful (163). An important implication here is that interventions can be tailored to address and influence different stages of the change.

In fact, when adolescents attempted to change or actually changed their behavior, sustainability of such changes is not known, or even guaranteed (117, 129). It was also suggested that when a behavior is repeated overtime, the outcome could be a habit which might be a significant enabler or barrier to lifelong PA (45, 50). Previous participation in an organized PA was reported to be associated with sustained and higher PA levels (50), while with multiple unsuccessful change attempts, individuals might be demoralized about their ability to change (45). The survey used in this study didn't capture how many times our teens attempted to change their behavior. In addition, the question posed was not specific to determine the outcome of such attempts as it was asked regardless whether they succeeded or not.

There is a lack in studies that incorporate theoretical frameworks to examine the complex and multidimensional PA behavior in our region. This area warrants more research, both qualitative and quantitative to gain insight into adolescents' perspective of perceived barriers and enablers of engaging and sustaining PA behavior changes. This could help in designing theory-guided effective interventions to change health behaviors, which have been linked with larger and longer-term impacts than those lacking a theoretical base (164).

### Strength and Limitations

In spite of the interesting findings from the present study, they should be interpreted with caution in line of some limitations.

First, this study is a cross-sectional one, as such, temporality assumption is difficult to be assured which did not allow for causal inference. However, given the ordering in the questions about using the sources and attempt to change, our model may allow for some sort of temporality assumption between our main exposure and outcome.

Second, this is secondary data from a complex survey design, this complexity put some hurdles to certain statistical analysis. The log-binomial model, recommended to estimate the prevalence rate ratio in cross-sectional studies, presented convergence problems and couldn't estimate this measure of effect. In addition, we were limited by the available measures in the survey, and to some extent, the research questions were dictated by these measures.

Another source of uncertainty is that the study relied on self-reporting questionnaire which makes PA and other reported variables prone to error and bias such as recall bias and social desirability. The respondents might overreport their utilization

of health information sources, the related attempt to change PA, and PA levels, which may lead to overestimation of the association, accordingly, affecting the internal validity. Similarly, they might be reluctant to report unfavorable correlates, such as BMI and trauma experience, due to perceptions, attitudes and beliefs. This underreporting may result in attenuation of the association. However, anonymity and computer assisted self-administration could lessen this possibility, since they offer fairness and guarantee confidentiality.

Further, though items of the current survey were extracted from a validated questionnaire, both the attempt to change PA and the current PA were measured by single-item questions which were not specific. Aspects such as the duration and outcome of the attempt were not captured. In addition, the range of provided activity options were limited with no indication of duration (more or less than 60 minutes). Similarly, SE measure used in this study was not PA specific measure. These constructs could be measured more deeply with other specific validated instruments available in the literature. Objective measures (e.g. for PA and BMI) would be also preferential in future research. Another limitation was collecting information on the sources, with no data about the content. Obtaining such information would have been helpful in understanding why certain sources had more impact on behavior than others.

One limitation to the generalizability of the findings to all adolescents in the country is the exclusion of teens from other nationalities. Nonresponse among schools and individuals is another weakness. We did not have information about the characteristics of schools that denied participation and the adolescents who did not participate. Students in these schools might have different characteristics than those participated, resulting in selection bias. The non-respondents in the participated schools might also be different from the respondents, which may bias inferences to the

population. However, post survey adjustment was performed to adjust sampling weights for non-response, which could minimize this bias. Moreover, given that adolescents in this study seemed similar to many teenagers in the country and the region, it is reasonable to expect that results may be generalizable to youth in Qatar and in neighboring countries with similar contexts.

Apart from the previously mentioned limitations, this study makes numerous important contributions. It is one of the first studies to examine the attempt to change PA behavior in relation to health-related information sources in the presence of some other important correlates. Unlike other studies which focused on limited number of sources, our study included a wide range of sources combined under specific categories. The study went beyond descriptive nature to explore the link between behavior change and information obtained from each source while taking into account the potential effect of other sources.

Another strength is the large sample which is nationally representative. The study handled the missing data by a sophisticated method; multiple imputation, to obtain valid results. The imputation changed our conclusion regarding gender and provided a more correct analysis. Besides, we estimated average marginal effects from the results of logistic regression model, taking into account the complex sampling design while adjusting for covariate distribution differences between the groups. By doing this, we were able to present results as differences in marginal probabilities or risk differences, which are more informative than OR and relative risks (165), and are important in public health as they indicate the potential for prevention.

Further, the study was also able to shed light on some psychosocially and culturally sensitive issues among adolescents which warrant further research.

## CHAPTER 7: CONCLUSION AND RECOMMENDATIONS

Sufficient and robust evidence in literature endorse continued efforts to promote the recommended levels of PA among our adolescents. Although this study reported higher PA prevalence compared to studies previously done on the same population, the level is still suboptimal with an obvious persistent gender gap.

Findings from the current study contribute to the literature and may inform intervention programs by providing insights into the way teens make sense of health information obtained from different sources and how they integrate them to their behavior. The results lend more support to the importance of interpersonal and online sources and emphasize their role in fostering behavior change among adolescents of both sexes. They also highlight the influence of age and personal value of PA on initiating behavior change.

These findings have a number of practical implications:

First, the findings support a multiple delivery approach of health information to align with the progressively exploratory nature of adolescents, satisfy their extensive need of information, and increase the likelihood of comprehension in order to generate the desired outcome to inform youth behavior.

Given the heavy reliance of teens on interpersonal sources, more tailored health information could be disseminated to and through these sources in different settings: family, school and healthcare facilities, to enhance development and maintenance of PA among youth. Parents, teachers and healthcare providers can collaborate to unify health messages and engage in effective communication with teens to better improve their health and wellbeing. The study also advocates the need for peer-based intervention, such as peer educators, to ensure that correct health information is conveyed to adolescents.

Taken together from a broader perspective, informing and engaging parents, peers, and teachers, may have beneficial effects on their own PA behavior, not only on that of the targeted teenagers.

Second, with the popularity of the Internet and the influence of online sources, there is a need to explore Internet literacy levels and online searching skills among adolescents in the country to better boost these skills. This can empower our teens to properly find, understand, and process online health information.

Third, despite our promising results in respect to the influence of health-related information sources on behavior change, questions remain on the outcome and sustainability of such changes. Future works are needed to advance our understanding on facilitators and barriers of behavior change and its sustainability based on theoretical framework. To analyze complex relationships between the behavior and the observed and unobservable “latent” constructs based on theory’s concept, structure equation modeling analysis appears to be a good method. It is also recommended to be used in the future analysis of data from the survey used in this study.

Fourth, in light of our findings on the influence of personal value of PA, it is also imperative to develop health promotion and education programs that highlight the benefit and importance of PA behavior to youth, stressing the meaning and relevance of such behavior to enhance value identification and make adaptive behavior change possible.

A lot has been done in Qatar to tackle low levels of PA at policy and school levels, but there is still a room for more improvement. Therefore, more effective strategies are needed to increase PA with more attention on girls.

The school setting appears to be a dynamic venue in this regard, given the time adolescents spent there, and the influence of peers and teachers. Schools can undertake

a leadership role to guarantee that adolescents engage in sufficient daily PA. School-based interventions should be age- and gender-sensitive, designed on cultural beliefs and practices and integrate socially acceptable yet enjoyable activities to address the disparities.

Finally, this is a cross sectional study and its findings are far from exhaustive. Exploring the outcome of health information seeking behavior and other modifiable determinants of PA behavior change prospectively would be worthwhile to establish causality, understand the mechanisms, and improve behavior change interventions. We also urge for qualitative research to draw a full image of adolescents PA, gain more insight into the drivers of their health seeking behavior, better understand their perception of PA correlates, and how and why they influence their PA-related decisions.

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## Appendix A: Questionnaire



### CONSENT:

هل توافق على المشاركة في هذه الدراسة؟

- 1 نعم  
2 لا

PROGRAMMER: IF THE ANSWER =1 GO TO Gender question]  
IF THE ANSWER=2, DO NOT START THE SURVEY, GO to REASON

### REASON

لماذا لا توافق المشاركة في هذه الدراسة؟

[textbox]

:End of Questionnaire] DISPLAY

شكرا لك على وقتك. الرجاء رفع يدك للحصول على المساعدة

[all respondents]

[Separate window/page, stand alone; both questions together]

{Q: GENDER}

هل أنت:

- 1 أنثى  
2 ذكر

9 أرفض الإجابة

### [ALL RESPONDENTS]

[SEPARATE WINDOW/PAGE, STAND ALONE; BOTH QUESTIONS TOGETHER]

{Q: NATION}

هل أنت مواطن قطري؟

1. نعم، مواطن قطري

5. لا، لست بمواطن قطري

8. لا أعرف

9. رفض الإجابة

**SEPARATE WINDOW/PAGE, STAND ALONE; BOTH QUESTIONS TOGETHER]**

(open ended questions)

(limit responses from 10 to 20)

{Q: AGE}

ما هو عمرك بالسنوات؟

السنوات ..... [ ] [ ] .....

88. لا أعرف

89. رفض الإجابة

If AGE = 88 or 99, ASK

{Q: YEAR}

في أي عام ولدت؟

العام ..... [1] [9] [ ] [ ] .....

8. لا أعرف

9. رفض الإجابة

**[SEPARATE WINDOW/PAGE, STAND ALONE; ALL BOTH QUESTIONS TOGETHER;]**

[IF RESPONDING 8-9<sup>TH</sup> OR REFUSED, THERE WILL BE PROGRAMMER NOTES IN QUESTIONS APPLICABLE ASKING TO NOT SHOW CERTAIN RESPONSE]

{Q:GRADE}

ما هو الصف الدراسي الذي تنتهي له؟

- |    |                 |
|----|-----------------|
| .1 | الصف الثامن     |
| .2 | الصف التاسع     |
| .3 | الصف العاشر     |
| .4 | الصف الحادى عشر |
| .5 | الصف الثاني عشر |
| .6 | لا أعرف         |
| .7 | رفض الاجابة     |

[ALL RESPONDENTS]

[NUMBERBOXES; RANGE 120CM TO 200CM]

NOTE TO PROGRAMMERS: Open question, Program the question to limit responses to the range provided. It should be in centimeters.]

{Q45:HEIGHT}

س 45. كم طولك؟

سم \_\_\_\_\_

[ALL RESPONDENTS]

[NUMBERBOXES; RANGE 30K -230K]

NOTE TO PROGRAMMERS Open question, program the question to limit responses to the range provided in kilos.]

{Q46:WEIGHT}

س. 46 كم وزنك؟

كغ \_\_\_\_\_

[ALL RESPONDENTS]

[IF RESPONDENT SELECTED GRADE 8<sup>TH</sup>-9<sup>TH</sup> OR REFUSED TO ANSWER, DO NOT PRESENT OPTION 7, 8, 9]

[ALL OPTIONS CAN BE RANDOMIZED, BUT 4&5 SHOULD ALWAYS BE PRESENTED TOGETHER AND 7,8, & 9 SHOULD ALWAYS BE PRESENTED TOGETHER. ANCHOR 22 LAST.]

[DISPLAY OPTIONS 1-14 IN ONE SCREEN; 15-22 IN SECOND SCREEN TO AVOID SCROLLING DOWN]

[OTHER OPTION-' OTHER HEALTH TOPIC NOT MENTIONED HERE" OPEN TEXT BOX; KEEP WITH TABLE]

س 2. الآن، أخبرنا عن أهمية كل من الموضوعات التالية بالنسبة لك شخصياً :

أرفض الإجابة	مهم للغاية	مهم نوعاً ما	غير مهم	غير مهم إطلاقاً
9	4	3	2	1

- |          |   |
|----------|---|
| 1 .....  | {Q2:IMPDEP} الاكتئاب والاضطرابات النفسية الأخرى.....    |
| 2 .....  | {Q2:IMPSMK} التدخين.....                                |
| 3 .....  | {Q2:IMPALL} الحساسية.....                               |
| 4 .....  | {Q2:IMPDIE} النظام الغذائي والتغذية.....                |
| 5 .....  | {Q2:IMPFIT} اللياقة البدنية والتمارين الرياضية.....     |
| 6 .....  | {Q2:IMPEAT} اضطرابات الأكل (مثل نهان أو فهم عصبي) ..... |
| 7 .....  | {Q2:IMPREP} الصحة التناسلية.....                        |
| 8 .....  | {Q2:IMPBULLY} التنمير أو المضايقة أو التمييز.....       |
| 9 .....  | {Q2:IMPPUB} أمور مرتبطة بالبلوغ (مثل حب الشباب).....    |
| 10 ..... | {Q2:IMPHYG} النظافة الشخصية.....                        |
| 11 ..... | {Q2:IMROAD} السلامة الطرقية.....                        |
| 12 ..... | {Q2:IMPANX} التوتر أو القلق.....                        |
| 13 ..... | {Q2:IMPSLP} النوم.....                                  |
| 14 ..... | {Q2:IMPDEN} صحة الفم والأسنان.....                      |
| 15 ..... | {Q2:IMPFLU} نزلات البرد/إنفلونزا.....                   |
| 16 ..... | {Q2:IMPADH} اضطراب نقص التركيز وفرط الحركة.....         |

- 17 ..... السرطان.{Q2:IMPCAN}  
 18 ..... السكري.{Q2:IMPDIAB}  
 19 ..... أمراض القلب.{Q2:IMPHEAR}  
 20 ..... العنف الأسري أو الإساءة.{Q2:IMPVIOL}  
 21 ..... طرق العلاج التقليدية (مثل الوخز بالإبر، والأدوية العشبية، الخ){Q2:IMPTRAD}  
 22 ..... موضوع صحي آخر لم يذكر هنا.{Q2:IMPOTH}

الرجاء تحديد أي أمور صحية أخرى لم تذكر في هذه القائمة هنا [Q2:IMPOTHBOX][textbox]

[ALL RESPONDENTS]

[KEEP ORDER OF ITEMS IN Q2]

[IF RESPONDENT SELECTED GRADE 8<sup>TH</sup>-9<sup>TH</sup> OR REFUSED TO ANSWER, DO NOT PRESENT OPTION 7, 8, 9]

[DISPLAY OPTIONS 1-14 IN ONE SCREEN; 15-22 IN SECOND SCREEN TO AVOID SCROLLING DOWN]

[OTHER OPTION-' OTHER HEALTH TOPIC NOT MENTIONED HERE" OPEN TEXT BOX; KEEP WITH TABLE]

[MARKED FOR DELETION PENDING PILOT INTERVIEW RESULTS/TOTAL TIME OF SURVEY]

س.3. الآن أخبرنا عن أهمية كل من الموضوعات التالية بالنسبة لأصدقائك:

غير مهم إطلاقاً	غير مهم	مهم نوعاً ما	مهم للغاية	لا أعرف	أرفض الإجابة
1	2	3	4	8	9

- 1 ..... الاكتئاب والاضطرابات النفسية الأخرى.{Q3:FRIDEP}  
 2 ..... التدخين.{Q3: FRISMK}  
 3 ..... الخصوبة.{Q3: FRIALL}  
 4 ..... النظام الغذائي والتغذية.{Q3: FRIDIE}  
 5 ..... اللياقة البدنية والتمارين الرياضية.{Q3: FRIFIT}  
 6 ..... اضطرابات الأكل (مثل ئهام أو قهقهة غذائية).{Q3: FRIEAT}  
 7 ..... الصحة التناسلية.{Q3: FRIREP}  
 8 ..... التصرم أو المضائق أو التمييز.{Q3: FRIBULLY}  
 9 ..... أمور مرتبطة بالبلوغ (مثل حب الشباب).{Q3: FRIPUB}  
 10 ..... النظافة الشخصية.{Q3: FRIHYG}  
 11 ..... السلامة الطريقية.{Q3: FRIROAD}  
 12 ..... التوتر أو القلق.{Q3: FRIANX}  
 13 ..... النوم.{Q3: FRISLP}  
 14 ..... صحة الفم والأسنان.{Q3: FRIDEN}  
 15 ..... نزلات البرد/إنفلونزا.{Q3: FRIFLU}  
 16 ..... اضطراب نقص التركيز وفرط الحركة.{Q3: FRIADH}  
 17 ..... السرطان.{Q3: FRICAN}  
 18 ..... السكري.{Q3: FRIDIAB}  
 19 ..... أمراض القلب.{Q3: FRIHEAR}  
 20 ..... العنف الأسري أو الإساءة.{Q3: FRIVIOL}  
 21 ..... طرق العلاج التقليدية (مثل الوخز بالإبر، والأدوية العشبية، الخ){Q3: FRITRAD}  
 22 ..... موضوع صحي آخر لم يذكر هنا.{Q3: FRIOTH}

الرجاء تحديد أي موضوع صحى آخر لم تذكر في هذه القائمة هنا [Q3:FRIOTHBOX][textbox]

[ALL RESPONDENTS]

[OPTIONS SHOULD BE RANDOMIZED. THE POSITION OF F & G CAN CHANGE IN THE LIST AS WELL, BUT THEY SHOULD ALWAYS BE PRESENTED TOGETHER, WITH F PRESENTED FIRST, THEN G.

anchor Q7:USEOTHNET followed by ee last]

[DISPLAY OPTIONS 1-14 IN ONE SCREEN; 15-22 IN SECOND SCREEN TO AVOID SCROLLING DOWN]

[OTHER OPTION THEY CAN SELECT YES/N/R BUT WHEN CHOOSING OPEN UP TEXTBOX ASKING "PLEASE SPECIFY WHICH OTHER SOURCE YOU GET HEALTH INFORMATION FROM" - OPEN TEXT BOX; KEEP WITH TABLE IF POSSIBLE]

[PARTICIPANTS SHOULD BE ABLE TO SKIP WRITING SOMETHING IN TEXTBOX]

س 7. يحصل الناس على المعلومات المتعلقة بالصحة من مصادر مختلفة. فيما يخص المصادر التالية، هل يمكنك أن تحدد إن كنت قد استخدمت أي منها ولو قليلاً للحصول على معلومات صحية؟

نعم، استخدمت هذا المصدر	لا، لم استخدم هذا المصدر	لا ينطبق على	أرفض الإجابة
1	2	3	9

{Q7:USEPAR}	أ. أولياء أمراً
{Q7:USECLAS}	ب. صفوف الصحة في المدرسة
{Q7:USEDDOC}	ج. الأطباء/الممرضون
{Q7:USEFRI}	د. الأصدقاء
{Q7:USEBRO}	هـ. الأخوة والأخوات
{Q7:USETV}	وـ. الأخبار على التلفزيون
{Q7:USEOTHHTV}	زـ. برامج تلفزيونية أخرى (كالبرامج الحوارية، وبرامج الواقع، والبرامج الطبية، والمسلسلات)
{Q7:USENEWSPR}	حـ. مقالات في الصحف المطبوعة
{Q7:USENEWSON}	طـ. مقالات في الصحف الالكترونية
{Q7:USEMAGPR}	يـ. مقالات في المجالات المطبوعة
{Q7:USEMAGON}	اـ. مقالات في المجالات الالكترونية
{Q7:USERADIO}	لـ. الراديو
{Q7:USEBOOKS}	مـ. الكتب
{Q7:USEPAMP}	نـ. منشورات من مستشفى أو عيادة، أو مركز طبي
{Q7:USEADON}	سـ. الإعلانات على الإنترنـت
{Q7:USEADRAD}	عـ. الإعلانات على الراديو
{Q7:USEADTV}	فـ. الإعلانات على التلفزيون
{Q7:USENEWSPI}	صـ. الإعلانات في الصحف
Q7:USEMAG	قـ. الإعلانات في المجالـات
{Q7:USEBILLB}	رـ. لوحـات الإعلـانـات على الـطـرق
{Q7:USEFACEB}	شـ. الفيسبوك
{Q7:USESNAP}	تـ. السناب ثـنـاثـات
{Q7:USETWIT}	ثـ. التويـتر
{Q7:USEINST}	خـ. الإـنـسـتـاجـرـام
{Q7:USEYOUT}	ذـ. الـيوـتـوب
	ضـ.
Q7:USEWIKI	ظـ. الـويـكيـديـا
{Q7:USEMEDWEB}	غـ. موقعـ الـكـتـرـونـيـ طـبـيـ
Q7:USESAHAT	آـ. الموقعـ الـإـلـكـتـرـونـيـ "ـصـحـتـكـ أـولـاـ"
{Q7:USEONFOR}	بـبـ. منتـديـاتـ الـانـتـرـنـتـ حولـ المـعـلـومـاتـ الصـحـيـةـ
{Q7:USEOTHNET}	جـجـ. غيرـ ذـلـكـ منـ مـوـاقـعـ تـواـصـلـ الـاجـتمـاعـيـ (ـمـثـلـ رـايـديـتـ،ـ تـمـبـلـرـ،ـ غـيرـهاـ)
{Q7:USEOTH}	دـدـ. مصدرـ غـيرـ الذيـ تمـ ذـكـرـهـ هـنـاـ.ـ الرـجـاءـ تحـديـدـ أيـ مصدرـ أـخـرـ لمـ يـتمـ ذـكـرـهـ هـنـاـ تـسـتـخدـمـهـ للـحـصـولـ عـلـىـ
{Q7:USEOTHBOX}	المـعـلـومـاتـ الصـحـيـةـ [ـمـرـبـعـ كـتـابـةـ نـصـ]

[IF Q7A-EE=1, ASK]

[NOTE TO PROGRAMMERS: THIS QUESTION SHOULD ONLY BE ASKED OF RESPONDENTS WHO CHOSE RESPONSE 1 FOR ANY SOURCE LISTED IN Q7 (Q7A-DD).

ONLY SHOW THE SOURCE(S) THAT THE RESPONDENT SELECTED 1/YES FOR

PRESENT THE OPTIONS IN THE SAME ORDER AS Q7 (WHICH WILL ALREADY BE RANDOMIZED)]

[IF THERE ARE MORE THAN 14 OPTIONS, PLEASE MAKE SURE 1-14 ARE DISPLAYED IN ONE SCREEN AND THE REST IN A SEPARATE SCREEN. THIS TO AVOID SCROLLING DOWN]

[INCLUDE THE RESPONSE IN THE OTHER-TEXTBOX]

[IF POSSIBLE DO NOT SHOW EMPTY ROWS]

[IN THE RED LETTERS IT SHOULD SAY "TRIED TO CHANGE"]

س. 11 بصرف النظر عما إذا كنت موفقًا في محاولتك أم لا، هل سبق لك أن حاولت تغيير سلوكك بسبب معلومات مرتبطة بالصحة وجدتها من أي من المصادر التالية:

أرفض الإجابة	لا	نعم
9	2	1

{Q11:TRIEDPAR}	أ. أولياء أمرك
{Q11:TRIEDCLAS}	ب. صفوف الصحة في المدرسة
{Q11:TRIEDDOC}	ج. الأطباء/الممرضون
{Q11:TRIEDFRI}	د. الأصدقاء
{Q11:TRIEDBRO}	هـ. الأخوة والأخوات
{Q11:TRIEDTV}	وـ. الأخبار على التلفزيون
{Q11:TRIEDOTHTV}	زـ. برامج تلفزيونية أخرى (كالبرامج الحوارية، وبرامج الواقع، والبرامج الطبية، والمسلسلات)
{Q11:TRIEDNEWSPR}	حـ. مقالات في الصحف المطبوعة
{Q11:TRIEDNEWSON}	طـ. مقالات في الصحف الإلكترونية
{Q11:TRIEDMAGPR}	يـ. مقالات في المجالس المطبوعة
{Q11:TRIEDMAGON}	اـ. مقالات في المجالس الإلكترونية
{Q11:TRIEDRADIO}	لـ. الراديو
{Q11:TRIEDBOOKS}	مـ. الكتب
{Q11:TRIEDPAMP}	نـ. منشورات من مستشفى أو عيادة، أو مركز طبي
{Q11:TRIEDADON}	سـ. الإعلانات على الإنترنت
{Q11:TRIEDADRAD}	عـ. الإعلانات على الراديو
{Q11:TRIEDADTV}	فـ. الإعلانات على التلفزيون
{Q11:TRIEDNEWSP}	صـ. الإعلانات في الصحف
{Q11:TRIEDMAG}	قـ. الإعلانات في المجالس
{Q11:TRIEDBILLB}	رـ. لوحات الإعلانات على الطرق
{Q11:TRIEDFACEB}	شـ. الفيسبوك
{Q11:TRIEDSNAP}	تـ. السناب ثنات
{Q11:TRIEDTWIT}	ثـ. التويتر
{Q11:TRIEDINST}	خـ. الإنستاجرام
{Q11:TRIEDYOUT}	ذـ. اليو توب
{Q11:TRIEDWIK}	ضـ. الويكيبيديا
{Q11:TRIEDMEDWEB}	ظـ. موقع الكتروني طبي
{Q11:TRIEDSAHAT}	غـ. الموقع الإلكتروني "صحتك أو لا"
{Q11:TRIEDONFOR}	ـ. منتديات الانترنت حول المعلومات الصحية
{Q11:TRIEDOTHNET}	بـ. غير ذلك من مواقع تواصل الاجتماعي (مثل رايديت، تمبلر، وغيرها)
{Q11:TRIEDOTH}	جـ. PROGRAMMER: Other health information source mentioned in Q7.ee [should be presented here (if applicable)]

[IF Q11 A-EE= 1, ASK]

[NOTE TO PROGRAMMERS: IF RESPONDENT ANSWERED (YES/1) FOR ANY OF THE OPTIONS (A-EE) IN Q11, PRESENT THIS QUESTION. RANDOMIZE OPTIONS]

[IN THE RED LETTERS IT SHOULD SAY "YES OR NO"]

[IF RESPONDENT SELECTED GRADE 8<sup>TH</sup>-9<sup>TH</sup> OR REFUSED TO ANSWER, DO NOT PRESENT OPTION 3- DRUG OR ALCOHOL ABUSE]

[OTHER "OTHER HEALTH TOPIC NOT MENTIONED HERE "- OPEN TEXT BOX; KEEP WITH TABLE]

[KEEP THE FORMAT OF THE QUESTION AS IN THE OTHER CASES, WITH EACH OF THE OPTIONS APPEARING IN THE QUESTION BOX]

س12.a. هل كانت محاولات تغيير السلوك التي ذكرتها في السؤال السابق مرتبطة بأي من المواضيع الصحية التالية؟

أرفض الإجابة	لا	نعم
9	2	1

1	.....	{Q12a:RELDEP}
2	.....	{Q12a:RELSMK}
3	.....	{Q12a:RELPUB}
4	.....	{Q12a:RELDIE}
5	.....	{Q12a:RELFIT}
6	.....	{Q12a:RELEAT}
7	.....	{Q12a:RELHYG}
8	.....	{Q12a:RELANX}
9	.....	{Q12a:RELSLP}
10	.....	{Q12a:RELDEN}
11	.....	{Q12a:RELFLU}
12	.....	{Q12a:RELADH}
13	.....	غير ذلك لم يذكر هنا [Q12a:RELOTH] [مربع كتابة نص][Q12a:RELOTHBOX]

[ALL RESPONDENTS]  
[RANDOMIZE OPTIONS]

س44. إلى أي مدى توافق أو لا توافق على كل من العبارات التالية:

أرفض الإجابة	لا أعرف	أوافق بشدة	أوافق نوعاً ما	أوافق و لا أتفق	لا أتفق	لا أافق بشدة		
9	8	5	4	3	2	1	أنا قادر على تحقيق معظم الأهداف التي أضعها لنفسي.	{Q44:ACHIGOAL}
9	8	5	4	3	2	1	عند مواجهة المهام الصعبة، أكون واثقاً من أنني سوف أحقيقها	{Q44:FACEDIFF}
9	8	5	4	3	2	1	بشكل عام، أعتقد أنني يمكن الحصول على النتائج التي هي مهمة بالنسبة لي.	Q44:OBTOUT}
9	8	5	4	3	2	1	أعتقد أنني يمكن أن أنجح في ما أسعى إليه	{Q44:BELIEVE}
9	8	5	4	3	2	1	أنا قادر على النجاح على العديد من التحديات بنجاح	{Q44:SUCCESS}
9	8	5	4	3	2	1	أنا واثق من قدرتي على أداء العديد من المهام المختلفة بشكل فعال.	{Q44:CONFID}
9	8	5	4	3	2	1	مقارنة مع أقراني، يمكنني القيام بمعظم المهام بشكل جيد جداً.	{Q44:DOTASK}
9	8	5	4	3	2	1	بإمكانني تنفيذ المهام بشكل جيد، حتى	Q44:PERFORM}

							عندما تكون الأمور صعبة.	
--	--	--	--	--	--	--	----------------------------	--

[ALL RESPONDENTS]  
[RANDOMIZE OPTIONS]

س 48. يُرجى تحديد ما إذا كنت توافق أو لا توافق على كل من العبارات التالية:

أرفض الإجابة	أوافق بشدة	أوافق نوًعاً ما	لا أوافق	لا أافق بشدة	أنا راضٍ عن شكل جسمي	{Q48:SATBOD}
9	4	3	2	1		

[ALL RESPONDENTS]  
[STAND ALONE QUESTION]  
[RESPONDENT IS ONLY PERMITTED TO CHOOSE ONE OPTION]  
{Q50:OFTENACT}

س 50. في الأيام الثلاثين الماضية، كم مَرَّة شاركت في أنشطة بدنية كممارسة الرياضة، أو الركض، أو التمارين، أو حضور صفوف رقص، أو ممارسة اليوغا؟ اختر إجابة واحدة فقط

- عدة مرات في اليوم ..... 1  
 مرّة واحدة في اليوم ..... 2  
 مرّة واحدة أو أكثر في الأسبوع ..... 3  
 مرّة واحدة أو أكثر في الشهر ..... 4  
 أبداً ..... 5  
 أرفض الإجابة ..... 9

[ALL RESPONDENTS]

س 52. خلال الأيام الثلاثين الماضية، كم مرّة شعرت بال التالي؟

أرفض الإجابة	ولا مرّة	الفيل من الوقت	بعض الوقت	معظم الوقت	طوال الوقت		VARIABLE NAME
9	5	4	3	2	1	... التوتر؟	{Q52:NERVOUS}
9	5	4	3	2	1	... اليأس؟	{Q52:HOPELESS}
9	5	4	3	2	1	... التملل التحطّم أو الضيق؟	{Q52:RESTLESS}

9	5	4	3	2	1	... الأكتاب الشديد لدرجة أن لا شيء يفرحك ؟	{Q52:DEPRESSED}
9	5	4	3	2	1	... أن كل نشاط يتطلب جهوداً؟!	Q52:EFFORT
9	5	4	3	2	1	... أنت عديم النفع؟	{Q52:WORTHLESS}
9	5	4	3	2	1	... أنت لست بأمان؟	{Q52:INSECURE}

[ALL RESPONDENTS]

الأسئلة القليلة التالية تتعلق بتجارب قد مرت بها.

س53. أخبرني ما إذا مرت بأي من التجارب التالية؟

أرفض الإجابة	لا أعرف	لا	نعم		
9	8	2	1	هل دخلت <u>المستشفى</u> لمدة أسبوعين أو أكثر بسبب مرض أو إصابة؟	{Q53: HOSPINJU}
9	8	2	1	هل حصل <u>اضطرابات كبيرة بين والديك</u> (مثل الطلاق، الانفصال)؟	{Q53: DIVORCE}
9	8	2	1	هل عشت <u>وفاة صديق مقرب</u> أو فرد من العائلة؟	{Q53:DEATHFAM}
9	8	2	1	هل حدث لك شيء جعلك <u>خائفاً جداً</u> واستمررت بالتفكير فيه لسنوات عدة بعد ذلك؟	{Q53: SCARED}
9	8	2	1	هل <u>أبعدت</u> عن المنزل بسبب سلوك خاطئ قمت به؟	{Q53:SENTAWAY}
9	8	2	1	هل <u>تعززت للضرب من قبل صديق مقرب</u> أو فرد من العائلة؟	{Q53: BEATENUP}
9	8	2	1	هل <u>تعرضت للإساءة من شخص قريب منك</u> ؟ (قد تكون هذه الإساءة جسدية أو معنوية أو إهمال أو استغلال)	{Q53: ABUSED}

**CONSENT:**

Will you agree to take part in the study? 1. Yes 2. No

**[PROGRAMMER: IF THE ANSWER= 1 GO TO Gender question**

**IF THE ANSWER= 2 ASK Can you let us know why you don't agree to take part in the study: <Q:CONSENTXTBX> PROCEED TO End of Questionnaire] DO NOT START THE SURVEY,  
DISPLAY: Thank you for your time. Please raise your hand and ask the interviewer for help]**

**DEMOGRAPHIC QUESTIONS**

**[ALL RESPONDENTS]**

**[SEPARATE WINDOW/PAGE, STAND ALONE; BOTH QUESTIONS TOGETHER]**

What is your Gender?

**{Q:GENDER}**

I am a female .....	1
I am a male .....	2
Refused.....	9

**[ALL RESPONDENTS]**

**[SEPARATE WINDOW/PAGE, STAND ALONE; BOTH QUESTIONS TOGETHER]**

Are you a Qatari citizen?

**{Q:NATION}**

I am a Qatari citizen .....	1
No, I am not a Qatari citizen .	2
Don't Know .....	8
Refused.....	9

**[ALL RESPONDENTS]**

**[SEPARATE WINDOW/PAGE, STAND ALONE; BOTH QUESTIONS TOGETHER]**

**[OPEN ENDED QUESTION]**

**[LIMIT RESPONSES FROM 13-20]**

**{Q: AGE}**

What is your age in years?

Textbox

88. Don't Know

99. Refused

**IF AGE = 88 OR 99 ASK**

**{Q: YEAR}**

In what year where you born?

Textbox DISPLAY 19\_\_\_\_ (YEAR)

8. Don't Know

9. Refused

**[ALL RESPONDENTS]**

**[SEPARATE WINDOW/PAGE, STAND ALONE; ALL BOTH QUESTIONS TOGETHER;]**

**[IF RESPONDING 8-9<sup>TH</sup> OR REFUSED, THERE WILL BE PROGRAMMER NOTES IN QUESTIONS APPLICABLE ASKING TO NOT SHOW CERTAIN RESPONSE]**

What school grade do you belong to?  
**{Q:GRADE}**

8 <sup>th</sup>	1
9 <sup>th</sup>	2
10 <sup>th</sup>	3
11 <sup>th</sup>	4
12 <sup>th</sup>	5
Don't Know	8
Refused	9

**[ALL RESPONDENTS]**

**[NUMBERBOXES; RANGE 120CM TO 200CM]**

**[NOTE TO PROGRAMMERS: Open question, Program the question to limit responses to the range provided. It should be in centimeters.]**

**How tall are you?**

**{Q:HEIGHT}**

\_\_\_\_\_ centimeters

**[ALL RESPONDENTS]**

**[NUMBERBOXES; RANGE 30K -230K]**

**[NOTE TO PROGRAMMERS Open question, program the question to limit responses to the range provided in kilos.]**

How much do you weigh?

**{Q:WEIGHT}**

\_\_\_\_\_ kilograms

**[ALL RESPONDENTS]**

**[SEPARATE WINDOW/PAGE, STAND ALONE]**

Q1. Please mark the statement that best applies to you. (Mark one response only)

**{Q:SCHOOLTYPE}**

I attend an independent school/government school .	1
I attend an international school./private school .....	2
Refused .....	9

**[ALL RESPONDENTS]**

**[IF RESPONDENT SELECTED GRADE 8<sup>TH</sup>-9<sup>TH</sup>, DON'T KNOW, OR REFUSED TO ANSWER, DO NOT PRESENT OPTION 7, 8, 9]**

**[ALL OPTIONS CAN BE RANDOMIZED, BUT 4&5 SHOULD ALWAYS BE PRESENTED TOGETHER AND 7,8, & 9 SHOULD  
ALWAYS BE PRESENTED TOGETHER. ANCHOR 22 LAST.]**

**[DISPLAY OPTIONS 1-14 IN ONE SCREEN; 15-22 IN SECOND SCREEN TO AVOID SCROLLING DOWN]**

**[OTHER OPTION-' OTHER HEALTH TOPIC NOT MENTIONED HERE" OPEN TEXT BOX; KEEP WITH TABLE]**

Q2. Now please tell us how important each of the following **health topics** are to YOU PERSONALLY:

Not at all important	Not too important	Somewhat important	Very important	Refused
1	2	3	4	9

**{Q2:IMPDEP}** Depression or other mental  
health issues ..... 1

**{Q2:IMPSMK}** Smoking..... 2

**{Q2:IMPALL}**Allergies ..... 3

**{Q2:IMPDIE}** Diet and nutrition..... 4

{Q2:IMPFIT}Fitness and exercise .....	5
{Q2:IMPEAT}Eating disorders (such as anorexia or bulimia).....	6
{Q2:IMPREP}Reproductive health.....	7
{Q2:IMPBULLY}Bullying .....	8
{Q2:IMPPUB}Issues surrounding puberty (such as menstruation, acne)	
.....	9
{Q2:IMPHYG}Hygiene.....	10
{Q2:IMPROAD} Road safety .....	11
{Q2:IMPANX}Stress or anxiety.....	12
{Q2:IMPSLP}Sleep .....	13
{Q2:IMPDEN}Dental health .....	14
{Q2:IMPFLU}Colds/flu .....	15
{Q2:IMPADH}Attention deficit disorder (ADHD).....	16
{Q2:IMPCAN}Cancer .....	17
{Q2:IMPDIAB}Diabetes .....	18
{Q2:IMPHEAR}Heart disease .....	19
{Q2:IMPVIOL}Domestic violence or abuse .....	20
{Q2:IMPTRAD}Traditional healing methods (e.g. acupuncture, herbal medicine, etc.) .....	21
{Q2:IMPOTH}Other health topic not mentioned here.....	22
{Q2:IMPOTHBOX}Please Specify what other health topic not mentioned here [textbox] ....	

[ALL RESPONDENTS]

[KEEP ORDER OF ITEMS IN Q2]

[IF RESPONDENT SELECTED GRADE 8<sup>TH</sup>-9<sup>TH</sup>, DON'T KNOW, OR REFUSED TO ANSWER, DO NOT PRESENT OPTION 7, 8, 9]

[DISPLAY OPTIONS 1-14 IN ONE SCREEN; 15-22 IN SECOND SCREEN TO AVOID SCROLLING DOWN]

[OTHER OPTION-' OTHER HEALTH TOPIC NOT MENTIONED HERE" OPEN TEXT BOX; KEEP WITH TABLE]

[MARKED FOR DELETION PENDING PILOT INTERVIEW RESULTS/TOTAL TIME OF SURVEY]

Q3. How much do YOUR FRIENDS care about each of the following health topics?

Not at all	Only a little	Somewhat	A lot	Don't Know	Refused
1	2	3	4	8	9

{Q3:FRIDEP} Depression or other mental health issuesh .....	1
{Q3:FRISMK} Smoking.....	2
{Q3:FRIALL}Allergies .....	3
{Q3:FRIDIE} Diet and nutrition .....	4
{Q3:FRIFIT}Fitness and exercise .....	5
{Q3:FRIEAT}Eating disorders (such as anorexia or bulimia).....	6
{Q3:FRIREP}Reproductive health.....	7
{Q3:FRIBULLY} Bullying .....	8
{Q3:FRIPUB}Issues surrounding puberty (such as menstruation, acne)	
.....	9
{Q3:FRIHYG}Hygiene .....	10
{Q3:FRIROAD}Road safety .....	11
{Q3:FRIANX}Stress or anxiety.....	12
{Q3:FRISLP}Sleep .....	13

{Q3:FRIDEN}	Dental health .....	14
{Q3:FRIFLU}	Colds/flu .....	15
{Q3:FRIADH}	Attention deficit disorder (ADHD).....	16
{Q3:FRICAN}	Cancer .....	17
{Q3:FRIDIAB}	Diabetes .....	18
{Q3:FRIHEAR}	Heart disease .....	19
{Q3:FRIVIOL}	Domestic violence or abuse .....	20
{Q3:FRITRAD}	Traditional healing methods (e.g. acupuncture, herbal medicine, etc.) .....	21
{Q3:FRIOTH}	Other health topic not mentioned here.....	22
{Q3:FRIOTHBOX}	Please Specify what other health topic not mentioned here.....	

**[ALL RESPONDENTS]**

**[OPTIONS SHOULD BE RANDOMIZED. THE POSITION OF F & G CAN CHANGE IN THE LIST AS WELL, BUT THEY SHOULD ALWAYS BE PRESENTED TOGETHER, WITH F PRESENTED FIRST, THEN G.]**

**ANCHOR EE LAST]**

**[DISPLAY OPTIONS 1-14 IN ONE SCREEN; 15-22 IN SECOND SCREEN TO AVOID SCROLLING DOWN]**

**[OTHER OPTION THEY CAN SELECT YES/N/R BUT WHEN CHOOSING OPEN UP TEXTBOX ASKING “PLEASE SPECIFY WHICH OTHER SOURCE YOU GET HEALTH INFORMATION FROM” - OPEN TEXT BOX; KEEP WITH TABLE IF POSSIBLE]**

**[PARTICIPANTS SHOULD BE ABLE TO SKIP WRITING SOMETHING IN TEXTBOX]**

Q7. People get information about health from many different sources. For each of the following sources please indicate whether you have used them at all to get information about health topics.

Yes, I use this source	No I haven't used this source	Not Applicable	Refused
1	2	3	9

- a. Your guardianss {Q7:USEPAR}
- b. Doctors/nurses {Q7:USEDODC}
- c. Friends {Q7:USEFRI}
- d. Brothers or sisters {Q7:USEBRO}
- e. TV news {Q7:USETV}
- f. Other TV shows (such as talk shows, reality shows, medical or other dramas)  
{Q7:USEOHTV}
- g. Newspaper articles (print version) {Q7:USENEWSPR}
- h. Newspaper articles (online version) {Q7:USENEWSON}
- i. Magazine articles (print version) {Q7:USEMAGPR}
- j. Magazine articles (online version) {Q7:USEMAGON}
- k. Radio {Q7:USERADIO}
- l. Books {Q7:USEBOOKS}
- m. Leaflets/pamphlets from a hospital, clinic, or medical practice {Q7:USEPAMP}

- n. Ads online {Q7:USEADON}
- o. Ads on the radio {Q7:USEADRAD}
- p. Ads on TV {Q7:USEADTV}
- q. Ads in newspapers {Q7:USENEWSP}
- r. Ads in magazines {Q7:USEMAG}
- s. Billboards {Q7:USEBILLB}
- t. Facebook {Q7:USEFACEB}
- u. Snapchat {Q7:USESNAP}
- v. Twitter {Q7:USETWIT}
- w. Instagram {Q7:USEINST}
- x. YouTube {Q7:USEYOUT}
- y. Any other social networking site (Reddit, Tumblr, other) {Q7:USEOTHNET}
- z. Wikipedia {Q7:USEWIKI}
- aa. A medical website {Q7:USEMEDWEB}
- bb. Sahatak Awalan website {Q7:USESAHAT}
- cc. Online forums about health information {Q7:USEONFOR}
- dd. Another source not mentioned here. {Q7:USEOTH}

Please specify which other source you get health information from [textbox]  
**{Q7:USEOTHBOX}**

**[IF Q7A-EE=1, ASK]**

**[NOTE TO PROGRAMMERS: THIS QUESTION SHOULD ONLY BE ASKED OF RESPONDENTS WHO CHOSE RESPONSE 1 FOR ANY SOURCE LISTED IN Q7 (Q7A-DD).**

**ONLY SHOW THE SOURCE(S) THAT THE RESPONDENT SELECTED 1/YES FOR**

**PRESENT THE OPTIONS IN THE SAME ORDER AS Q7 (WHICH WILL ALREADY BE RANDOMIZED)]**

**[IF THERE ARE MORE THAN 14 OPTIONS, PLEASE MAKE SURE 1-14 ARE DISPLAYED IN ONE SCREEN AND THE REST IN A SEPARATE SCREEN. THIS TO AVOID SCROLLING DOWN]**

**[INCLUDE THE RESPONSE IN THE OTHER-TEXTBOX]**

**[IF POSSIBLE DO NOT SHOW EMPTY ROWS]**

**[IN THE RED LETTERS IT SHOULD SAY “TRIED TO CHANGE”]**

Q11. Irrespective of whether you succeeded or not, have you ever tried to change your behavior because of any of the health-related information you've found from each of the following sources?

Yes	No	Refused
1	2	9

- a. Your guardians {Q11:TRIEDPAR}
- b. Health classes in school {Q11:TRIEDCLAS}
- c. Doctors/nurses {Q11:TRIEDDOC}
- d. Friends {Q11:TRIEDFRI}

- e. Brothers or sisters {Q11:TRIEDBRO}
- f. TV news {Q11:TRIEDTV}
- g. Other TV shows (such as talk shows, reality shows, medical or other dramas) {Q11:TRIEDOTHDTV}
- h. Newspaper articles (print version) {Q11:TRIEDNEWSPR}
- i. Newspaper articles (online version) {Q11:TRIEDNEWSON}
- j. Magazine articles (print version) {Q11:TRIEDMAGPR}
- k. Magazine articles (online version) {Q11:TRIEDMAGON}
- l. Radio {Q11:TRIEDRADIO}
- m. Books {Q11:TRIEDBOOKS}
- n. Leaflets/pamphlets from a hospital, clinic, or medical practice {Q11:TRIEDPAMP}
- o. Ads online {Q11:TRIEDADON}
- p. Ads on the radio {Q11:TRIEDADRAD}
- q. Ads on TV {Q11:TRIEDADTV}
- r. Ads in newspapers {Q11:TRIEDNEWSP}
- s. Ads in magazines {Q11:TRIEDMAG}
- t. Billboards {Q11:TRIEBILLB}
- u. Facebook {Q11:TRIEDFACEB}
- v. Snapchat {Q11:TRIEDSNAP}
- w. Twitter {Q11:TRIEDTWIT}
- x. Instagram {Q11:TRIEDINST}
- y. YouTube {Q11:TRIEDYOUT}
- z. Any other social networking site (Reddit, Tumblr, other) {Q11:TRIEDOTHNET}
- aa. Wikipedia {Q11:TRIEDWIK}
- bb. A medical website {Q11:TRIEDMEDWEB}
- cc. Sahatak Awalan website {Q11:TRIEDSAHAT}
- dd. Online forums about health information {Q11:TRIEDONFOR}
- ee. Another source not mentioned here. {Q11:TRIEDOTH}

**[NOTE TO PROGRAMMERS: All other responses mentioned in Q7.ee “other” should be presented in this question as well.]**

**[IF Q11 A-EE= 1, ASK]**

**[IF RESPONDENT SELECTED GRADE 8<sup>TH</sup>-9<sup>TH</sup> OR REFUSED TO ANSWER, DO NOT PRESENT OPTION 3]**

**[NOTE TO PROGRAMMERS: IF RESPONDENT ANSWERED (YES/1) FOR ANY OF THE OPTIONS (A-EE) IN Q11, PRESENT THIS QUESTION. RANDOMIZE OPTIONS]**

**[IN THE RED LETTERS IT SHOULD SAY “YES OR NO”]**

**[OTHER “OTHER HEALTH TOPIC NOT MENTIONED HERE “- OPEN TEXT BOX; KEEP WITH TABLE]**

[KEEP THE FORMAT OF THE QUESTION AS IN THE OTHER CASES, WITH EACH OF THE OPTIONS APPEARING IN THE QUESTION BOX]

Q12a. Have the changes you just mentioned been related to any of the following health topics?

Yes	No	Refused
1	2	9

**{Q12a:RELDEP}** Depression or other  
 mental health issues ... 1  
**{Q12a:RELSMK}** Smoking ..... 2  
**{Q12a:RELPUB}** Issues surrounding  
 puberty (such as  
 menstruation, acne) ..... 3  
**{Q12a:RELDIE}** Diet and nutrition ..... 4  
**{Q12a:RELFIT}** Fitness and exercise..... 5  
**{Q12a:RELEAT}** Eating disorders (such as  
 anorexia or bulimia)... 6  
**{Q12a:RELHYG}** Hygiene habits ..... 7  
**{Q12a:RELANX}** Stress or anxiety ..... 8  
**{Q12a:RELSLP}** Sleep..... 9  
**{Q12a:RELDEN}** Dental health..... 10  
**{Q12a:RELFLU}** Colds/flu..... 11  
**{Q12a:RELADH}** Attention deficit disorder  
 (ADHD) ..... 12  
**{Q12a:RELOTH}** Other health topic not  
 mentioned here..... 13

Please specify the other health not  
 mentioned in the list [textbox]

**{Q12a:RELOTHBOX}**

**[ALL RESPONDENTS]**

**[RANDOMIZE OPTIONS]**

Q44. TO WHAT EXTENT DO YOU AGREE/DISAGREE WITH THE FOLLOWING STATEMENTS?

		STRONGLY DISAGREE	DISAGREE	NEITHER AGREE NOR DISAGREE	AGREE	STRONGLY AGREE	DON'T KNOW	REFUSE
1	I AM ABLE TO ACHIEVE MOST OF THE GOALS THAT I HAVE SET FOR MYSELF— WHATEVER THEY ARE. <b>{Q44:ACHIGOAL}</b>	1	2	3	4	5	8	9
2	WHEN FACING DIFFICULT TASKS, I AM CERTAIN THAT I ACCOMPLISH THEM. <b>{Q44:FACEDIFF}</b>	1	2	3	4	5	8	9
3	In general, I think that I can obtain outcomes that are important to me. <b>{Q44:OBTOUT}</b>	1	2	3	4	5	8	9
4	I believe I can succeed at any	1	2	3	4	5	8	9

	endeavor to which I set my mind. <b>{Q44:BELIEVE}</b>							
5	I am able to successfully overcome many challenges. <b>{Q44:SUCCESS}</b>	1	2	3	4	5	8	9
6	I am confident that I can perform effectively on many different tasks. <b>{Q44:CONFID}</b>	1	2	3	4	5	8	9
7	Compared to my peers, I can do most tasks very well—whatever they are. <b>{Q44:DOTASK}</b>	1	2	3	4	5	8	9
8	Even when things are tough, I can perform quite well. <b>{Q44:PERFORM}</b>	1	2	3	4	5	8	9

[ALL RESPONDENTS]

[RANDOMIZE OPTIONS]

Q48. Please mark whether you agree or disagree with each of the following statements:

		Strongly disagree	Somewhat disagree	Somewhat agree	Strongly agree	Refused
1	I am satisfied with the shape of my body <b>{Q48:SATBOD}</b>	1	2	3	4	9

[ALL RESPONDENTS]

[STAND ALONE QUESTION]

[RESPONDENT IS ONLY PERMITTED TO CHOOSE ONE OPTION ONLY]

Q50. In the past 30 days, how often have you participated in physical activities, such as playing sports, running, working out, taking a dance class, or doing yoga? Select one.

**{Q50:OFTENACT}**

- |                           |   |
|---------------------------|---|
| Several times a day ..... | 1 |
| Once a day .....          | 2 |
| Once or more a week.....  | 3 |
| Once or more a month..... | 4 |
| Never .....               | 5 |
| Refused.....              | 9 |

[ALL RESPONDENTS]

Q52. During the past 30 days, how often did you feel

		All of the time	Most of the time	Some of the time	A little of the time	None of the time	Refused
1	... nervous? <b>{Q52:NERVOUS}</b>	1	2	3	4	5	9
2	... hopeless? <b>{Q52:HOPELESS}</b>	1	2	3	4	5	9

3	... restless or fidgety? <b>{Q52:RESTLESS}</b>	1	2	3	4	5	9
4	... so depressed that nothing could cheer you up? <b>{Q52:DEPRESSED}</b>	1	2	3	4	5	9
5	... that everything was an effort? <b>{Q52:EFFORT}</b>	1	2	3	4	5	9
6	... worthless? <b>{Q52:WORTHLESS}</b>	1	2	3	4	5	9
7	... insecure? <b>{Q52:INSECURE}</b>	1	2	3	4	5	9

**[DISPLAY]**

THE NEXT FEW QUESTIONS ASK ABOUT SOME THINGS THAT MAY HAVE HAPPENED TO YOU.

**[ALL RESPONDENTS]**

Q53. Please tell me if any of these things have happened.

		Yes	No	Don't Know	Refused
1	{Q53: HOSPINJU} Were you <b>hospitalized</b> for 2 weeks or more due to extreme illness or injury?	1	2	8	9
2	{Q53: DIVORCE} Was there a <b>major upheaval</b> between your guardians (such as divorce, separation)?	1	2	8	9
3	{Q53: DEATHFAM} Did you experience a <b>death</b> of a very close friend or family member?	1	2	8	9
4	{Q53: SCARED} Did something happen that <b>scared</b> you so much you thought about it for years after?	1	2	8	9
5	{Q53: SENTAWAY} Were you <b>sent away</b> from home because you did something wrong?	1	2	8	9
6	{Q53: BEATEN UP} Were you ever <b>beaten up</b> by someone close to you, like a family member or a friend?	1	2	8	9
7	{Q53: ABUSED} Were you ever <b>sexually abused</b> by someone close to you, like a family member or a friend?	1	2	8	9