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Assessing Knowledge, Attitudes, and Practices of Primary Healthcare Physicians Toward Physical Activity Counseling, Saudi Arabia, Eastern Province

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2013

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Abstract

Assessing Knowledge, Attitudes, and Practices of Primary Healthcare Physicians Toward Physical Activity Counseling, Saudi Arabia, Eastern Province

By Zahra Alahmed

Background: Physical inactivity is a major health issue in Saudi Arabia (SA) and is considered a risk factor for other non-communicable diseases. Being physically active can improve overall health and prevent the risk of non-communicable diseases and their consequences. Primary healthcare (PHC) centers are a suitable place for health promotion and physical activity (PA) counseling, both of which are affected by the knowledge, attitudes, and practices of PHC physicians.

Aims: 1. Assess the knowledge, attitudes, and practices of PHC physicians in SA toward PA through self-reported surveys. 2. Identify barriers to providing PA counseling. 3. Assess physician lifestyle behaviors and the related effects on physicians' PA counseling practices. 4. Develop a set of recommendations for a potential strategy to promote physical activity through PHC centers

Method: This cross-sectional study was conducted in four main cities in Eastern Province, SA (AL-Khobar, Dammam, Qatif, and Safwa). A total of 147 physicians filled out self-reported surveys for use in the assessment of aims.

Results: Overall, 61.54% of physicians believed that PA promotion to patients was their responsibility. They felt confident in their ability to provide counseling but believed that they lacked time and adequate referral services for PA and received inadequate training in PA counseling. Among all family and general physicians, the prevalence of PA counseling practice increased if the patient had a chronic disease. Moreover, several factors were associated with physicians' attitudes toward PA counseling and their PA counseling practice, including physician age, gender, specialty, education level, university of graduation, level of knowledge about PA guidelines, general health status, number of adult and pediatric patients seen by physician/day, number of nurses working in PHC centers, and others.

Recommendations: Training the medical staff in PA counseling and empowering the healthcare manpower and infrastructure can help physicians improve their counseling practice. Furthermore, working with the community to develop an electronic referral system for community centers and gyms to promote physical activity could be beneficial. This approach would help decrease physical inactivity in SA and its related health and economic burdens.

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Chapter 1. Introduction

Abbreviations

ACSM	American College of Sports Medicine
AHA	American Heart Association
BMI	body mass index
BP	blood pressure
CA	cancer
CAD	coronary artery disease
CDC	U.S. Centers for Disease Control and Prevention
CHD	coronary heart disease
COPD	chronic obstructive pulmonary disease
CVD	cardiovascular disease
DASH	dietary approaches to stop hypertension
DBP	diastolic blood pressure
DM	diabetes mellitus
DOHHS	Department of Health and Human Services
ECG	electrocardiogram (electrocardiographic)
FITT	frequency, intensity, time, and type
HbA1C	glycosylated hemoglobin
HDL	high-density lipoprotein cholesterol
HR	heart rate
HTN	hypertension
LBP	lower back pain
LDL	low-density lipoprotein cholesterol

MOH	Ministry of Health
PAF	population attributable fraction PAF
SBP	systolic blood pressure
TG	Triglycerides
USPSTF	U.S. Preventive Services Task Force
WHO	World Health Organization
WHR	waist-to-hip ratio

Definitions and Terms

- **Physical activity** is defined as any bodily movement produced by the contraction of skeletal muscles that results in a substantial increase in caloric requirements over resting energy expenditure [2].
- **Insufficient physical** activity is defined as less than 150 minutes of moderate physical activity per week [3].
- **Exercise** is a type of physical activity consisting of planned, structured, and repetitive bodily movement done to improve and/or maintain one or more components of physical fitness [2].
- **Physical fitness** is defined as a set of attributes or characteristics that individuals have or achieve that relates to their ability to perform physical activity [4].
- **Cardiorespiratory fitness** is the ability of the circulatory and respiratory systems to provide oxygen during sustained aerobic physical activity [5].
- **Health** has physical, mental, social, and psychological dimensions. Positive health is not merely the absence of disease or infirmity but the capacity to withstand challenges and to accomplish life's activities with pleasure and energy [5].
- **Leisure-time physical activity** refers to physical activities performed by a person that are not required as essential activities of daily living and are performed at the discretion of that person. These activities include sports participation, exercise conditioning or training, and recreational activities such as going for a walk, dancing, and gardening [4].
- **Lifestyle activities** is a term that is frequently used to encompass activities that one carries out in the course of one's daily life that can contribute to sizeable energy expenditure, such as taking the stairs instead of using the elevator, walking to run errands

instead of driving, exiting the bus one stop earlier, or parking farther away than usual to walk to a destination [4].

- **Dose** refers to the amount of physical activity performed by the subject or participants in the field of physical activity. The total dose or amount is determined by the three components of activity: frequency, duration, and intensity. Frequency is commonly recorded as sessions, episodes, or bouts per day or per week. Duration is the length of time for each bout of any specific activity. Intensity is the rate of energy expenditure necessary to perform the activity to accomplish the desired function (aerobic activity) or the magnitude of the force exerted during resistance exercise [4].
- **Dose response** is defined as the relationship between the dose of physical activity and the health or fitness outcome of interest. The dose can be measured in terms of a single component of activity (e.g., frequency, duration, intensity) or as the total amount. This concept is similar to the prescription of a medication, where the expected response will vary as the dose of the medication is changed. The dose–response relationship can be linear, exponential, or hyperbolic, and the dose–response relationship is likely to vary depending on the primary measure of interest. For example, improvements in cardiorespiratory fitness, bone health, or adiposity are common dose–response measures of interest. A dose of physical activity may exist below which no effect is detected, as may a dose above which no effect is detected. These seemingly lowest and highest doses of activity may be called “thresholds,” but this term should be used with caution as these apparent limits may be more related to problems of measurement than to true biological limitations [4].

- **Duration** refers to the length of time during which an activity or exercise is performed. Duration is generally expressed in minutes [4].
- **Frequency** is the number of times an exercise or activity is performed. Frequency is generally expressed in sessions, episodes, or bouts per week [4].
- **Intensity** refers to how much work is being done or the magnitude of the effort required to perform an activity or exercise [4].
- **Aerobic physical activity** is activity in which the body's large muscles move in a rhythmic manner for a sustained period of time. Aerobic activity, also called endurance activity, improves cardiorespiratory fitness. Examples include walking, running, swimming, and bicycling [6].
- **Moderate-intensity physical activity**, on an absolute scale, is physical activity that is done at 3.0 to 5.9 times the intensity of rest. On a scale relative to an individual's personal capacity, moderate-intensity physical activity is usually a 5 or 6 on a scale from 0 to 10 [6].
- **Muscle-strengthening activity (strength training, resistance training, or muscular strength and endurance exercises)** encompasses physical activity, including exercise that increases skeletal muscle strength, power, endurance, and mass [6].
- **Vigorous-intensity physical activity**, on an absolute scale, is physical activity that is done at 6.0 or more times the intensity of rest. On a scale relative to an individual's personal capacity, vigorous-intensity physical activity is usually a 7 or 8 on a scale from 0 to 10 [6].
- **Strength training** (also resistance training) refers to activities designed to improve the strength, power, endurance, and size of skeletal muscles [5].

- **Resistance training** refers to an exercise program that uses repeated, progressive contractions of specific muscle groups to increase muscle strength, endurance, or power [7].
- **Quality of life** is defined as an overall satisfaction and happiness with life. It includes the facets of physiological, emotional, functional, and spiritual well-being [7].

The Health Benefits of Physical Activity

Studies have suggested that physician-recommended physical activity is one of the most powerful health-promoting practices [8]. Physical activity reduces the risk of diabetes, stroke, ischemic heart diseases, and breast and colon cancers. It is also important for weight control and the prevention of obesity [9]. Furthermore, evidence has shown that physical activity improves mental health by reducing anxiety, depression, and stress [10]. In addition, the health-related outcomes of physical activity are inversely associated with the dose of physical activity (Figure 1). The health-related benefits of physical activity are summarized in Table 1 [4, 11-13].

Table 1. Health-Related Benefits of Physical Activity

Health Outcome	Evidence for Inverse Dose–Response Relationship	Effect Size	Strength of Evidence †
All-cause mortality	Yes	30% risk reduction	Strong
Cardiorespiratory health	Yes	20% to 35% lower risk of cardiovascular disease, coronary heart disease, and stroke	Strong
	_____	Lower risk of high blood pressure Aerobic activity decreases blood pressure by 6.9/4.9 mmHg	Strong
	Yes	Increased cardiorespiratory and muscular fitness	Strong
Metabolic health	Yes	30% to 40% lower risk of metabolic syndrome and type 2 diabetes in at least moderately active people compared to those who are sedentary	Moderate to Strong
	_____	Healthier body mass and composition	Strong
Energy balance	Yes	Weight loss	Strong
	Yes	Weight maintenance following weight loss	Moderate
	Yes	Abdominal obesity	Moderate

Table 1. Health-Related Benefits of Physical Activity			
Health Outcome	**Evidence for Inverse Dose–Response Relationship**	**Effect Size**	**Strength of Evidence †**
Musculoskeletal health	Yes	**Bone:** Reduced risk of hip fracture is 36% to 68% at the highest level of physical activity. The magnitude of the effect of physical activity on bone mineral density is 1% to 2%.	Moderate (weak for vertebral fracture)
	Yes	**Muscular:** Increases in exercise training enhance skeletal muscle mass, strength, power, and intrinsic neuromuscular activation.	Strong
Functional health	Yes	Approximately 30% risk reduction in terms of the prevention or delay in function and/or role limitations with physical activity.	Moderate to strong
		Older adults who participate in regular physical activity have an approximately 30% lower risk of falls.	Strong
	_____	Improved cognitive function.	Strong
Cancer	Yes	30% lower risk of colon cancer and approximately 20% lower risk of breast cancer for adults participating in daily physical activity.	Strong
	_____	Lower risk of lung cancer and endometrial cancer.	Moderate

Table 1. Health-Related Benefits of Physical Activity			
Health Outcome	**Evidence for Inverse Dose–Response Relationship**	**Effect Size**	**Strength of Evidence †**
Mental health	Yes	There is an approximately 20% to 30% lower risk of depression and dementia for adults participating in daily physical activity.	Strong
	Yes	There is an approximately 20% to 30% lower risk of distress for adults participating in daily physical activity.	Weak
	_____	Improved sleep quality.	Moderate

(Adapted from [4, 11-13])

†The strength of the evidence was classified as follows:
Strong: strong, consistent across studies and populations
Moderate: moderate or reasonable, reasonably consistent
Weak: Weak or limited, inconsistent across studies and populations

Unfortunately, according to the World Health Organization (WHO), physical inactivity is considered the fourth leading risk factor for global mortality [14] and is estimated to account for 6% of the global mortality rate [9]. Worldwide, physical inactivity has been estimated to be leading cause of most non-communicable diseases (NCDs), 6% of coronary heart disease cases, 7% of type 2 diabetes cases, 10% of breast cancers, and 10% of colon cancers [12]. In 2008, physical inactivity caused more than 5.7 million deaths worldwide and 9% of premature mortality [12].

In the region surrounding Saudi Arabia (SA), more than 1.2 million people died due to

NCDs in 2008 [15]. In SA, WHO estimated 57% of children and 71% of youths were physically inactive [16]. In a similar vein, according to a national survey, 60% of the Saudi Arabian population is physically inactive [17]. Worldwide, NCDs such as hypertension, diabetes, and ischemic heart disease are among the top causes of death [18]. Thus, with such a high prevalence, physical inactivity is a major public health burden. Elimination of this unhealthy behavior is expected to increase the life expectancy of the world's population by 0.68 years [12].

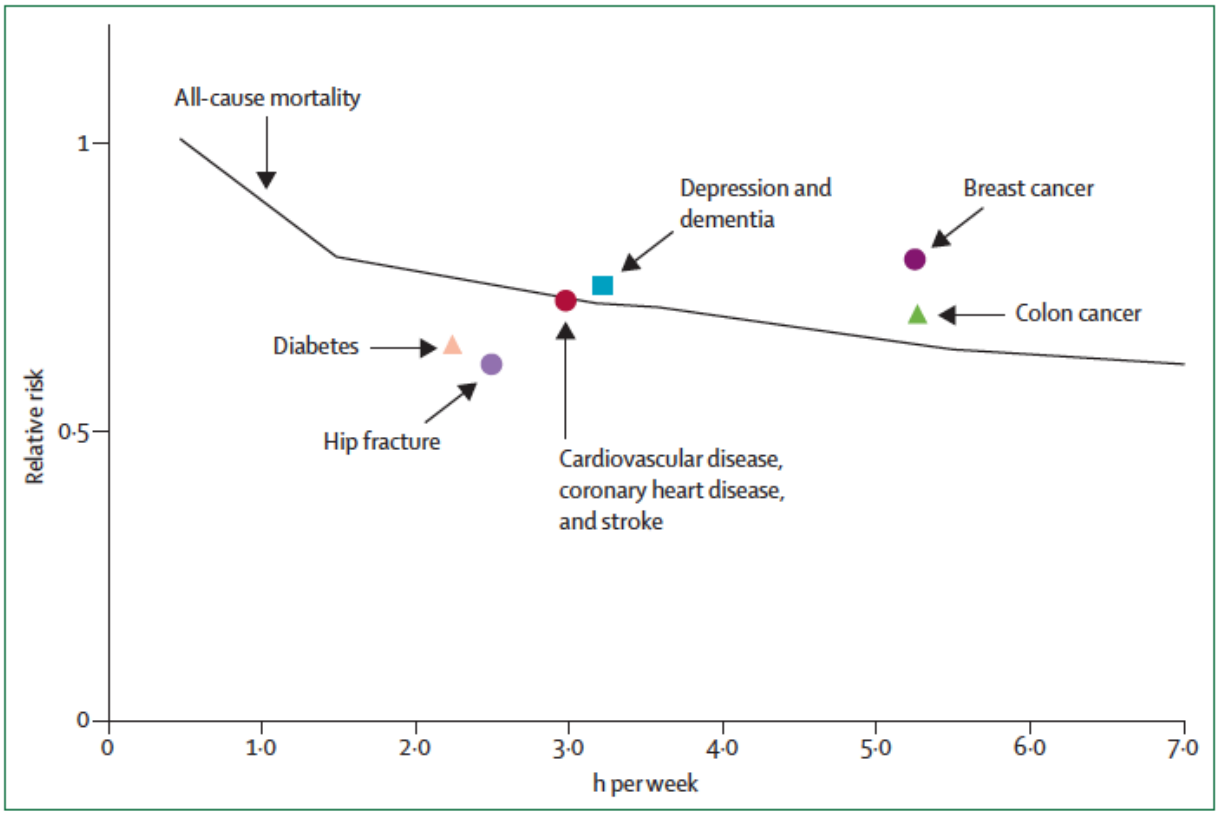


Figure 1. Associations of Moderate to Vigorous Physical Activity with Key Health Events, Including All-Cause Mortality [1].

Role of Primary Healthcare Centers

PHC centers serve as the frontline in healthcare systems, given that they are the first place where patients go for health services regarding prevention, promotion, management, and

health education to improve their quality of life. The range of services provided at PHC centers is required to meet people's healthcare needs for prevention and primary treatment, and of these, the promotion of physical activity is one of the most important services that physicians provide to their patients. Therefore, physical activity counseling interventions offered in PHC settings have emerged as a viable strategy to promote physical activity [19, 20].

Given that physical inactivity is a major public health burden in SA, assessing the knowledge, attitudes, and practices of PHC providers in SA with regard to physical activity is an essential step in implementing effective interventions and policies that encourage physical activity. This is especially true considering that in 2015 there were 49,615,932 visits to 2,282 PHC centers around SA. Each center served on average around 13,813 persons [21]. With regard to the manpower in PHC centers, physicians totaled 9,647 and nurses 18,745 [21]. With such numbers, an assessment of PHC providers is needed to help shed light on the barriers that exist regarding physical activity counseling. Assessment can also help in improving continuous health education strategies. Providing the Ministry of Health (MoH) with an assessment that defines the structure of the physical activity counseling in PHC centers could help improve behavioral counseling and therefore potentially increase physical activity levels amongst patients. In turn, this could possibly decrease NCD mortality.

Conceptual Framework of Physical Activity

Engagement in physical activity is driven by many factors, both internal and external. Healthcare promotion (external) is one of these factors. One form of promotion involves physical activity counseling for patients. Physical activity counseling comprises three main elements that have an impact on its provision and effectiveness: the physician's knowledge, attitudes, and practices related to physical activity.

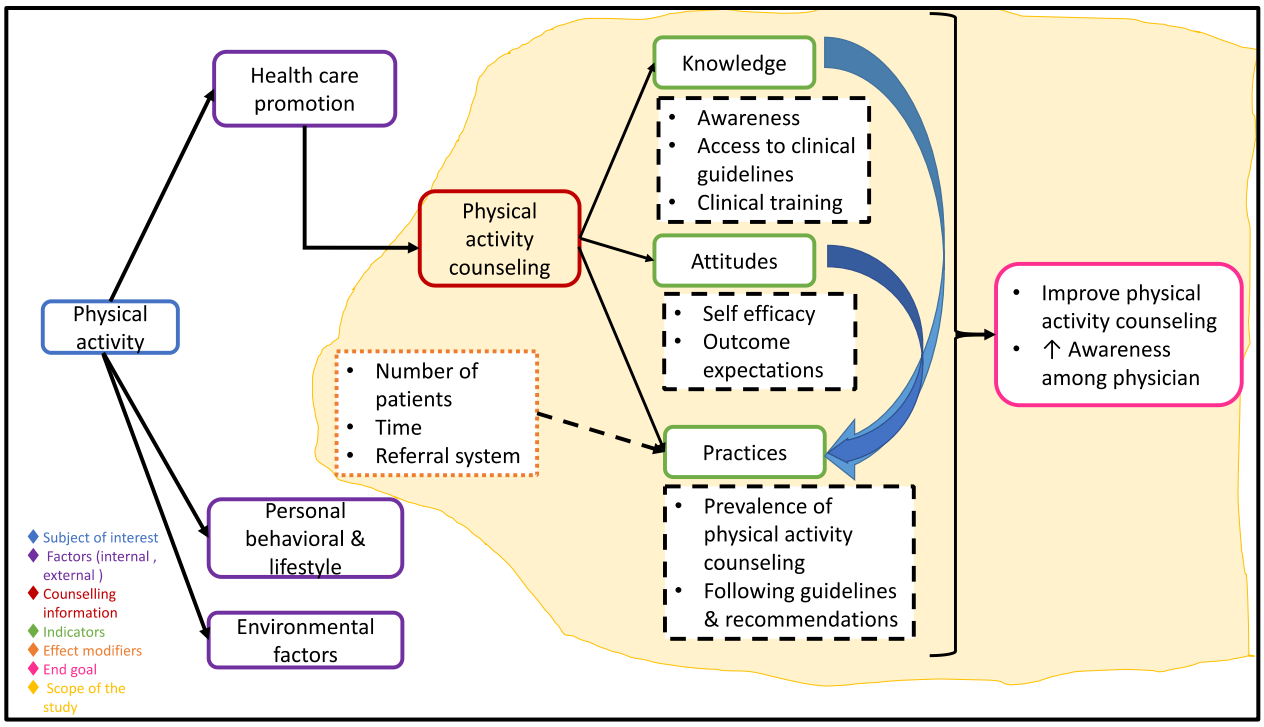


Figure 2. Conceptual Framework for Physical Activity

Each of these elements has underlying issues. For example, knowledge regarding physical activity counseling is affected by the physician's awareness of the importance of physical activity, whether the physician has access to clinical guidelines, and whether he/she has received enough training on how to provide this type of counseling. Attitude is impacted by the physician's self-efficacy in providing counseling, outcome expectations from this counseling, and whether he/she is motivated to provide it. In terms of practices, this can be tracked by the prevalence of physical activity counseling in PHCs and whether or not the physician follows the clinical guidelines in his/her practice. Note that knowledge and attitude both impact the physician's practice related to physical activity. Moreover, practice is also affected by other modifiers, such as the number of patients, time and availability, and the effectiveness of the referral system.

This study aims to evaluate these three elements (knowledge, attitudes, and practices)

among physicians using self-reported surveys.

Problem Statement/Significance

Sixty percent of the Saudi population is physically inactive, and 90% sit for more than two consecutive hours daily. Both are causes of NCDs [17]. To counter this phenomenon, health education counseling should be provided in PHC centers to encourage physical activity. However, there is currently limited data about the knowledge, attitudes, and practices of PHC providers regarding physical activity in SA. Assessing data in this regard is an essential step in implementing effective interventions and policies that encourage physical activity, as such an assessment could help identify the barriers to offering physical activity counseling. Such an assessment could also help in improving continuous health education strategies.

The Relevance of the Problem to the Target Population

Despite established evidence for the effectiveness of physical activity in NCD risk reduction, as well as the importance and cost effectiveness of physical activity counseling in the primary care setting, minimal studies have been conducted on physical activity counseling in SA, even with the high prevalence of physical inactivity, obesity, and NCDs. The literature available about physical activity is limited to some regions, a specific specialty in PHC (family physicians), or a specific type of patient (patients with chronic disease), And all studies that have assessed physical activity have done so in a general manner without specific and detailed data about physical activity counseling.

Objective

To assess PHC physicians' attitudes and counseling practices related to physical activity in Eastern Province, SA.

Aims

1. Assess knowledge, attitudes, and practices of PHC physicians in SA toward physical activity through self-reported surveys
2. Identify barriers to providing physical activity counseling
3. Assess physician lifestyle behaviors and the related effects on physicians' physical activity counseling practices
4. Develop a set of recommendations for a potential strategy to help promote physical activity through primary healthcare centers

Research Questions

What is the prevalence of physical activity counseling in PHC centers? How do the knowledge, attitudes, and practices of PHC providers affect counseling? What are the barriers to providing counseling? Do physician lifestyle behaviors affect their physical activity counseling practice?

Physical Activity and Inactivity in SA

NCDs have become more prevalent in the oil-producing countries of the Arabian Peninsula (Bahrain, Kuwait, Oman, Qatar, SA, and the United Arab Emirates [UAE]), accounting for a large portion of mortality and morbidity there [3]. Most NCD mortality is due to cardiovascular diseases, including hypertension, diabetes, dyslipidemia, and overweight/obesity. The rise of NCD mortality and morbidity in the Arabian Peninsula is in part caused by the rapid change in the population's lifestyle toward urbanization and motorization, which is increasing the level of physical inactivity in these communities [3, 16]. This can especially be seen in SA, where a nationwide study showed that the prevalence of physical activity was very low (men: 6.1%; women: 1.9%)[3].

According to WHO's 2016 diabetes country profile, 58.5% of the Saudi adult population was found to be physically inactive: 52.1% of males and 67.7% of females [23]. In another study, the prevalence of physical inactivity was found to be 66.6% in the overall SA population, with 60.1% for males and 72.9% for females [24]. On the other hand, 16.8% of the population was found to engage in a moderate-level of physical activity and 16.6% in a high-level of physical activity[24]. The estimated population attributable fraction (PAF) in SA, calculated with adjusted relative risks has been reported to be 11.4% for coronary heart disease, 14.1% for type 2 diabetes, 19.9% for breast cancer, 20.4% for colon cancer, and 18.4% for all-cause mortality associated with physical inactivity [12]. The estimated gains in life expectancy by eliminating physical inactivity are 1.51 years [12].

In addition to health-related problems, physical inactivity creates an economic burden in every country. In SA, using the PAF approach, the direct healthcare costs attributable to physical inactivity have been estimated to total $869,019, which represents 1.71% of total healthcare costs

[25]. The indirect productivity costs ($169,442), which represent the financial value of lost productivity due to premature mortality using a friction cost approach, takes into account replacement within the labor market (three-month friction period). Thus, the total costs (direct + indirect costs) are estimated to be $ 1,038,461 in SA [25]. In 2013, the amount of direct healthcare costs attributable to physical inactivity was $557,910 (64.2% of total direct costs) paid by the public sector, $172,066 (19.8% of total direct costs) by households, and $139,043 (16.0% of total direct costs) by the private sector [25].

To assess the health and economic related burden of physical inactivity as well as the effectiveness of PA interventions, a Behavioral Epidemiology Framework has been developed to understand the pattern of physical activity and sedentary behavior to build evidence for public health action. This framework organizes the research into six phases to help identify the research gaps and guide public health policy and practice [3]. These phases are the following:

Phase 1. Identify relationships of physical activity and sedentary behavior with health outcomes (see Table 2).

Phase 2. Measure physical activity and sedentary behavior.

Phase 3. Characterize the prevalence and variations of physical activity and sedentary behavior in populations (see Table 3).

Phase 4. Identify the determinants of physical activity and sedentary behavior (see Table 4).

Phase 5. Develop and test interventions that influence physical activity and sedentary behavior (see Table 5).

Phase 6. Use evidence to inform public health guidelines and policy [3].

Table 2. Studies on the Associations of Physical Activity and Sedentary Behavior with Health Outcomes in SA (Behavioral Epidemiology Framework, Phase 1)			
Lead Author/Year	**Study Design**	**Health Outcomes**	**Association Physical Activity (Type)**
Prospective Studies			
Al Saif, A. (2015)	Aerobic and anaerobic intervention (3 months)	BMI BP	− (aerobic intervention)
Al-Eisa, E. (2014)	Exercise intervention (3 weeks) 76 female university students aged 19–25 years	Insomnia Depression Attention span	− (exercise intervention) + (exercise intervention)
Alghadir, A.H. (2016)	Exercise intervention (12 weeks) 100 adults aged 30–60 years Serum levels of calcium and manganese	BMI Waist-hip ratio Serum levels of copper, zinc, and bone-specific alkaline phosphatase Osteoporosis T-score Bone mineral density Serum levels of calcium and manganese	− (exercise intervention) + (exercise intervention)
Rouzi, A.A. (2011)	Prospective cohort (6 years) 707 healthy post-menopausal women aged 50+ years	All fragility-related fractures	− (total PA)
Salman, R.A. (2009)	Exercise intervention (11 years) 916 normotensive adults with diabetes aged 20+ years	Hypertension	− (leisure PA)
Tomar, R.H. (2013)	Exercise intervention (12 weeks) 24 adult men with type 2 diabetes aged 25–55	Glycemic control	+ (exercise intervention)

Table 2. Studies on the Associations of Physical Activity and Sedentary Behavior with Health Outcomes in SA (Behavioral Epidemiology Framework, Phase 1)			
Lead Author/Year	**Study Design**	**Health Outcomes**	**Association Physical Activity (Type)**
Cross-Sectional: Adults			
Al-Hamdan, N.A. (2012)	Cross-sectional 4,758 adults aged 15–64 years	Hypertension	−(work, transport, and leisure PA)
Almajwal, M.A. (2015)	Cross-sectional 362 non-Saudi hospital nurses	BMI	−(total PA)
Al-Nozha, M.M. (2007)	Cross-sectional 17,395 adults aged 30–70 years	BMI WC	−(leisure PA) −(leisure PA)
Basulaiman, M. (2014)	Cross-sectional 10,735 adults aged 15+ years	Hypercholesterolemia Borderline hypercholesterolemia	N (total PA) N (total PA)
El Bcheraoui, C. (2013)	Cross-sectional 10,735 adults aged 15+ years	Hypertension Borderline hypertension	N (total PA) + (total PA−moderate active only)
Hegazy, A.M. (2015)	Cross-sectional study 174 women, half with lower back pain for 3+ months aged 20–45 years	Lower back pain	−(total PA)
Memish, Z.A. (2014)	Cross-sectional 10,735 adults aged 15+ years	BMI	−(total PA, men only)
Tuffaha, M. (2015)	Cross-sectional 10,735 adults aged 15+ years	Vitamin D deficiency	N (total PA)

Table 2. Studies on the Associations of Physical Activity and Sedentary Behavior with Health Outcomes in SA (Behavioral Epidemiology Framework, Phase 1)			
Lead Author/Year	**Study Design**	**Health Outcomes**	**Association Physical Activity (Type)**
Cross-Sectional: Children and Adolescents			
Al-Hazzaa, H.M. (2012)	Cross-sectional 2,906 school students aged 14–19 years	BMI WtHR	−(vigorous PA), N (total PA) −(vigorous PA), N (total PA)
Al-Hazzaa, H.M. (2013)	Cross-sectional 2,868 secondary-school students aged 15–19 years	Sleep duration	+ (total PA)
Al-Nakeeb, Y. (2012)	Cross-sectional 1,138 school students aged 15–17 years	BMI	−(total PA and walking)
Al-Nuaim, A.A. (2012)	Cross-sectional 1,270 school students aged 15–19 years	BMI WC	−(total PA) −(total PA)
Alqahtani, N. (2015)	Cross-sectional 370 school children aged 14–19 years	BMI	−(total PA, boys only)

BMI: body mass index; PA: physical activity; WC: waist circumference; WtHr: waist-to-hip-ratio; + positive association; − inverse association; N non-significat

Table 3. Prevalence of Physical Activity in SA			
Author/Year	**Sample**	**Physical Activity Measurement Tool**	**Physical Activity Prevalence**
Adults			
Al-Hazzaa, H.M. (2007)	1,064 adults aged 15–78 years	IPAQ short	Men: 56.3% Women: 65.7% Total: 59.4%
Allam, A.R. (2012)	194 medical students	IPAQ short	Men: 36.2% Women: 35.0% Total: 35.5%
Al-Nozha, M.M. (2007)	17,395 adults aged 30–70 years	Validated questionnaire on leisure time physical activity and walking	Men: 6.1% Women: 1.9%
Awadalla, N.J. (2014)	1,257 health professional college students	IPAQ short	Men: 43.7% Women: 41.2% Total: 42.0%
Banday, A.H. (2015)	106 PHC physicians aged 27–63 years	GPAQ	Total: 65.2%
Khalaf, A. (2013)	663 female university students	ATLS	Women: 62.4%
Koura, M.R. (2013)	370 female university students	GPAQ	Women: 46.8%
Children and Adolescents			
Al-Hazzaa, H.M. (2014)	2,866 school students aged 15–19 years	ATLS	Boys: 43.8% Girls: 20.2% Total: 31.5%
Al-Hazzaa, H.M. (2011)	2,908 secondary-school students aged 14–19 years	ATLS	Boys: 55.5% Girls: 21.9%

Table 3. Prevalence of Physical Activity in SA			
Author/Year	**Sample**	**Physical Activity Measurement Tool**	**Physical Activity Prevalence**
Al-Hazzaa, H.M. (2013)	2,886 students aged 15–19 years	ATLS	Boys: 55.0% Girls: 21.7%
Al-Hazzaa, H.M. (2013)	1,648 students aged 14–18 years	ATLS	Boys: 53.4% Girls: 19.1% Total: 36.0%
Al-Nakeeb, Y. (2012)	2,290 school students aged 15–17 years	ATLS	Boys: 45.8% Girls: 4.5% Total: 26.0%
Al-Nuaim, A.A. (2012)	1,270 school students aged 15–19 years	ATLS	Boys: 44.5% Girls: 4.0%

GPAQ: global physical activity questionnaire; IPAQ: international physical activity questionnaire; ATLS: Arab teens lifestyle student questionnaire; physical activity presented as percentage meeting recommendations: 150 min of moderate-intensity activity per week for adults and 60 min of moderate-intensity activity 7 days a week for adolescents [3].

Table 4. Factors Associated with Physical Activity in SA	
Factors	**Association with Physical Activity**
Age, education, lack of time (interpersonal), self-motivation, shift duty, social support, low level of PA, availability of physical activity facilities	inverse association
Gender, marital status	positive association

PA: physical activity

At the policy level, some of the studies conducted in the Arabian Peninsula have identified an inverse association between PA and the following: ineffective health communication, limited resources (general) allocated for physical activity promotion, and ineffective PA policies in colleges—all at the population-based policy level. On the other hand, at the individual-based policy level, studies have identified an inverse association between physical activity and the following: lack of time for counseling, health personnel's limited knowledge/awareness of the benefits of physical activity, limited material resources in health centers (teaching materials, guidelines), lack of specialty clinics at the PHC level, and limited availability of human resources (i.e., dietitians) [3].

Physical Activity Promotion Intervention

Strategies to promote physical activity can be implemented using an ecological model to determine the factors that play a role in promoting PA and behavioral change. Physical activity counseling is one of these strategies, and it can affect different levels in the ecological model of the determinants of physical activity (Figure 3)

Table 5. Physical Activity-Related Interventions in SA			
Lead Author/Year	**Target Group (Size)**	**Description of Intervention**	**Results**
Al-Eisa, E. (2016)	Female university students aged 18–25 years (58)	4-week intervention involving Instagram educational and motivational messages regarding exercise using a 37-min cardio work out video (81% response rate)	Significant difference between case and controls regarding adherence to program;17% exercised 8+ times in case group compared to 4% in control group during intervention period
Midhet, F.M. (2011)	Community (population size not reported)	1-year intervention in all PHC centers involving training physicians on lifestyle counselling and regular health-center-based lectures conducted by health educators and medical students	A pre- and post-test community-based survey found significant increases in levels of brisk walking in men after adjustment for key demographic variables
Sharaf, F. (2011)	Adults with hypertension, diabetes, and coronary artery disease visiting PHC clinics (population size not reported)	6-month intervention involving training of PHC physicians and health educators aiming to increase knowledge and skills regarding patient education with a focus on diet, smoking, and physical activity	No significant change in physical activity

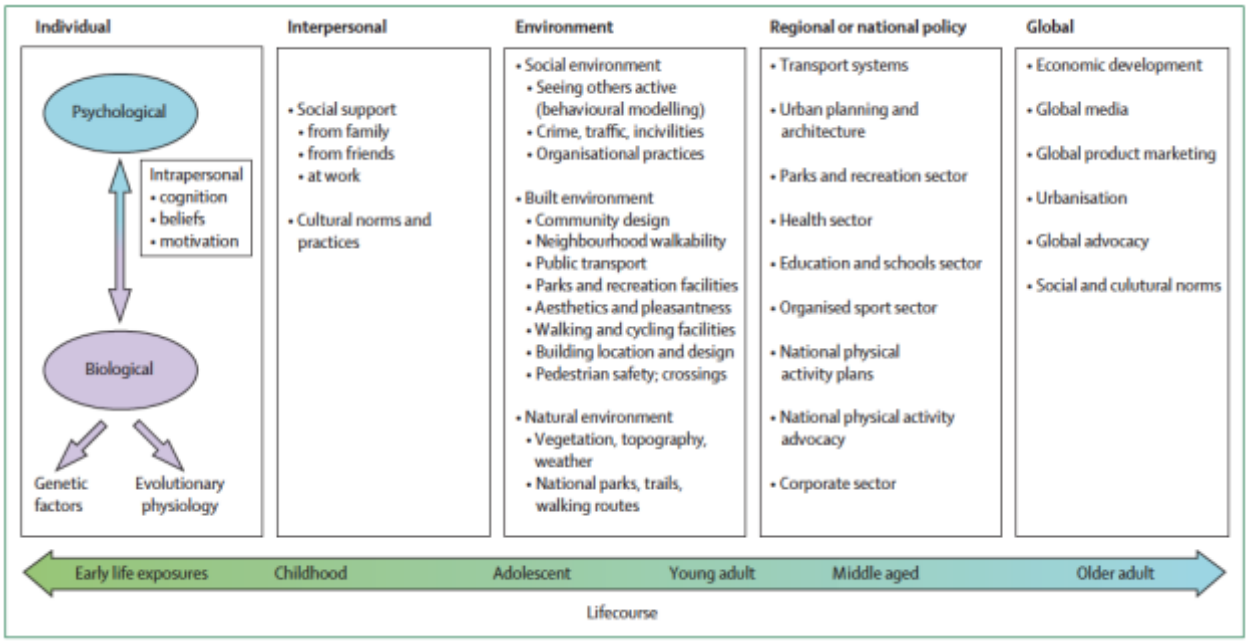


Figure 3. Adapted Ecological Model of the Determinants of Physical Activity [26]

Physical Activity Counseling

Physical activity counseling in the PHC system can help to achieve the main objectives of WHO's Global Strategy for Diet, Physical Activity, and Health. These objectives include **reducing risk factors for chronic diseases**; **increasing the awareness and understanding** of the influences of diet and physical activity on health and the positive impact of preventive interventions; **developing, strengthening, and implementing global, regional, and national policies and action plans** to improve diets and increase physical activity that are sustainable and that comprehensively and actively engage all sectors; and **monitoring science and promoting research** on diet and PA [27].

Table 6 below presents different organizations and evidence-gathering agencies and their set of recommendations for physical activity counseling within PHC centers.

Table 6. Recommendations for Physical Activity Promotion within the PHC Context from Organizations and Evidence-Gathering Agencies(Adapted from [28])

Organizations	Recommendation	Description
Royal Australian College of General Practitioners (Royal Australian College of General Practice, 2012)	All adults should be advised to participate in 30 mins of moderate activity on most, preferably all, days of the week.	Interventions that have shown short-term benefits in changing physical activity include a) patient screening to identify current levels of activity (including use of a pedometer) and readiness to be more active; b) provision of brief advice or counseling on exercise; c) supporting written materials and/or written prescription for exercise; d) pedometer step target of 10,000 steps per day, or 2,000 more than at baseline.
U.S. Preventive Services Task Force (Moyer and U.S. Preventive Services Task Force, 2012)	Existing evidence indicates that the health benefits of initiating behavioral counseling in the primary care setting to promote physical activity is small. Clinicians may choose to selectively counsel patients instead of incorporating counseling into the care of all adults in the general population.	• Studies of medium-and high-intensity behavioral counseling interventions have shown beneficial effects on behavioral and intermediate health outcomes. • Medium-intensity interventions involved a range of 3 to 24 phone sessions or 1 to 8 in-person sessions. High-intensity interventions involved a range of 4 to 20 in-person group sessions and were the only interventions to report sustained benefits beyond 12 months. • No high-intensity interventions and few medium-intensity interventions have involved primary care clinicians as the providers of the intervention.
NICE (National Institute for Health and Care Excellence, 2013)	Adults who have been assessed as being inactive should be advised to do more physical activity.	• Tailor advice to: a) motivations and goals; b) current level of activity and ability; c) circumstances, preferences, and barriers to being physically active; d) health status • Provide information about local opportunities to be physically active for people with a range of abilities, preferences, and needs. • Consider giving a written outline of the advice and goals that have been discussed. • Follow up when there is another appointment or opportunity.

Physical Activity Counseling Effectiveness

The American Heart Association has emphasized that "the advice from healthcare professionals significantly influences adoption of healthy lifestyle behaviors, including regular physical activity, and can increase satisfaction with medical care" [29]. According to numerous studies, cardiovascular risk factors, mortality, and morbidity from stroke and heart disease can be reduced by lifestyle modification (utilizing a number of clinician counseling strategies), including PA [29].

Trials and studies have been conducted to examine the effectiveness of brief counseling during PHC visits. In one trial, the Activity and Counseling Trial, physicians in primary care were trained to deliver a brief, 3–4-minute counseling session during routine office visits. This intervention was associated with increased levels of physical activity over the two-year follow up. In another trial, the PREMIER trial, a brief lifestyle and PA counseling session was given to adult patients with prehypertension or stage 1 hypertension. Strong evidence was found that counseling was effective, given that the intervention resulted in a 12%–14% risk reduction over an 18-month time period (based on the 10-year Framingham Coronary Heart Disease Risk Score) [29]. Moreover, a cohort study conducted in the United Kingdom found that brief physical activity counseling in primary care was a cost-effective way to promote and improve physical activity among adults [30].

Physical activity counseling in a primary care setting can be delivered using the "5A" approach: assess, advise, agree, assist, and arrange. These 5As are a sequence of counseling behaviors that are designed to engage the patient in developing a specific and realistic action plan for behavior change [31]. The following figure (Figure 4) demonstrates how to use the 5As in physical activity counseling.

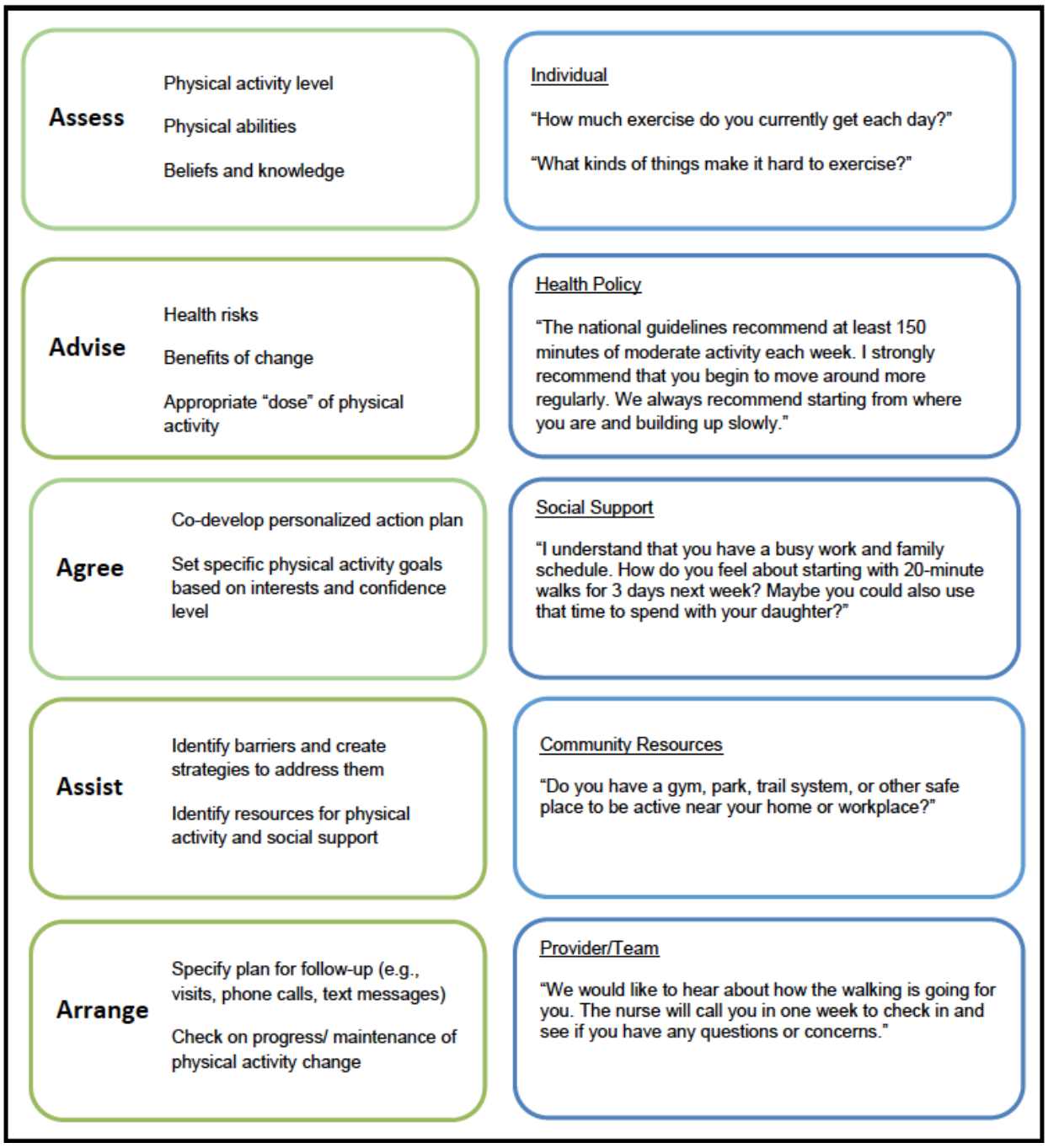


Figure 4. How to Use the 5As in Physical Activity Counseling (Adapted from [31])

Physical Activity Counseling in Primary Care in SA

Even with evidence supporting physical activity counseling in PHC centers, only a minimal number of studies have been conducted on this topic in SA: two published papers and two unpublished research studies. These studies are discussed below, and summarized in Table 7.

In 2016, Al Shammari studied the physical activity counseling practice of family medicine residents. This study was limited to only family medicine residents who had joined the residency program and did not assess the physicians who in fact worked in PHC centers, regardless of their specialties. The study was also limited to the assessment of counseling provided regarding specific diseases, without detailed information about the assessment process [32]. In 2014, Al Jaberi assessed physical activity counseling at primary care centers in the Aseer region. The data collected were related to physical activity counseling practice, opinions regarding physical activity behavior, main sources of information on physical activity, and perceived barriers to physical activity counseling [18].

In addition, family medicine residents in SA conducted two unpublished studies during their residency program. One of these studies assessed physicians' attitudes toward physical activity counseling and the barriers perceived by physicians in promoting physical activity counseling [33]. The other assessed physician knowledge of current physical activity guidelines and current practices of physical activity counseling in PHC and identified the barriers preventing the promotion of physical activity [34].

Table 7. Studies About Physical Activity Counseling in PHC Centers, SA			
Authors/Year	**Study Objective**	**Study Type/Tool**	**Population/Sample Size**
Al Shammari, M. (2016) [32]	Determine the amount of physical activity to which family medicine residents adhere, and determine whether family medicine residents practice what they counsel to their patients regarding physical activity	Cross-sectional Physical Activity Questionnaire (IPAQ)	Residents of the family medicine joint program, Eastern Province (n = 80 family medicine residents)
Al Jaberi, A. (2014) [18]	Assess the physical activity counseling provided by PHC physicians in the Aseer region, SA	Self-administered questionnaire; Physician Based Assessment and Counseling for Exercise (PACE) Program	PHC physicians in the Aseer region (n = 232)
AL-nahdi, F. (2006) [34]	Assess physician knowledge of the current physical activity guidelines, and the current practice of physical activity counseling in PHC; identify the barriers related to the promotion of physical activity	Cross-sectional descriptive analytic study	Jeddah city, SA (n = ?)
AlRashdi, M. (2015) [33]	Determine the attitude of primary care physicians toward promoting regular physical activity; determine the barriers to promoting physical activity	Cross-sectional	Prince Sultan Military Medical City Riyadh Kingdom of SA (n = 80 physicians)

Global View: Physical Activity Counseling in Primary Care

Several studies were conducted around the globe to 1) explore PHC providers, including general physicians' and nursing practitioners' attitudes, knowledge, and practices regarding the promotion of PA; 2) determine the prevalence of PA prescription among PHC providers in relation to a patient's chronic disease status; and 3) identify barriers to prescribing physical activity in primary care.

Most of the studies were cross-sectional and used different methods for data collection, including focus groups, individual interviews, self-reported surveys (web-based, phone-based, paper-based), or mixed methods. Table 8 summarizes the studies from around the globe.

Table 8. Studies About Physical Activity Counseling in PHC Centers, Worldwide			
Author/ Year	**Study Type**	**Study Objective**	**Population**
Douglas (2006) [35]	A cross-sectional survey	Investigate attitudes, current practices, and knowledge of primary care staff (GP, PN, HV) related to advising patients about PA during routine consultation	757 primary care staff/general practitioners (or family physicians), practice nurses, and health visitors Scotland
Ribera (2005) [36]	A mixed method approach	Describe PA promotion in Catalan general practices, and to explore the experiences of doctors/nurses in promoting PA in their day-to-day professional lives	145 physicians and 92 nurses Catalan Institute of Health (ICS)
Kennedy (2003) [37]	A cross-sectional survey	Assess physician confidence, current versus desired practice, and barriers related to the counselling of exercise by family physicians	330 family physicians Canada
Abramson (2000) [38]	A cross-sectional survey	Obtain information about the personal exercise behavior and counseling practices of primary care physicians; to evaluate the relationship between their personal and professional exercise practices; and to determine whether physician specialty is associated with these practices	298 primary care physicians United States
Petrella (2007) [39]	A cross-sectional survey	Obtain information on primary care physicians' behaviors with respect to counseling and prescribing physical activity, physician demographics, and practice characteristics	166 primary care physicians Canada
Florindo (2013) [40]	Phone survey	Determine the prevalence and correlates of physical activity counseling among physicians and nurses working in PHC in Brazil	182 physicians and 347 nurses Brazil
Persson (2013) [41]	Focus group interviews	Explore and understand the meaning of prescribing physical activity from the general practitioner's perspective	15 Swedish general physicians South of Sweden
Bock (2012) [42]	A cross-sectional survey	Study physical activity assessment and advice provided by the physician, attitudes toward health promotion and cooperation activities	260 physicians State Medical Association of Baden-Wuerttemberg, Germany

Table 8. Studies about Physical Activity Counseling in PHC Centers, Worldwide			
Author/ Year	**Study Type**	**Study objective**	**Population**
Bize (2007) [43]	Qualitative; semi-structured interviews	Examine the opinions and behavior of Swiss physicians regarding physical activity promotion in primary care settings	Switzerland
Buffart (2009) [44]	Quantitative; cross-sectional: repeated mailed questionnaire	Study trends in general physician (GP) knowledge and opinions of physical activity promotion in 1997, 2000, and 2007	New South Wales, Australia
Cho (2003) [45]	Quantitative; cross-sectional: questionnaire	Investigate the frequency of lifestyle counseling by physicians and the factors associated with active involvement of primary care physicians in health promotion	Korea
Goodman (2011) [46]	Quantitative; cross-sectional: questionnaire	Examine current attitudes, knowledge, and practices of primary care nurses pertaining to physical activity promotion in older people	Not reported
Graham (2005) [46]	Mixed methods; cross-sectional; quantitative: questionnaire; qualitative: semi-structured interviews	Examine physicians' beliefs regarding physical activity referrals, including perceived barriers and their role in patients' behavior change	Unnamed North Western borough, United Kingdom
Ploeg (2007) [47]	A cross-sectional questionnaire	Examine general practitioners' knowledge, confidence, perceived role, and frequency of talking to patients about physical activity	New South Wales
Bélanger (2015) [48]	web-based survey + individual interviews	Explore barriers and enablers to prescribing physical activity in primary care among family physicians who are currently prescribing it and those who are not	26 family physicians

Table 8. Studies about Physical Activity Counseling in PHC Centers, Worldwide			
Author/ Year	**Study Type**	**Study objective**	**Population**
Ashley (2011) [49]	Nationally representative survey	Assess primary care physicians' (PCPs') counseling, referral, and follow-up of diet, physical activity, and weight control in adult patients with and without chronic disease; PCPs' use of pharmacologic treatments and surgical referrals for overweight and obesity	1,211 primary care physicians United States

(Adapted from [35-49])

Methodology

Study Design

This cross-sectional study was conducted in four main cities of Eastern province, SA (AL-Khobar, Dammam, Qatif, and Safwa) between May 2016 and July 2016. Self-reported surveys (online or paper) were used to assess knowledge, attitudes, and practices among PHC physicians. The correlation between these and the provision of physical activity counseling was examined. Furthermore, the study identified barriers to physical activity counseling in addition to its prevalence among different physician specialties working in PHC centers and the effect of physicians' lifestyles on offering this counseling.

Study Site and Population

The study targets PHC physicians in Eastern Province, SA. Eastern Province is the largest region in SA, with a population of three million and a high prevalence of obesity: 27.7% [50]. This high rate of obesity could be due to the prevalence of physical inactivity, which has been self-reported by primary care patients to be 43.3% in male patients and 84.7% in female patients [51]. Such high levels of physical inactivity could potentially be occurring for various reasons, including the high temperature and humidity in the area discouraging participation in physical activity.

A nonprobability method was used to select the sample population, as it was convenient for the primary researcher; this method relied on collecting data from the population available to participate in the study. The questionnaire was distributed online through social media (e.g., WhatsApp, Twitter, Facebook, LinkedIn, emails). All physicians working in PHC centers were invited to participate in the study. A physical activity counseling guide was provided as an incentive for participants after finishing the survey (Appendix 2).

Eastern Province has 10 healthcare sectors; however, in this study the population of interest consisted of four main sectors, as they employ a large number of PHC physicians. The total number of PHC physicians in Eastern Province is 637, and 334 of this total work in PHC centers in Safwa, AL-Khobar, Dammam, and Qatif [21].

Inclusion criteria: Any PHC physician working in PHC centers in Safwa, AL-Khobar, Dammam, or Qatif under the MoH.

Exclusion criteria: Dentists; physicians who worked in the private sector or other non-target sectors.

Instruments

All four aims were addressed with the use of a self-reporting survey that included questions adapted from an internationally accredited survey (the Physician Survey of Practices on Diet, Physical Activity, and Weight Control) developed by the National Institute of Health (NIH) [52]. This study modified the survey to assess physical activity counseling knowledge, attitudes, and practices of primary care physicians only. The survey was created with SurveyMonkey for online participation and data collection. The survey was tested after modification using a small pilot study to ensure that the questions were understood and to assess the time it took to complete. This pilot survey was completed by five physicians working in PHC centers and took about 15–20 minutes to complete. Only one question needed modification; the rest were clear.

At the end of May 2016, the survey link was distributed through social media available to the primary researcher (e.g., WhatsApp, Twitter, Facebook, LinkedIn, emails). The survey link was distributed three times at different intervals to remind and encourage physicians to participate. Given that the response rate in two sectors (Qatif and Dammam)

was high via online distribution, which was potentially indicative of higher willingness of physicians in these regions to participate, the primary researcher went directly to PHC centers in these two sectors to distribute and collect additional paper surveys in July 2016. At the end of the study, the response rate was 44.01% (147 surveys from the total of 334 physicians). The response rate by sector is shown in Table 9, and the data collection procedure is detailed in Figure 5.

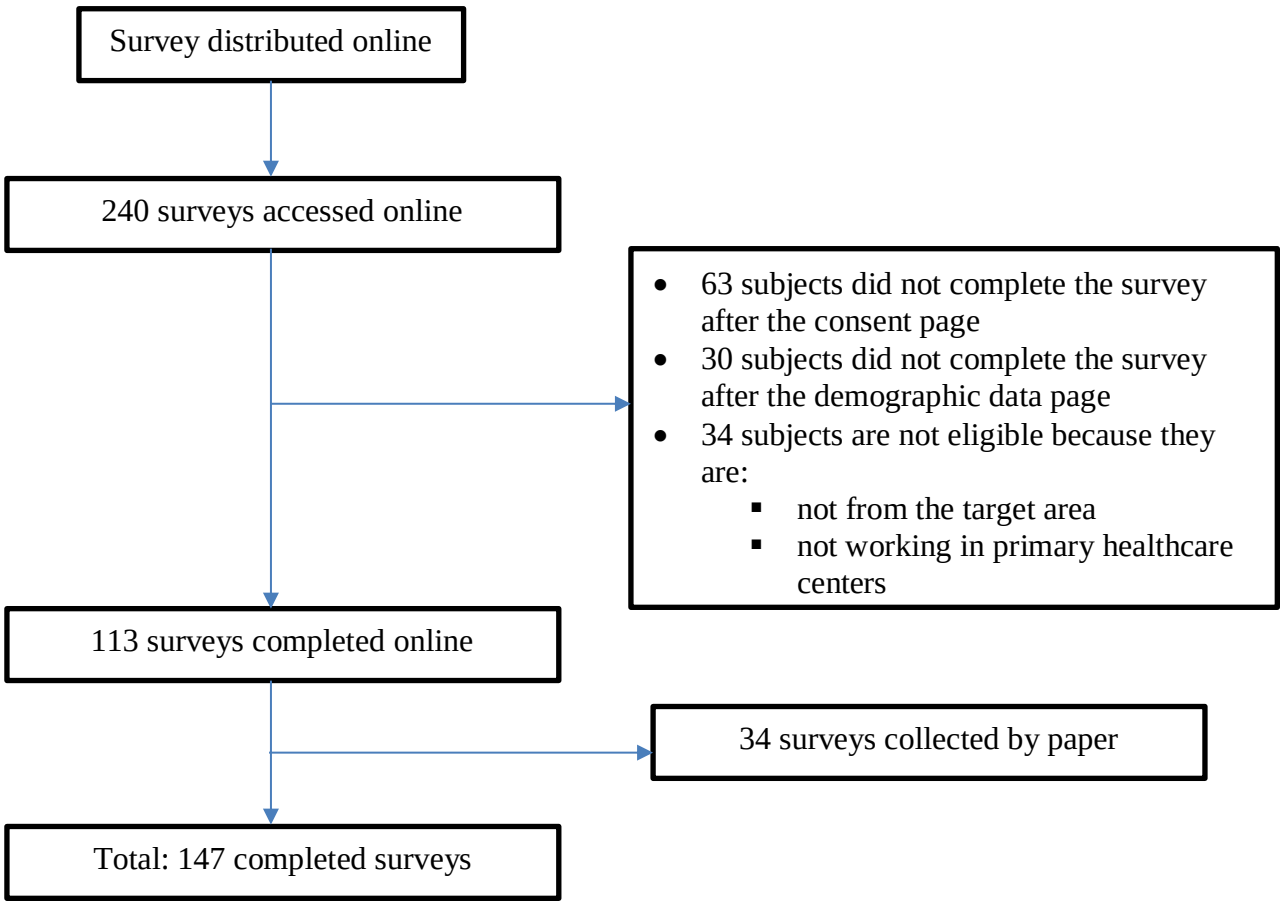


Figure 5. Data Collection Procedure

Table 9. Study Response Rate by Sector; SA Eastern Province, 2016			
PHC Sector	**# of Physicians**	**# of Responses**	**Response Rate**
Dammam	152	47	30.92%
Qatif	102	75	69.44%
Al- khobar	60	13	21.66%
Safwa	20	12	60%
Total	**334**	**147**	**44.01%**

Human Subjects and Ethical Considerations

Emory IRB determined that this study did not require IRB review because it did not meet the definition of "research" with human subjects as set forth in Emory policies and procedures and federal rules, if applicable. In addition, approval from the research committee of the MoH in Eastern Province, SA was obtained to run the study in the MoH PHCs.

Written consent was obtained on the first page of the survey. The survey did not contain any identification information and was labeled by serial number only. All information gathered through the survey is confidential and used for health service improvements. The online survey was conducted securely via SurveyMonkey without collecting responder IP addresses. For the paper surveys, the data were stored in sealed envelopes.

Variables

Demographics

Physicians were asked for general demographic data about themselves and their work. Furthermore, some of this information was used to define possible barriers to physical activity counseling as well as how modifiers—such as professional degree, years of experience, and number of patients per day—can affect this counseling.

Knowledge

Providers were asked to answer questions by checking the boxes that applied to them. The knowledge section included specific questions about current international guidelines and recommendations about physical activity. Furthermore, questions included whether providers had received training about physical activity counseling.

Attitudes

In this section, providers were asked about the importance of physical activity counseling and about who is responsible for providing such counseling. They were also asked about their confidence in delivering the counseling and about possible barriers that may prevent them from providing it.

Clinical Practices

In this section, questions assessed the practices of healthcare providers, including the frequency with which they provided physical activity counseling sessions and whether sessions were conducted for all patients or only for chronic disease patients. To this end, questions asked healthcare providers to determine their level of physical activity counseling toward adults in general, adult patients with chronic diseases, adult patients without chronic diseases, children and teenagers, and pregnant women. Please note that the questions differed regarding different target groups; see Appendix 1 for the list of questions. Furthermore, at the end of this section, physicians were asked how they assessed physical activity.

Physician Personal Behaviors

This section consisted of questions about the physician's lifestyle, including PA, sleeping hours, general health status, physician chronic disease status, and smoking

status. Questions about PA were derived from the NIH survey, while the rest of the questions were derived from the Behavioral Risk Factor Surveillance System 2014 Questionnaire [53].

The survey used in this study is presented in Appendix 1.

Data Management and Analysis

The data were downloaded from SurveyMonkey as an Excel spreadsheet after manual entry of the paper surveys. Double entry was performed for the paper surveys into the SurveyMonkey website. Incomplete surveys were excluded from the study. Data analysis was conducted using the SAS program (SAS Institute Inc. 2016. SAS® 9.4). A descriptive statistical analysis was performed after re-categorizing all variables. For continuous variables, the median was considered as the defining point of categorization.

A chi-square test was conducted to test the association between physician specialty and the frequency of PA counseling practice (providing general counseling, providing verbal counseling, providing written counseling, referral for further assessment and management, and following up with and tracking patients); the correlation was considered significant if $p < 0.05$. Fisher's exact test was performed for the correlation of tables with small cell size.

Stepwise selection and binary logistic regression were conducted to examine the relationship between physician characteristics (i.e., demographics, knowledge and training, personal lifestyle behaviors) and the frequency of PA counseling practice. A *p*-value of 0.25 was used as a cut-off point in the stepwise variables selection procedure. For each counseling practice, one binary logistic regression model (Always + Often versus all other levels) was estimated, and the likelihood was computed as the predicted probabilities.

Results

Descriptive Analysis

The total sample comprised 147 PHC physicians: 51.70% from the Qatif sector, 92.52% Saudi, 70.75% female, 87.07% married, and 57.45% below the age of 31 years (mean age of the sample). Nearly half of the physicians were general physicians, and more than 40% were family physicians. More than half of the physicians had a Bachelor of Medicine and Bachelor of Surgery (MBBS), and more than 80% had graduated from a domestic university or residency program. Only 21.77% had received training about physical activity counseling during medical school or their residency program. Around 60% of physicians had less than five years of work experience. A small portion (5.56%) had excellent knowledge about the physical activity guidelines and recommendations. Regarding physicians' health status, 25.36% reported having (a) chronic disease(s), while 45.65% reported having a very good general health status. Around 60% saw 20 or fewer adult patients per day, and 55.10% saw 10 or fewer pediatric patients per day. Regarding the number of physicians and nurses working in PHC centers, 76.19% had four or more physicians working with them in the same PHC center, and only 25.17% had 12–15 nurses or more. Only around 30% reported having an electronic referral system.

A total of 61.54% of the physicians indicated that the physician is the main health professional responsible for promoting physical activity. Furthermore, 60.14% agreed that they were effective at helping patients be adequately physically active, and 55.24% indicated that they were confident in their ability to do so. In addition, 86.71% of physicians agreed that they were able to provide more credible and effective counseling if they themselves were adequately physically active.

The top three barriers reported by the physicians that prevented them from providing PA

counseling to their patients were the following: not enough time, lack of adequate referral services for physical activity, and inadequate training in physical activity counseling (70.06%, 54.42%, and 38.09%, respectively). Tables 10–14 present the results for all the data collected in this study.

Table 10. Demographic Characteristics of PHC Physicians		
	Number (N = 147)	**Percentage (%)**
Age		
26–31 years old	81	57.45
32–60 years old	60	42.55
Gender		
Male	43	29.25
Female	104	70.75
Nationality		
Saudi	136	92.52
Non-Saudi	11	7.48
Marital Status		
Single	13	8.84
Married	128	87.07
Other	6	4.08
Sector		
Al-Khobar	13	8.84
Dammam	47	31.97
Qatif	75	51.02
Safwa	12	8.16
Physician Specialty		
Family physician	66	44.90
General physician	69	46.94
Other specialty	12	8.16
Education		
Board certified	35	23.81
Diploma	34	23.13
MBBS	76	51.70
Other	2	1.36

Table 10. Demographic Characteristics of PHC Physicians		
	Number (N = 147)	**Percentage (%)**
Physician Chronic Disease		
Had chronic disease	35	25.36
Did not have chronic disease	103	74.64
Physician General Health		
Very good	63	45.65
Good	48	34.78
Fair	27	19.57

Chronic diseases include one or more of the following: hypertension, diabetes, dyslipidemia, arthritis, asthma, coronary heart disease, thyroid disorders, chronic back pain, cancer.

Table 11. Training Characteristics of PHC Physicians		
	Frequency (N = 147)	**Percentage (%)**
Years of Experience After Graduation from Medical School		
Less than five years	88	59.86
Five years or more	59	40.14
Training in Medical School About Physical Activity		
Yes	32	21.77
No	115	78.23
University of Medical Degree		
Domestic	105	84.00
International	20	16.00
Physician Knowledge About Physical Activity		
Poor knowledge	87	60.42
Good knowledge	49	34.03
Excellent knowledge	8	5.56

Domestic: King Abdul-Aziz University, King Faisal University, King Saud University, Qassem, University, University of Dammam; **International:** Arabian Gulf University, Beirut University, Cairo University, Jordan University of Science and Technology, Karachi University, Shendi University, Vienna University; **Poor knowledge:** knowing 0–1 recommendations; **Good knowledge:** knowing 2–3 recommendations; **Excellent knowledge:** knowing 4–6 recommendations)

Table 12. Practice Characteristics of PHC Physicians		
	Frequency (N = 147)	**Percentage (%)**
Average Number of Adult Patients Seen by Physician per Day		
20 or fewer	85	59.02
More than 20	59	40.97
Average Pediatric Patients Seen by Physician per Day		
10 or fewer	81	55.10
More than 10	61	41.50
Number of Physicians in PHC		
4 or fewer	35	23.81
More than 4	112	76.19
Number of Nurses in PHC		
12-15 nurses or fewer	110	74.83
12-15 nurses or more	37	25.17
Electronic Referral System in PHC		
Yes	44	29.93
No	103	70.07

Table 13. Attitudes of Physicians Toward Physical Activity Counseling			
Attitude	**Agree % (N)**	**Neutral % (N)**	**Disagree% (N)**
It is important that physical activity programs be offered by the health system for the community.	97.89 (139)	1.41 (2)	0.70 (1)
Patients are more likely to adopt healthier lifestyles if physicians counsel them to do so.	83.22 (119)	13.29 (19)	3.50 (5)
There are effective strategies and/or tools to help patients be adequately physically active.	68.53 (98)	18.18 (26)	13.29 (19)
I am confident in my ability to counsel my patients to be adequately physically active.	55.24 (79)	31.47 (45)	13.29 (19)
I am effective at helping my patients be adequately physically active.	60.14 (86)	31.47 (45)	8.39 (12)
Specifically, a physician/nurse will be able to provide more credible and effective counseling if he/she is adequately physically active.	86.71 (124)	8.39 (12)	4.90 (7)
Response to the question, "Who is the main health professional responsible for promoting physical activity counseling?"			
	% (N)		
Physician	61.54 (88)		
Nurse	1.40 (2)		
Physical education professionals	27.97 (40)		
Nutritionist	4.20 (6)		
Physiotherapist	1.40 (2)		
Other	3.50 (5)		

Table 14. Perceived Barriers to Providing Physical Activity Counseling from Physicians' Perspective	
Barriers	**% (N)**
Not enough time	70.06 (103)
Not part of my role	3.40 (5)
I am not adequately trained in this area	38.09 (56)
Too difficult to evaluate and manage	5.44 (8)
Inadequate reimbursement	3.40 (5)
Lack of adequate referral services for physical activity	54.42 (80)
Patients are not interested in improving their physical activity	32.65 (48)
Fear of offending the patient	2.7 (4)
Too difficult for patients to change their behavior	27.21 (40)
Lack of effective tools and information to give to patients	26.53 (39)
Lack of effective treatment options	12.24 (18)
Patients expect drug treatments when they visit their general practice	15.64 (23)

Physician Health Behaviors and Lifestyle

In total, 43.05% of the physicians were found to be either overweight or obese, and only 17.39% slept the recommended hours of sleep per night according to the guidelines. Only 7.97% of the physicians had the habit of smoking. Overall, 8.84% and 10.88% of the physicians reported that they practice the recommended moderate activity and vigorous activity for adults according to the guidelines, respectively. Aerobic activity was calculated from reported vigorous and moderate physical activity, and 71.43% reported their activity met the recommended time for aerobic activity per day. A total of 27.54% of the physicians reported that they do strength-building physical activity. Only 19.05% of the physicians reported that their activity met the global recommendations for physical activity (aerobic and strength activity) (see Figure 6).

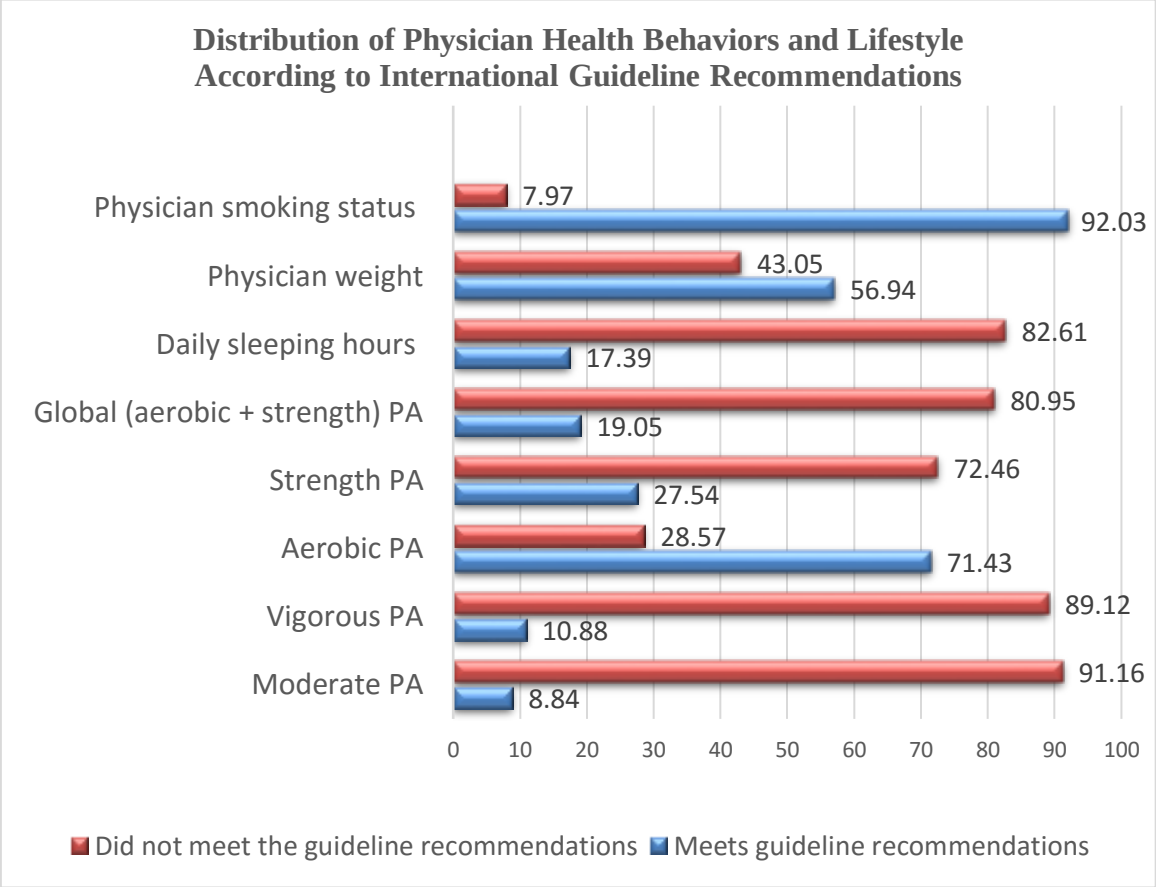


Figure 6. Distribution (%) of Physician Health Behaviors and Lifestyle According to International Guideline Recommendations

PA: physical activity; **Meets recommended guidelines:** 150 min/week of moderate physical activity [n = 13], 75 min/week of vigorous physical activity [n = 16], ≥ 150 min/week of aerobic activity (moderate + vigorous) [n = 15], engages in physical strength activity (weight lifting) during the week [n = 38], follows globally recommended PA guidelines (combined aerobic + strength) [n = 4], 7 hours or more per night of sleep [n = 24], non-smoker [n = 127], normal physician body weight (BMI < 25.00) [n = 82]

Did not meet recommended guidelines: less than 150 min/week of moderate physical activity [n = 134], less than 75 min/week of vigorous physical activity [n = 131], < 150 min/week of aerobic activity (moderate + vigorous) [n = 6], does not engage in physical strength activities (weight lifting) during the week [n = 100], does not follow globally recommended PA guidelines (combined aerobic + strength) [n = 17], less than 7 hours per night of sleep [n = 114], smoker [n = 11], abnormal physician body weight [obese :BMI ≥ 30.00 [n = 22], overweight: BMI = 25.00–29.99 [n = 40]. Guidelines include CDC recommendations for PA, ACSM recommendations for PA, WHO recommendations for PA, American Heart Association (AHA) recommendations for PA, American Academy of Sleep Medicine (AASM) and Sleep Research Society (SRS) recommendations for the amount of sleep needed to promote optimal health in adults.

Association Analysis

Association Between Physician Specialty and the Frequency of Physical Activity Counseling Practice

Among other specialties working in PHC, family physicians reported the highest prevalence of providing general counseling to patients with chronic diseases (93.94%) and without (45.45%), and 95.45% provided verbal behavioral counseling to patients with chronic disease. Among all family and general physicians, the prevalence of providing general counseling, verbal behavioral counseling, written prescriptions, and referrals for further assessment and management as well as following up with and tracking a patient increased if the patient had chronic diseases (see figures 7 and 8).

A chi-square test was conducted to demonstrate the statistical difference between physician specialties and their physical activity counseling practice. There was a statistically significant difference between specialties in the referral of patients without chronic diseases for further assessment and management of physical activity. Family physicians were significantly different from other specialties in the frequency of providing general counseling and verbal behavioral counseling as well as following-up with and tracking patients with chronic diseases (see tables 15–16).

Table 15. Univariate Association Between Physician Specialty and Physical Activity Counseling Practice for Patients *Without* Chronic Disease					
Specialty	**Family Physician (n = 66)**	**General Physician (n = 69)**	**Other (n = 12)**	**Total 147**	***p*-value**
	n (%)	**n (%)**	**n (%)**		
Provide general counseling					**0.1689**
Sometimes	36 (54.55)	42 (60.87)	10 (83.33)	98	
Often	30 (45.45)	27 (39.13)	2 (16.67)	59	
Provide verbal behavioral counseling					**0.9213**
Sometimes	26 (39.39)	27 (39.13)	4 (33.33)	57	
Often	40 (60.61)	42 (60.87)	8 (66.67)	90	
Provide written prescription					**0.4823**
Sometimes	61 (92.42)	62 (89.86)	12 (100.00)	135	
Often	5 (7.58)	7 (10.14)	0 (0.00)	12	
Referral	†				**0.0034**
Sometimes	61 (92.42)	48 (69.57)	9 (75.00)	118	
Often	5 (7.58)	21 (30.43)	3 (25.00)	29	
Follow-up					**0.6228**
Sometimes	56 (84.85)	24 (34.78)	11 (91.67)	91	
Often	10 (15.15)	13 (18.84)	1 (8.33)	24	

† significant *p*-value at the level of 0.05 for chi-square test for family physician vs. general physician

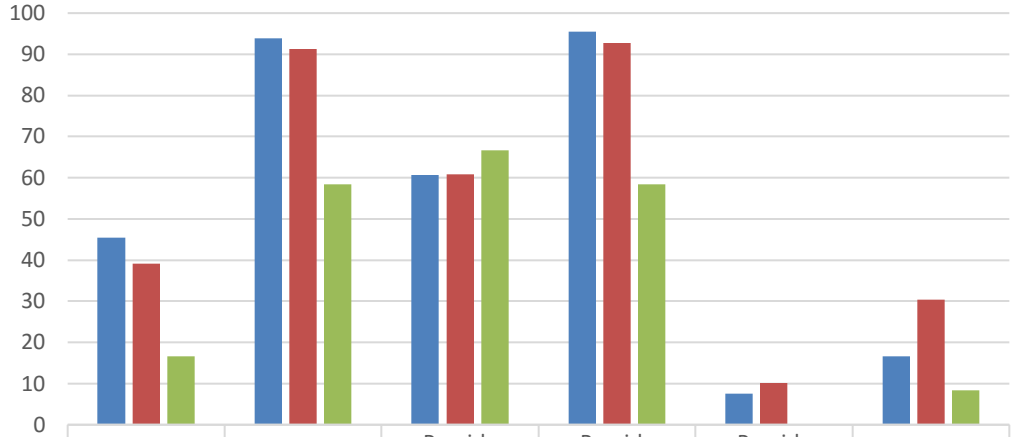
Table 16. Univariate Association Between Physician Specialty and Physical Activity Counseling Practice for Patients *With* Chronic Disease					
Specialty	**Family Physician (n = 66)**	**General Physician (n = 69)**	**Other (n = 12)**	**Total 147**	***p*-value**
	n (%)	**n (%)**	**n (%)**		
Provide general counseling	‡	∓			**0.0008**
Sometimes	4 (6.06)	6 (8.70)	5 (41.67)	15	
Often	62 (93.94)	63 (91.30)	7 (58.33)	132	
Provide verbal behavioral counseling	‡	∓			**0.0001**
Sometimes	3 (4.55)	5 (7.25)	5 (7.25)	13	
Often	63 (95.45)	64 (92.75)	7 (58.33)	134	
Provide written prescription					**0.0755**
Sometimes	55 (83.33)	48 (69.57)	11 (91.67)	114	
Often	11 (16.67)	21 (30.43)	1 (8.33)	33	
Referral	†				**0.0682**
Sometimes	51 (77.27)	41 (59.42)	7 (58.33)	99	
Often	15 (22.73)	28 (40.58)	5 (41.67)	48	
Follow-up	† ‡				**0.0114**
Sometimes	27 (40.91)	40 (57.97)	10 (83.33)	77	
Often	39 (59.09)	29 (42.03)	2 (16.67)	70	

† significant *p*-value at the level of 0.05 for chi-square test for family physician vs. general physician

‡ significant *p*-value at the level of 0.05 for chi-square test for family physician vs. other specialties

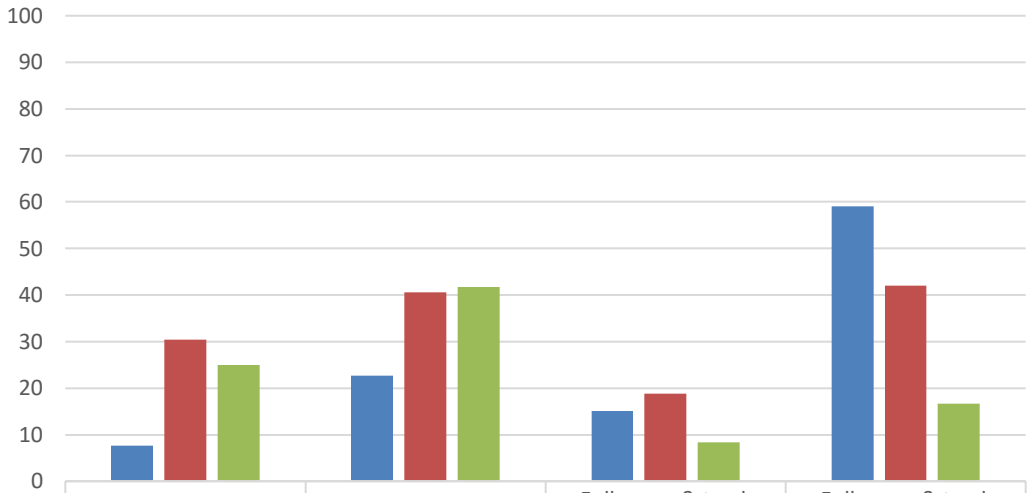
∓ significant *p*-value at the level of 0.05 for chi-square test for general physician vs. other specialties

Figure 7. Physical Activity Counseling Practice by Physician Specialty



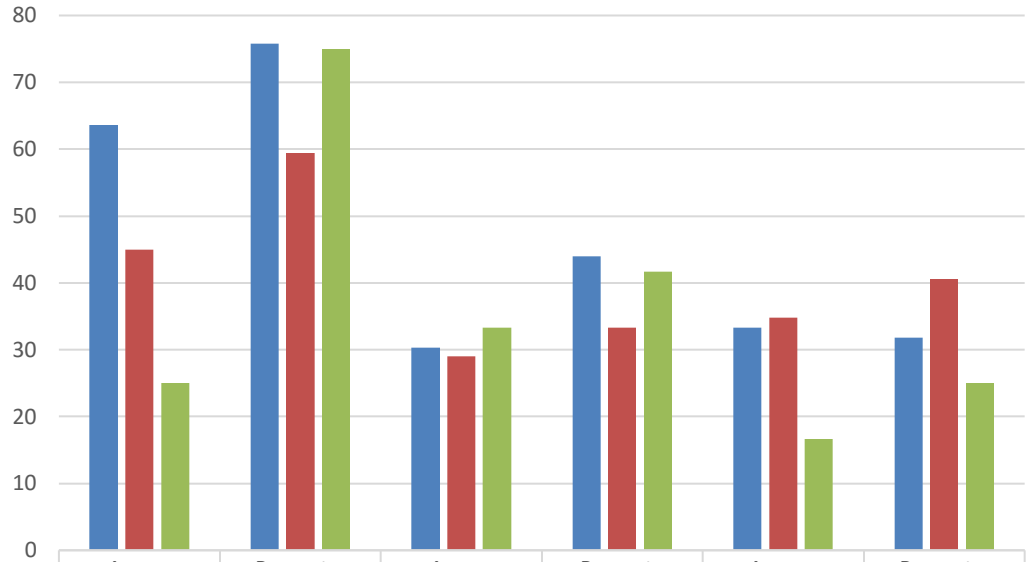
	Provide general counseling/ without CD	Provide general counseling/ with CD	Provide verbal behavioral counseling/ without CD	Provide verbal behavioral counseling/ with CD	Provide written prescriptio n/without CD	Provide written prescriptio n/with CD
Family physician	45.45	93.94	60.61	95.45	7.58	16.67
General physician	39.13	91.3	60.78	92.75	10.14	30.43
Other speciality	16.67	58.33	66.67	58.33	0	8.33

Figure 8. Physical Activity Counseling Practice by Physician Specialty



	Referral /without CD	Referral /with CD	Follow up & track /without CD	Follow up & track /with CD
Family physician	7.58	22.73	15.15	59.09
General physician	30.43	40.58	18.84	42.03
Other speciality	25	41.67	8.33	16.67

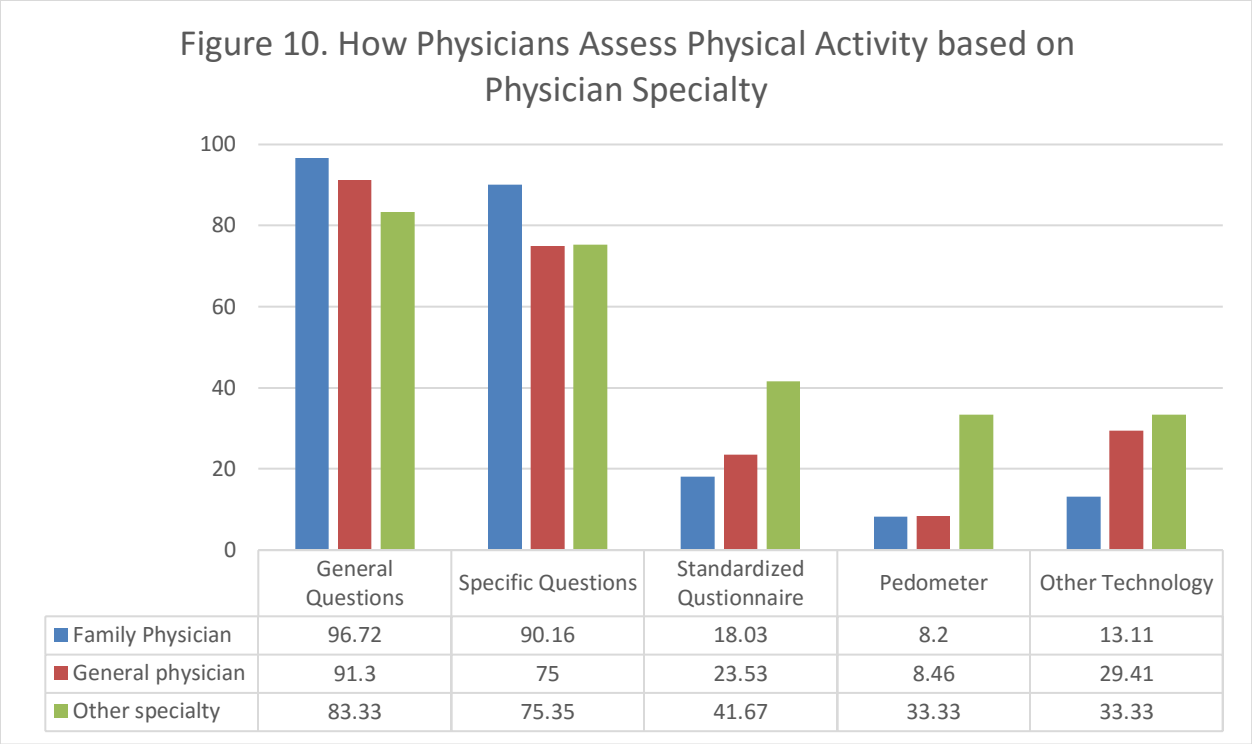
Figure 9. Percentage of Physicians Assessing/Promoting Physical Activity by Physician Specialty and Patient Type



	Assess PA/Adult	Promote PA/Adult	Assess PA/Pediatric	Promote PA/Pediatric	Assess PA/Pregnant	Promote PA/Pregnant
Family physician	63.64	75.76	30.3	43.94	33.33	31.82
General physician	44.93	59.42	28.99	33.33	34.78	40.58
Other speciality	25	75	33.33	41.67	16.67	25

Figure 9 shows the frequencies of assessing and promoting physical activity to adults, children, and pregnant women. Family physicians demonstrated a statistically significant difference ($p < 0.05$) in assessing and promoting physical activity to adult patients compared to general physicians. In addition, the difference in assessing physical activity with the use of specific questions about duration, intensity, and type of physical activity was statistically significant between family and general physicians ($p < 0.05$) (see tables 17 and 18).

Figure 10 demonstrates how the physicians assess physical activity according to their specialty.



	General Questions	Specific Questions	Standardized Qustionnaire	Pedometer	Other Technology
Family Physician	96.72	90.16	18.03	8.2	13.11
General physician	91.3	75	23.53	8.46	29.41
Other specialty	83.33	75.35	41.67	33.33	33.33

Characteristics Associated with Physicians' Physical Activity Counseling Practice and Attitudes

A stepwise regression selection was made to determine which covariate contributed to the results of physical activity counseling practice and attitudes; see tables 21–30. A final model of binary logistic regression was obtained including only covariate results from a stepwise selection.

Table 17. Univariate Association Between Assessment & Promotion of Physical Activity and Physician Specialty					
Specialty	**Family Physician (n = 66)**	**General Physician (n = 69)**	**Other (n = 12)**	**Total 147**	***p*-value**
	n (%)	**n (%)**	**n (%)**		
Assess PA for adults	† ‡				**0.0146**
Sometimes	24 (36.36)	38 (55.07)	9 (75.00)	71	
Often	42 (63.64)	31 (44.93)	3 (25.00)	76	
Promote PA for adults	†				**0.1091**
Sometimes	16 (24.24)	28 (40.58)	3 (25.00)	38	
Often	50 (75.76)	41 (59.42)	9 (75.00)	100	
Assess PA for children					**0.9512**
Sometimes	46 (69.70)	49 (71.01)	8 (66.67)	61	
Often	20 (30.30)	20 (28.99)	4 (33.33)	44	
Promote PA for children					**0.4395**
Sometimes	37 (56.06)	46 (66.67)	7 (58.33)	58	
Often	29 (43.94)	23 (33.33)	5 (41.67)	57	
Assess PA for pregnant					**0.4605**
Sometimes	44 (66.67)	45 (65.22)	10 (83.33)	40	
Often	22 (33.33)	24 (34.78)	2 (16.67)	48	
Promote PA for pregnant					**0.4173**
Sometimes	45 (68.18)	41 (59.42)	9 (75.00)	43	
Often	21 (31.82)	28 (40.58)	3 (25.00)	52	

† significant *p*-value at the level of 0.05 for chi-square test for family physician vs. general physician

‡ significant *p*-value at the level of 0.05 for chi-square test for family physician vs. other specialties

Table 18. Univariate Association Between How Physicians Assess Physical Activity and Physician Specialty					
Form of Physical Activity Assessment	**Family Physician**	**General Physician**	**Other**	**Total**	***p*-value**
	n (%)	**n (%)**	**n (%)**		
General questions about amount of physical activity	**61**	**69**	**12**	**142**	**0.1915**
Yes	59 (96.72)	63 (91.30)	10 (83.33)	132	
No	2 (1.54)	6 (8.70)	2 (16.67)	10	
Specific questions about duration, intensity, and type of physical activity	**61†**	**68**	**12**	**141**	**0.0709**
Yes	55 (90.16)	51 (75.00)	9 (75.34)	115	
No	6 (9.84)	17 (25.00)	3 (25.00)	26	
Standardized physical activity questionnaire	**61**	**68**	**12**	**141**	**0.1975**
Yes	11 (18.03)	16 (23.53)	5 (41.67)	32	
No	50 (81.97)	52 (76.47)	7 (58.33)	109	
Pedometer	**61‡**	**69**	**11**	**142**	**0.0602**
Yes	5 (8.20)	11 (8.46)	4 (33.33)	20	
No	56 (91.80)	58 (84.06)	7 (66.67)	121	
Other technology	**61†**	**68**	**12**	**141**	**0.0574**
Yes	8 (13.11)	20 (29.41)	4 (33.33)	32	
No	53 (86.89)	48 (70.59)	8 (66.67)	109	

† significant *p*-value at the level of 0.05 for chi-square test for family physician vs. general physician

‡ significant *p*-value at the level of 0.05 for chi-square test for family physician vs. other specialties

Other technology: phone application, tablets, Fitbit

Characteristics Associated with Physicians' Physical Activity Counseling Practice (tables 19–23)

Female physicians were found to be more likely than male physicians to provide general physical activity counseling to patients without chronic disease, with OR = 1.88 (95% CI 0.75–4.74) as well as to assess physical activity in adult patients, with OR = 1.66 (95% CI 0.80–3.45), but neither finding was statistically significant. However, female physicians were also more likely to promote physical activity, and this was statistically significant, with a *p*-value of 0.0349 [OR = 3.72 (95% CI 1.10–12.58)]. Furthermore, female physicians were found to be more likely to assess physical activity in pediatric patients than male physicians, with OR 2.61 (95% CI 1.03–6.61), and the difference was statistically significant with a *p*-value of 0.0432.

Both general and family physicians were found to be more likely to provide general physical activity counseling to patients with chronic diseases compared to other specialties [OR 8.86 (95% CI 1.86–42.13), *p*-value 0.0061; OR 7.13 (95% CI 1.60–31.89), *p*-value 0.0101]. Moreover, family and general physicians were found to be more likely to promote physical activity to pregnant women compared to other specialties, but this difference was not statistically significant.

A physician with a good to excellent general health status was found to be more likely to provide general physical activity counseling to patients without chronic disease, but less likely to systematically track/follow chronic disease patients regarding physical activity and to promote physical activity to adult patients. These findings were not statistically significant.

In a similar vein, physicians who did not have chronic diseases were more likely to provide written prescriptions for physical activity for patients with chronic diseases as well as to assess and promote physical activity for pediatric patients. However, none of these findings were

statistically significant.

Physicians who had graduated from domestic universities were less likely than physicians who had graduated from international universities to systematically track/follow patients without chronic disease regarding physical activity [OR 0.33 (95% CI 0.11–0.99)]. In contrast, this difference was not statistically significant for patients with chronic disease. In addition, graduates from domestic universities were statistically less likely to promote physical activity to adult patients [OR 0.12 (95% CI 0.017–0.80)] than those who had attended international universities (p = 0.0291) and less likely to promote physical activity to pediatric patients [OR 0.62 (95% CI 0.23–167), p = 0.1252]. Moreover, physicians who had graduated from domestic universities were more likely to assess (p = 0.0100) and promote physical activity (p = 0.0015) in pregnant women than physicians who had graduated from international universities. On the other hand, physicians who had received training in medical school or followed a physical activity counseling specialty program were more likely to assess physical activity in adults than those who had not received such training (p = 0.0413) Physicians holding a diploma degree or who were board certified were less likely than physicians with an MBBS to refer patients without chronic diseases for further evaluation and management of physical activity.

Physicians with either good or excellent knowledge of physical activity guidelines and recommendations were more likely to promote physical activity in pediatric patients, and those with excellent knowledge were more likely to assess physical activity in pregnant women [OR 5.16 (95% CI 0.68–39.36)].

The number of adult patients that physicians saw per day was found to affect their physical activity counseling practice: physicians who saw fewer adult patients were less likely to provide verbal counseling to patients without chronic disease [OR 0.33 (95% CI 0.15–0.72), *p*-

value 0.0049] but more likely to systematically track/follow patients regarding physical activity [OR 3.13 (95% CI 1.14–8.58), *p*-value 0.0268] and more likely to promote physical activity to pediatric patients [OR 2.87 (95% CI 1.37–6.00), *p*-value 0.0051].

Finally, if a physician's sleeping hours met the recommended amount of 7 hours or more per night, he or she was more likely to assess physical activity in pregnant women [OR 4.42 (95% CI 1.12–17.35), *p*-value 0.0334].

Table 19. Characteristics Associated with Providing Physical Activity Counseling							
		Provide General Counseling		**Provide Verbal Behavioral Counseling**		**Provide Written Prescriptions**	
Patient *without* chronic disease		**OR (CI)**	***p*-value**	**OR (CI)**	***p*-value**	**OR (CI)**	***p*-value**
Physician chronic disease status	Had chronic disease	**1.00 (ref.)**	**1.00 (ref.)**	_____	_____	_____	____
	Did not have chronic disease	0.46 (0.19–1.11)	0.0844	_____	_____	_____	_____
Gender (female vs. male)	Male	**1.00 (ref.)**	**1.00 (ref.)**	_____	_____	_____	____
	Female	1.88 (0.75–4.74)	0.1812	_____	_____	_____	____
University of medical degree	International	**1.00 (ref.)**	**1.00 (ref.)**	_____	_____	**1.00 (ref.)**	**1.00 (ref.)**
	Domestic	0.39 (0.14–1.13)	0.0815	_____	_____	0.34 (0.09–1.33)	0.1206
Number of adult patients per day	More than 20 patients / day	**1.00 (ref.)**	**1.00 (ref.)**	_____	_____	**1.00 (ref.)**	**1.00 (ref.)**
	20 patients or less / day	0.33 (0.15–0.72)	0.0049	_____	_____	0.27 (0.07–1.07)	0.0625
Physician smoking status	Smoker	_____	_____	1.00 (ref.)	1.00 (ref.)	_____	_____
	Non-smoker	_____	_____	0.31 (0.06–1.52)	0.1485	_____	____

Table 19. Characteristics Associated with Providing Physical Activity Counseling							
		Provide General Counseling		**Provide Verbal Behavioral Counseling**		**Provide Written Prescriptions**	
Patient *with* chronic disease		**OR (CI)**	***p*-value**	**OR (CI)**	***p*-value**	**OR (CI)**	***p*-value**
Specialty	Other	**1.00 (ref.)**	**1.00 (ref.)**	_____	_____	**1.00 (ref.)**	**1.00 (ref.)**
	Family physician	8.86 (1.86–42.13)	0.0061	_____	_____	0.88 (0.08–9.54)	0.5007
	General physician	7.13 (1.60 – 31.89)	0.0101	_____	_____	2.19 (0.22 -21.61)	0.9191
Patient *with* chronic disease		**OR (CI)**	***p-value***	**OR (CI)**	***p*-value**	**OR (CI)**	***p*-value**
Physician's general health status	Fair	1.00 (ref.)	1.00 (ref.)	_____	_____	_____	_____
	Good	4.08 (0.68 – 24.323)	0.1230	_____	_____	_____	____
	Excellent	1.66 (0.44 – 6.30)	0.4572	_____	_____	_____	____
Number of nurses per PHC	12-15 nurses or less	_____	_____	**1.00 (ref.)**	**1.00 (ref.)**	**1.00 (ref.)**	**1.00 (ref.)**
	More than 12-15 nurses	_____	_____	0.27 (0.08–0.91)	0.0355	0.29 (0.08–1.01)	0.0529

Table 19. Characteristics Associated with Providing Physical Activity Counseling							
		Provide General Counseling		**Provide Verbal Behavioral Counseling**		**Provide Written Prescriptions**	
Number of adult patients per day	More than 20 patients/ day	———	———	**1.00 (ref.)**	**1.00 (ref.)**	———	———
	20 patients or less/ day	———	———	0.24 (0.05–1.16)	0.075	———	———
Patient *with* chronic disease		**OR (CI)**	***p-value***	**OR (CI)**	***p*-value**	**OR (CI)**	***p*-value**
Physician's chronic disease status	Had chronic disease	———	———	———	———	**1.00 (ref.)**	**1.00 (ref.)**
	Hadn't chronic disease	———	———	———	———	2.22 (0.75–6.53)	0.1475

PHC: primary healthcare center; __ : not selected by the stepwise.

Table 20. Characteristics Associated with Physical Activity Counseling (Systematically Track, Referral for Further Evaluation)					
		Systematically Track/Follow Patient		**Refer for Further Evaluation and Management**	
Patient *without* chronic disease		**OR (CI)**	***p*-value**	**OR (CI)**	***p*-value**
Number of adult patients per day	More than 20 patients/ day	**1.00 (ref.)**	**1.00 (ref.)**	_____	_____
	20 patients or less/ day	3.13 (1.140–8.58)	0.0268	_____	_____
University of medical degree	International	**1.00 (ref.)**	**1.00 (ref.)**		
	Domestic	0.33 (0.11–0.99)	0.0481	_____	_____
Number of pediatric patients	More than 10 patients/ day	_____	_____	**1.00 (ref.)**	**1.00 (ref.)**
	10 patients or less/ day	_____	_____	3.98 (1.36–11.70)	0.0119
Education	MBBS			**1.00 (ref.)**	**1.00 (ref.)**
	Diploma	_____	_____	0.19 (0.04–0.86)	0.0315
	Board certified	_____	_____	0.55 (0.13–2.40)	0.4287
	Other	_____	_____	6.15 (0.326–116.08)	0.2255
Patient *with* chronic disease					
Number of nurses per PHC	12-15 nurses or less	**1.00 (ref.)**	**1.00 (ref.)**	_____	_____
	More than 12-15 nurses	0.10 (0.03–0.31)	0.0001	_____	_____

Table 20. Characteristics Associated with Physical Activity Counseling (Systematically Track, Referral for Further Evaluation)					
		Systematically Track/Follow Patient		**Refer for Further Evaluation and Management**	
University of medical degree	International	_____	_____		
	Domestic	0.203 (0.06–0.75)	0.0561	_____	_____
Physician's general health status	Fair	**1.00 (ref.)**	**1.00 (ref.)**		
	Good	0.28 (0.08–0.95)	0.0411	_____	_____
	Excellent	0.33 (0.10–1.07)	0.0640	_____	_____
Age	31 years old or less	_____	_____	**1.00 (ref.)**	**1.00 (ref.)**
	Older than 31 years	_____	_____	0.44 (0.21–0.93)	0.0319

PHC: primary healthcare center; __ : not selected by the stepwise.

Table 21. Characteristics Associated with Assessment and Promotion of Physical Activity to Adult Patients					
		Assess Physical Activity in Adult Patients		**Promote Physical Activity in Adult Patients**	
		OR (CI)	***p*-value**	**OR (CI)**	***p*-value**
Training in medical school/specialty program about physical activity counseling	Untrained	**1.00 (ref.)**	**1.00 (ref.)**	**1.00 (ref.)**	**1.00 (ref.)**
	Trained	2.39 (1.04–5.53)	**0.0413**	2.82 (0.54–14.87)	0.2216
Gender	Male	**1.00 (ref.)**	**1.00 (ref.)**	**1.00 (ref.)**	**1.00 (ref.)**
	Female	1.66 (0.80–3.45)	0.1717	3.72 (1.10–12.58)	**0.0349**
Physician moderate-to-vigorous activity status	Less than 150 minute /week	**1.00 (ref.)**	**1.00 (ref.)**	**1.00 (ref.)**	**1.00 (ref.)**
	150 minute /week or more	_____	_____	1.80 (0.45–7.13)	0.4050
University medical degree	International	**1.00 (ref.)**	**1.00 (ref.)**	**1.00 (ref.)**	**1.00 (ref.)**
	Domestic	_____	_____	0.12 (0.017–0.80)	**0.0291**
Marital status	Single	**1.00 (ref.)**	**1.00 (ref.)**	**1.00 (ref.)**	**1.00 (ref.)**
	Married	_____	_____	0.76 (0.10–5.99)	0.7924
	Other	_____	_____	0.02 (< 0.001–0.72)	**0.0333**
Number of physicians per PHC	4 physicians or less	_____	_____	**1.00 (ref.)**	**1.00 (ref.)**
	More than 4 physicians	_____	_____	0.41 (0.13–1.27)	0.1219

Table 21. Characteristics Associated with Assessment and Promotion of Physical Activity to Adult Patients					
		Assess Physical Activity in Adult Patients		**Promote Physical Activity in Adult Patients**	
Years of work experience	5 years of experience or less	_____	_____	**1.00 (ref.)**	**1.00 (ref.)**
	More than 5 years of experience	_____	_____	0.44 (0.15–1.32)	0.1441
Physician general health status	Fair	_____	_____	**1.00 (ref.)**	**1.00 (ref.)**
	Good	_____	_____	0.42 (0.10–1.76)	0.2340
	Excellent	_____	_____	0.66 (0.15 2.86)	0.5748
Number of nurses per PHC	12-15 nurses or less			**1.00 (ref.)**	**1.00 (ref.)**
	More than 12-15 nurses	_____	_____	0.33 (0.11–1.03)	0.0566
Number of pediatric patients	More than 10 patients/ day			**1.00 (ref.)**	**1.00 (ref.)**
	10 patients or less/ day	_____	_____	0.26 (0.09–0.78)	**0.0166**
Sector	Qatif			**1.00 (ref.)**	**1.00 (ref.)**
	Safwa	_____	_____	1.18 (0.16–8.53)	0.8719
	Al-Kkhobar	_____	_____	1.30 (0.08–21.99)	0.8557
	Dammam	_____	_____	0.41 (0.14–1.25)	0.1167

PHC: primary healthcare center; poor knowledge: knowing 0–1 recommendations; good knowledge: knowing 2–3 recommendations; excellent knowledge: knowing 4–6 recommendations; __ : not selected by the stepwise.

Table 22. Characteristics Associated with Assessment and Promotion of Physical Activity to Pediatric Patients					
		Assess Physical Activity in Pediatric Patients		**Promote Physical Activity in Pediatric Patients**	
		OR (CI)	***p*-value**	**OR (CI)**	***p*-value**
Gender	Male	**1.00 (ref.)**	**1.00 (ref.)**	_____	_____
	Female	2.61 (1.03–6.61)	**0.0432**	_____	_____
University medical degree	International	_____	_____	**1.00 (ref.)**	**1.00 (ref.)**
	Domestic	_____	_____	0.62 (0.23–1.67)	0.1252
Number of physicians per PHC	Less than 4 physicians	**1.00 (ref.)**	**1.00 (ref.)**		
	4 physicians or more	1.56 (0.66–3.70)	0.3087	_____	_____
Physician chronic disease	Had chronic disease	**1.00 (ref.)**	**1.00 (ref.)**	**1.00 (ref.)**	**1.00 (ref.)**
	Did not have chronic disease	2.54 (0.10–6.79)	0.0630	1.32 (0.554–3.13)	0.5327
Number of adult patients	20 patient or more/ day	_____	_____	**1.00 (ref.)**	**1.00 (ref.)**
	Less than 20 patient/ day	_____	_____	2.87 (1.37–6.00)	**0.0051**
Physician knowledge about physical activity	Poor	_____	_____	**1.00 (ref.)**	**1.00 (ref.)**
	Good	_____	_____	1.40 (0.64–3.05)	0.3976
	Excellent	_____	_____	1.06 (0.21–5.30)	0.9394

PHC: primary healthcare center; poor knowledge: knowing 0–1 recommendations; good knowledge: knowing 2–3 recommendations; excellent knowledge: knowing 4–6 recommendations; __ : not selected by the stepwise.

Table 23. Characteristics Associated with Assessment and Promotion of Physical Activity to Pregnant Women					
		Assess Physical Activity in Pregnant Women		**Promote Physical Activity in Pregnant Women**	
		OR (CI)	***p*-value**	**OR (CI)**	***p*-value**
Number of nurses per PHC	12-15 nurses or less	**1.00 (ref.)**	**1.00 (ref.)**	**1.00 (ref.)**	**1.00 (ref.)**
	More than 12-15 nurses	0.29 (0.08–1.07)	0.0631	_____	_____
Age	Less than 31 years old	**1.00 (ref.)**	**1.00 (ref.)**	**1.00 (ref.)**	**1.00 (ref.)**
	31 years or older	0.41 (0.15–1.13)	0.0849	0.18 (0.04 0.86)	0.0319
University medical degree	International	**1.00 (ref.)**	**1.00 (ref.)**	**1.00 (ref.)**	**1.00 (ref.)**
	Domestic	5.91 (1.53–22.86)	0.0100	6.63 (2.07–21.27)	0.0015
Electronic referral system in the PHC	Did not have electronic referral system	**1.00 (ref.)**	**1.00 (ref.)**	_____	_____
	Had electronic referral system	6.34 (1.79–22.47)	0.1118	_____	_____
Sector	Qatif	**1.00 (ref.)**	**1.00 (ref.)**		
	Safwa	0.48 (0.08–2.90)	0.4244	_____	_____
	Al-Kkhobar	< 0.001 (< 0.001 – > 999.99)	0.9806	_____	_____
	Dammam	0.22 (0.06–0.86)	0.0291	_____	_____

Table 23. Characteristics Associated with Assessment and Promotion of Physical Activity to Pregnant Women					
		Assess Physical Activity in Pregnant Women		**Promote Physical Activity in Pregnant Women**	
Physician sleeping hours	Less than 7 hr. of sleep	**1.00 (ref.)**	**1.00 (ref.)**		
	7 hr. of sleep or more	4.42 (1.12–17.345)	0.0334	_____	_____
Physician knowledge about physical activity	Poor	**1.00 (ref.)**	**1.00 (ref.)**		
	Good	0.87 (0.33–2.31)	0.7775	_____	_____
	Excellent	5.16 (0.68–39.36)	0.1135	_____	_____
Years of work experience	5 years of experience or less	**1.00 (ref.)**	**1.00 (ref.)**	**1.00 (ref.)**	**1.00 (ref.)**
	More than 5 years of experience	_____	_____	3.81 (0.82–17.60)	0.0871
Specialty	Other	_____	_____	**1.00 (ref.)**	**1.00 (ref.)**
	Family physician	_____	_____	1.54 (0.23–10.49)	0.2057
	General physician	_____	_____	3.32 (0.52–21.28)	0.6569

PHC: primary healthcare center; poor knowledge: knowing 0–1 recommendations; good knowledge: knowing 2–3 recommendations; excellent knowledge: knowing 4–6 recommendations; __ : not selected by the stepwise.

Characteristics Associated with Physician Attitudes Toward Physical Activity Counseling (tables 24–28)

The presence of an electronic referral system and physician chronic disease status both affected the physician agreement response to the statement that "It is important that physical activity programs for the community be offered by the health system" (Table 24).

Table 24. Characteristics Associated with Physician's Attitude Toward Physical Activity Counseling, Attitude # 1

		It is important that physical activity programs for the community be offered by the health system.	
Characteristics		**OR (CI)**	***p*-value**
Electronic referral system in the PHC	Did not have electronic referral system	**1.00 (ref.)**	**1.00 (ref.)**
	Had electronic referral system	0.56 (0.19–1.61)	0.2808
Physician chronic disease status	Had chronic disease	**1.00 (ref.)**	**1.00 (ref.)**
	Did not have chronic disease	0.47 (0.19–1.20)	0.1163

PHC: primary healthcare center

Physicians who slept the recommended number of hours per night, or who did not have chronic diseases, or who had good to excellent knowledge about physical activity recommendations, or who worked in the Safwa, Al-Khobar, or Dammam sectors were more likely to agree that there are effective strategies and/or tools to help patients be adequately physically active (see Table 25).

Table 25. Characteristics Associated with Physician's Attitude Toward Physical Activity Counseling, Attitude # 2			
		There are effective strategies and/or tools to help patients be adequately physically active.	
Characteristics		**OR (CI)**	***p*-value**
Physician sleeping hours	Did not meet the recommendation	**1.00 (ref.)**	**1.00 (ref.)**
	Met the recommendation	2.37 (0.94–5.97)	0.0664
Physician chronic disease status	Had chronic disease	**1.00 (ref.)**	**1.00 (ref.)**
	Did not have chronic disease	1.40 (0.56–3.54)	0.4674
Sector	Qatif	**1.00 (ref.)**	**1.00 (ref.)**
	Safwa	6.12 (1.61–23.25)	0.0078
	Al-Kkhobar	2.40 (0.56–10.34)	0.2419
	Dammam	2.90 (1.23–6.82)	0.0149
Physician knowledge about physical activity	Poor	**1.00 (ref.)**	**1.00 (ref.)**
	Good	3.11 (1.38–7.01)	0.0064
	Excellent	4.40 (0.89–21.62)	0.0684

PHC: primary healthcare center; poor knowledge: knowing 0–1 recommendations; good knowledge: knowing 2–3 recommendations; excellent knowledge: knowing 4–6 recommendations.

Physicians who were female, or had good to excellent knowledge about physical activity recommendations, or were 31 or older, or whose specialty was family medicine, or saw fewer adult patients (< 20 patients/day), or had 12–15 nurses or more working in their PHC center reported that they were confident in their ability to counsel patients to be adequately physically active (see Table 26).

Table 26. Characteristics Associated with Physician's Attitude Toward Physical Activity Counseling, Attitude # 3			
		I am confident in my ability to counsel my patients to be adequately physically active.	
Characteristics		**OR (CI)**	***p*-value**
Physician knowledge about physical activity	Poor	**1.00 (ref.)**	**1.00 (ref.)**
	Good	2.75 (0.89–8.51)	0.0793
	Excellent	37.51 (3.66–384.63)	0.0023
Age	31 years old or less	**1.00 (ref.)**	**1.00 (ref.)**
	Older than 31 years	10.23 (1.88–55.75)	0.0072
Specialty	Other	**1.00 (ref.)**	**1.00 (ref.)**
	Family physician	3.88 (0.43–34.95)	0.2274
	General physician	0.10 (0.003–3.57)	0.2088
Gender	Male	**1.00 (ref.)**	**1.00 (ref.)**
	Female	4.17 (1.15–15.10)	0.0297
Education	MBBS	**1.00 (ref.)**	**1.00 (ref.)**
	Diploma	157.61 (3.82 – > 999.99)	0.0077
	Board certified	91.65 (3.201 – > 999.99)	0.0083
	Other	5.54 (0.06–529.54)	0.4620
University medical degree	Domestic	**1.00 (ref.)**	**1.00 (ref.)**
	International	0.22 (0.06–0.87)	0.0312

Table 26. Characteristics Associated with Physician's Attitude Toward Physical Activity Counseling, Attitude # 3			
Number of adult patients	More than 20 patients/ day	**1.00 (ref.)**	**1.00 (ref.)**
	20 patients or less/ day	2.53 (0.90–7.14)	0.0799
Number of nurses per PHC	12-15 nurses or less	**1.00 (ref.)**	**1.00 (ref.)**
	More than 12-15 nurses	8.69 (2.27–33.25)	0.0016
Physician general health status	Fair	**1.00 (ref.)**	**1.00 (ref.)**
	Good	0.56 (0.17–1.86)	0.3426
	Excellent	0.10 (0.025–0.362)	0.0005
Number of pediatric patients	More than 10 patients/ day	**1.00 (ref.)**	**1.00 (ref.)**
	10 patients or less/ day	0.17 (0.04–0.62)	0.0074
Years of work experience	Less than 5 years of experience	**1.00 (ref.)**	**1.00 (ref.)**
	5 years or more of experience	0.24 (0.05–1.24)	0.0884
Electronic referral system in the PHC	Did not have electronic referral system	**1.00 (ref.)**	**1.00 (ref.)**
	Had electronic referral system	0.16 (0.05–0.51)	0.0019

PHC: primary healthcare center; poor knowledge: knowing 0–1 recommendations; good knowledge: knowing 2–3 recommendations; excellent knowledge: knowing 4–6 recommendations.

Moreover, physicians who were female, or had good to excellent knowledge about physical activity recommendations, or had more nurses (12–15 or more) working in their PHC center, or were family or general physicians felt that they were effective at helping patients to be adequately physical active (see Table 27).

Table 27. Characteristics Associated with Physician's Attitude Toward Physical Activity Counseling, Attitude # 4			
		I am effective at helping my patients be adequately physically active.	
Characteristics		**OR (CI)**	***p*-value**
Physician knowledge about physical activity	Poor	**1.00 (ref.)**	**1.00 (ref.)**
	Good	1.83 (0.85–3.94)	0.1221
	Excellent	3.30 (0.67–16.31)	0.1425
Specialty	Other	**1.00 (ref.)**	**1.00 (ref.)**
	Family physician	2.60 (0.52–13.00	0.2437
	General physician	4.21 (0.81–21.81)	0.0867
Gender	Male	**1.00 (ref.)**	**1.00 (ref.)**
	Female	2.71 (1.09–6.76)	0.0328
Number of nurses per PHC	12-15 nurses or less	**1.00 (ref.)**	**1.00 (ref.)**
	More than 12-15 nurses	2.67 (1.06–6.73)	0.0372
Physician general health status	Fair	**1.00 (ref.)**	**1.00 (ref.)**
	Good	0.78 (0.30–2.01)	0.6022
	Excellent	0.34 (0.13–0.86)	0.0232
Electronic referral system in the PHC	Did not have electronic referral system	**1.00 (ref.)**	**1.00 (ref.)**
	Had electronic referral system	0.64 (0.29–1.41)	0.2687

PHC: primary healthcare center; poor knowledge: knowing 0–1 recommendations; good knowledge: knowing 2–3 recommendations; excellent knowledge: knowing 4–6 recommendations.

Finally, physicians who were female, or had more nurses (12–15 or more) working in their PHC center, or were family or general physicians, or were 31 or older believed that a physician/nurse would be able to provide more credible and effective counseling if he/she was adequately physically active (see Table 28).

Table 28. Characteristics Associated with Physician's Attitude Toward Physical Activity Counseling

		A physician/nurse will be able to provide more credible and effective counseling if he/she is adequately physically active.	
Characteristics		**OR (CI)**	***p*-value**
Specialty	Other	**1.00 (ref.)**	**1.00 (ref.)**
	Family physician	1.62 (0.31–8.41)	0.5690
	General physician	3.82 (0.71–20.69)	0.1198
Gender	Male	**1.00 (ref.)**	**1.00 (ref.)**
	Female	1.43 (0.62–3.31	0.3989
Number of nurses per PHC	12-15 nurses or less	**1.00 (ref.)**	**1.00 (ref.)**
	More than 12-15 nurses	2.14 (0.85–5.40)	0.1059
Age	Less than 31 years old	**1.00 (ref.)**	**1.00 (ref.)**
	31 years or older	1.36 (0.65–2.86)	0.4203
Number of pediatric patients	More than 10 patients/ day	**1.00 (ref.)**	**1.00 (ref.)**
	10 patients or less/ day	0.66 (0.29–1.49)	0.3142

PHC: primary healthcare center.

Discussion

The present research is the first study in Eastern Province, SA to assess physical activity counseling practice among all physician specialties working in PHC centers, except dentists. Moreover, it is also the first to assess in-depth physician knowledge about physical activity recommendations, whether they assess physical activity for their patients and, if so, how the assessment is conducted, and whether any physician characteristics, such as demographics, affect physical activity counseling. Therefore, with the use of the findings from this study, the quality of care provided in primary healthcare centers as well as health promotion services (especially related to lifestyle modification) as a mode for health promotion and disease prevention can be improved in the Kingdom of Saudi Arabia (KSA).

In our study, 61.54% of physicians indicated that the physician is the main health professional responsible for promoting physical activity counseling, which corresponds to the findings in a systematic review [46], where Buffart (2009) found that 98% of general physicians agreed that promoting physical activity amongst patients is part of their role, Van der Ploeg (2007) found that 92–99% of general physicians agreed that part of their role is suggesting methods about how to increase daily physical activity to patients, and Graham (2005) also found that the majority of general physicians felt that promotion of physical activity was part of their role. However, although it should be a main role of physicians to promote physical activity, other healthcare workers, such as nurses, should be properly trained regarding physical activity counseling. By training nurses and other healthcare workers, there can be a potential decrease in the responsibility of physicians to provide physical activity counseling, who, given their oftentimes high patient numbers, do not always have time to provide physical activity counseling. Therefore, if more healthcare providers were to be trained, patients would have

higher chances of receiving physical activity counseling.

Also, this study found that physicians believe in the importance of physical activity programs for the community and that they as physicians feel effective and confident in regard to helping patients be adequately physical active. This result was also found in a systematic review about provider perceptions of physician activity counseling, with three studies demonstrating that 66–92% of physicians felt confident in providing general counseling about physical activity to patients [46]. However, based on this study, although the physicians were confident in providing physical counseling, 60.42% of physicians were found to have poor knowledge regarding physical activity recommended guidelines, which can be explained by the fact that 38.09% reported inadequate training in physical activity counseling and that only 21.77% received training about physical activity counseling during medical school or a specialty program. The results of these studies as well as our own results correspond with an unpublished cross-sectional study done in Jeddah, Saudi Arabia that showed primary care physicians were not aware of current physical activity guidelines [34]. Such results suggest the need to modify the training curriculum for medical schools and specialty programs by adding sections regarding the promotion of services for lifestyle changes; in other words, education needs to focus on how to provide physical activity counseling.

Lack of time, lack of adequate referral services for physical activity, and inadequate training in physical activity counseling were the top three barriers reported in this study by physicians that prevent them from providing physical activity counseling to patients. Some of these barriers were found in other studies, with 14 indicating that lack of time is the biggest barrier to PA counseling and eight indicating that lack of knowledge and training in PA counseling is the biggest barrier [46]. Furthermore, these two barriers were also found to be the

most common barriers for primary care physicians in a study done in Asser Region, Saudi Arabia [18].

To overcome these barriers, physical activity counseling training programs should be implemented by MoH for medical staff working in PHC centers to help improve physical counseling practice. In addition, lifestyle counseling and health coaching need to be added to the medical school curriculum. To overcome this issue, KSA should empower the healthcare infrastructure by increasing the number of available trained physicians and medical staff (especially related to physical activity) in each PHC center so that physicians will be able to spend more time on lifestyle counseling. Furthermore, efforts should be put forth in working with communities to develop electronic referral systems (ERSs) for community centers and gyms as well as secondary healthcare (e.g., hospitals, specialist centers) to promote physical activity. ERSs are the pathway to more specialized assessment and management of patient health issues. For example, secondary healthcare providers (e.g., physical activity therapists) would be able to gain specific and specialized insight into patient issues and conduct further physical activity assessment and management. In regard to community centers and ERSs, the presence of ERSs would provide a potentially effective resource to promote physical activity in patients, as physicians would be able to help their patients do physical activity under the supervision of physical trainers who could take the responsibility for prescribing and monitoring physical activity according to patient needs. A combination of these approaches regarding physical counseling in PHC centers could potentially help decrease physical inactivity in Saudi Arabia and its related health and economic burdens.

Moreover, several factors and characteristics were found in the current study to be associated with physicians' attitudes toward physical activity counseling and their counseling

practice: these factors include physician age, gender, specialty, education level, university of graduation, level of knowledge about physical activity guidelines, general health status, number of hours of sleep per night, sectors, number of adult and pediatric patients seen by physicians per day, number of nurses working in the PHC center, and availability of an electronic referral system in the PHC center. Gender and specialty have both been identified in previous studies conducted in the United States as factors associated with primary care physicians' physical activity practice [49].

In our sample, family physicians, compared to general physicians, reported the highest prevalence regarding the use of physical activity counseling practice, especially if patients had chronic diseases. This finding was supported by Al Shammari (2016), who explored whether family medicine residents in Eastern Province, Saudi Arabia counsel chronic disease patients about physical activity [32]. In our sample, significant difference was seen between family and general physicians regarding their assessment of physical activity through the use of specific questions about duration, intensity, and type of physical activity. These findings can be contributed to family physicians' knowledge and the training they received during residency specialty programs about the importance of lifestyle changes in the management of chronic diseases and disease prevention. Therefore, given the importance of residency programs in the delivery of physical activity care, each KSA physician working in primary healthcare should also go through training in a residency program.

According to this study's results, the physicians themselves believe that they will be able to provide more credible and effective counseling if they are adequately physically active. However, based on the survey results, more than 40% of the physicians were overweight or obese, with only 19.05% meeting the global physical activity (aerobic + strength)

recommendations. In fact, four studies done in Saudi Arabia in different regions than this study found that healthcare professionals and physicians in residency programs are either physically inactive or have a low level of physical activity [18, 54-56].This lack of physical activity could be due to the very busy working hours related to the shortage of physicians, which has led to high patient load per day for each physician. Also, this lack of physical activity amongst physicians can potentially be contributed to that fact that 70% of our sample were female, which in Saudi culture means that most of them have other responsibilities at home (e.g., raising children and housework) that could prevent them from meeting the recommended minutes of PA per week. Therefore, to increase physician PA levels, MoH should mandate that each physician be required to take a one-hour break during working hours to practice some sort of PA.

However, this study did not find statistical difference in physician physical activity counseling practice in relation to their own physical activity levels, which was in contrast to two studies in southern (sample size = 106) and southwestern (sample size = 232) regions of Saudi Arabia that found significant relations between physician PA and their PA counseling practice [18, 57]. The difference in results may be a result of the study sample size, with a response rate of 44.01% (147 from 334 physicians) compared to a response rate ranging from 64–77% in the two studies previously referenced. This conflict in results needs further examination in future studies.

This study expected that physicians who saw fewer adult patients per day and had more nurses on staff would provide counseling more frequently for patients with or without chronic disease. Contrarily, this study found that physicians who saw fewer adult patients per day were less likely to provide verbal counseling to patients without chronic disease. This finding does not correspond with the information reported by the physicians in this study—that a high number of

patients results in insufficient time to provide PA counseling. There is no possible explanation for this result, so further study is needed to address this issue. However, it should be noted that this study found that physicians seeing fewer adult patients per day were more likely to systematically track and follow-up with chronic disease patients regarding physical activity and promote PA to children (see Figure 11).

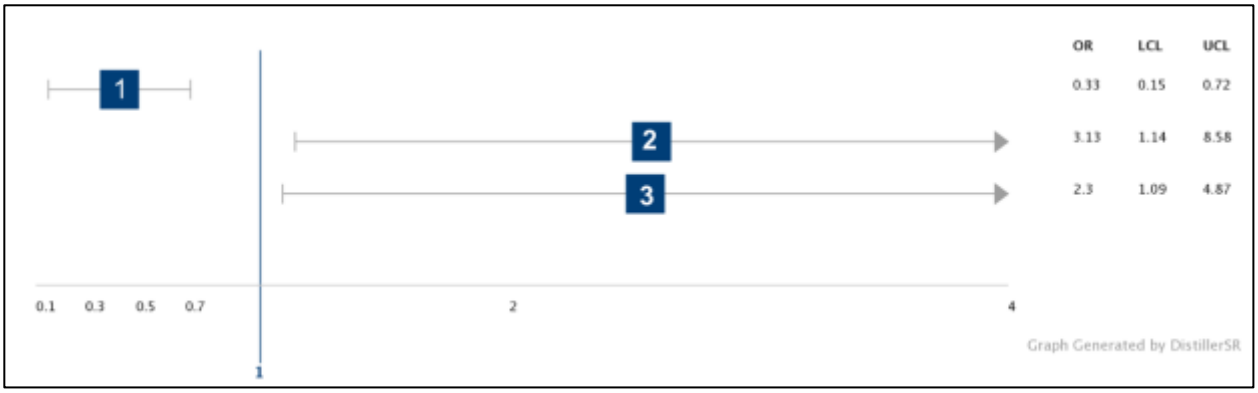


Figure 11. Outcomes Affected by Number of Adult Patients (OR fewer patients vs. more patients)
1: Physicians provide verbal behavioral counseling for patients without chronic disease. 2: Physicians systematically track /follow patients without chronic disease. 3: Physicians promote physical activity in pediatric patients. OR: odds ratio, LCL: lower confidence limit, UCL: upper confidence limit

Furthermore, physicians with more nursing staff were found to be less likely to provide verbal counseling and systematically track and follow-up with chronic disease patients (see Figure 12), which could potentially be explained by the idea that having more nursing staff tends to result in physicians relying on nurses to provide this service. Therefore, there is a potential need to train nursing staff on how to provide physical activity counseling and their role in promoting health. In addition, in the current study, the physicians indicated feeling more confident and effective in counseling their patients to be adequately physically active if there are more nursing staff in their PHC center.

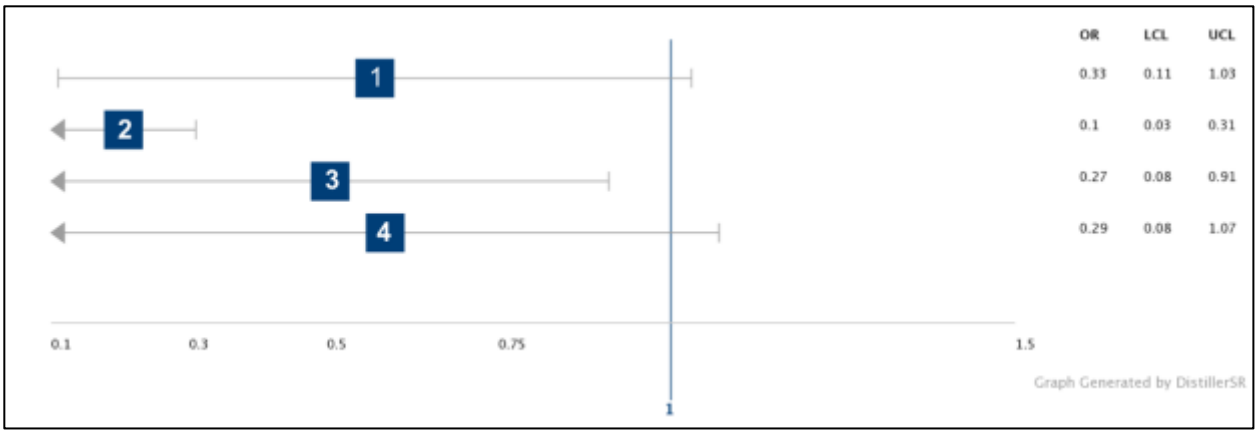


Figure 12. Outcomes Affected by Number of Nurses in PHC Center (OR more nurses vs. fewer nurses) 1: Physicians promote physical activity in adult patients. 2: Physicians systematically track/follow patients with chronic disease. 3: Physicians provide verbal behavioral counseling for patients with chronic disease. 4: Physicians assess physical activity for pregnant women. OR: odds ratio, LCL: lower confidence limit, UCL: upper confidence limit.

In addition, physicians who graduated from international universities were found to assess and promote PA for pregnant women less than physicians who graduated from domestic universities. This could potentially be explained by the idea that physicians who graduated from international universities might assume that since Saudi culture and norms for females dictate that females not go outside the home to do PA alone, there is no need for assessment and promotion. However, physicians who graduated from international universities systematically track/follow up with their patients more frequently regarding physical activity, regardless of his/her chronic disease status (see Figure 13). This suggests that medical school curriculums may vary in content between from domestic KSA universities and international ones. Therefore, domestic universities in KSA need to improve their curriculum with cooperation from international universities to develop a more effective curriculum.

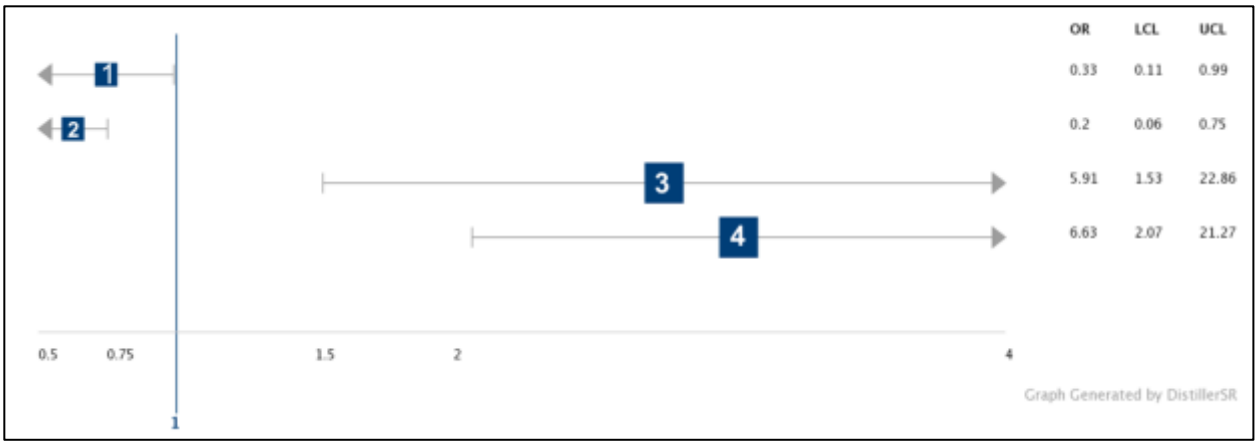


Figure 13. Outcomes Affected by University of Graduation (OR domestics vs. international)
1: Physicians systematically track \/follow patients without chronic disease. 2: Physicians systematically track/follow patients with chronic disease. 3: Physicians assess physical activity in pregnant women. 4: Physicians promote physical activity in pregnant women. OR: odds ratio, LCL: lower confidence limit, UCL: upper confidence limit.

Limitations

The convenience sampling method used in this study could be considered to be a limitation, as it makes it impossible to generalize the results. Nevertheless, the study provides insight into physical activity counseling practices in Eastern Province, as the sample was gathered from the largest sector in that province.

The counseling practice is self-reported by the physician, which may not reflect the actual counseling practice; they may overestimate their counseling practice. This necessitates future research to measure the actual PA counseling practice.

Another limitation is that physician lifestyle behaviors, including physical activity levels, weight, and height, were self-reported, which could affect the accuracy of the results. However, this is the most suitable method of collection from physicians working in a busy environment.

In addition, the length of the survey may be considered a limitation, as it could potentially lead to a decrease in the response rate or result in incomplete survey(s). However, the

length of the survey was necessary to evaluate physician PA counseling practice, knowledge, and attitudes and could not be assessed in an in-depth manner if the survey length were very short.

Recommendations and Future Research

In conclusion, the results of this study indicate the need for a KSA PA training program and the distribution of national clinical physical activity guidelines to all PHC centers to improve physician and healthcare providers' knowledge. Furthermore, the strengthening of PHC center manpower along with PHC center infrastructures are necessary to allow more time for PA counseling amongst physicians. Additionally, along with vital signs, physical activity assessment questions should be a mandatory part of PHC visits. Additionally, the development of special prescription paper for physical activity and printed educational material about physical activity should be made available. Furthermore, there needs to be focused collaboration with community centers so as to coordinate a referral system to promote physical activity. This can potentially decrease the burden of chronic and non-chronic diseases related to lack of physical activity.

In order to develop effective strategies and approaches for the promotion of PA counseling, future research should address the actual effect of PA counseling by doing longitudinal studies in the Saudi population. This can determine whether or not improvement of patient outcomes and behavioral change takes place with counseling. In addition, studies should be conducted to assess the PA knowledge and attitudes of healthcare providers besides physicians so as to put forth strategies for all healthcare providers in the promotion of PA.

These approaches can help promote physical activity for the Saudi population and decrease the economic and health related burdens of physical inactivity.

References

1. Khan, K., et al., *Sport and exercise as contributors to the health of nations.* The Lancet, 2012. **380**: p. 59-64.
2. Caspersen, C.J., K.E. Powell, and G.M. Christenson, *Physical activity, exercise, and physical fitness: definitions and distinctions for health-related research.* Public Health Reports, 1985. **100**(2): p. 126–131.
3. Mabry, R., et al., *A systematic review of physical activity and sedentary behaviour research in the oil-producing countries of the Arabian Peninsula.* BMC Public Health, 2016. **16**(1003).
4. **DOHHS**, *Physical Activity Guidelines Advisory Committee Report, 2008. To the Secretary of Health and Human Services.* 2008, Washington (DC): U.S. Department of Health and Human Services; 2008: Washington (DC): U.S. Department of Health and Human Services; 2008.
5. Powell, K., A. Paluch, and S. Blair, *Physical Activity for Health: What Kind? How Much? How Intense? On Top of What?* Annu. Rev. Public Health, 2011. **32**: p. 349–65.
6. Division of Nutrition , P.A., and Obesity ,National Center for Chronic Disease Prevention and Health Promotion. *Physical Activity Basics/ Glossary of Terms*. 2015 [cited 2017; Available from: https://www.cdc.gov/physicalactivity/basics/glossary/.
7. Warburton, D.E.R., C.W. Nicol, and S.S.D. Bredin, *Health benefits of physical activity: the evidence.* CMAJ, Canadian Medical Association Journal, 2006. **174**(6): p. 801-809.
8. Kraus, W.E., et al., *The National Physical Activity Plan: A Call to Action From the American Heart Association.* Circulation, 2015. **131**(21): p. 1932-1940.
9. WHO, *Global recommendations on physical activity for health. Geneva: World Health Organization*. 2010.
10. Blake, H., et al., *How effective are physical activity interventions for alleviating depressive symptoms in older people? A systematic review.* Clinical Rehabilitation, 2009. **23**(10): p. 873-887.
11. Pescatello, L.S., *ACSM's guidelines for exercise testing and prescription/ American College of Sports Medicine*. Vol. Tenth Edition. 2017: Lippincott Williams & Wilkins.
12. Lee, I.-M., et al., *Effect of physical inactivity on major non-communicable diseases worldwide: an analysis of burden of disease and life expectancy.* The Lancet, 2012. **380**: p. 219-229.
13. McKinney, J., et al., *The health benefits of physical activity and cardiorespiratory fitness.* British Columbia Medical Journal, 2016. **58**(3): p. 131-137.
14. WHO. *Physical activity*. [cited 2017; Available from: http://www.who.int/topics/physical_activity/en/.
15. Rahim, H.F.A., et al., *Non-communicable diseases in the Arab world.* The Lancet, 2014. **383**: p. 356-367.
16. Al-Hazzaa, H.M., *The public health burden of physical inactivity in saudi arabia.* Journal of Family and Community Medicine, 2004. **11**(2): p. 45-51.
17. MOH, *Survey of Health Information in Kingdom of Saudi Arabia* 2013.

18. ALJABERI, A.S., *Assessment of Physical Activity (Counseling) at Primary Health Care Centers in Aseer Region, Saudi Arabia.* Medical Journal of Cairo University, 2014. **82**(2): p. 207-213.
19. Eakin, E.G., B.J. Smith, and A.E. Bauman, *Evaluating the Population Health Impact of Physical Activity Interventions in Primary Care—Are We Asking the Right Questions?* Journal of Physical Activity and Health, 2005. **2**(2): p. 197-215.
20. Elley, R., et al., *Cost-effectiveness of physical activity counselling in general practice.* New Zealand Medical Journal, 2004. **117**(1207).
21. MOH, *Statistical Yearbook 1436H*. 2015, Ministry of Health.
22. CDC. *Physical Activity Guidelines*. June 4, 2015 [cited 2017; Available from: https://www.cdc.gov/physicalactivity/basics/.
23. WHO, *Saudi Arabia Diabetes country profiles 2016*. 2016, World Health Organization.
24. Al-Zalabani, A., N. Al-Hamdan, and A. Saeed, *The prevalence of physical activity and its socioeconomic correlates in Kingdom of Saudi Arabia: A cross-sectional population-based national survey.* Journal of Taibah University Medical Sciences, 2015. **10**(2): p. 208-215.
25. Ding, D., et al., *The economic burden of physical inactivity: a global analysis of major non-communicable diseases.* The Lancet, 2016. **388**: p. 1311–1324.
26. Bauman, A., et al., *Correlates of physical activity: why are some people physically active and others not?* The Lancet, 2012. **380**.
27. WHO, *Global Strategy on Diet, Physical Activity and Health.* 2004.
28. Sanchez, A., et al., *Effectiveness of physical activity promotion interventions in primary care: A review of reviews.* Preventive Medicine, 2015. **76**: p. 56-67.
29. Berra, K., J. Rippe, and J. Manson, *Making Physical Activity Counseling a Priority in Clinical Practice: The Time for Action Is Now.* JAMA, 2015. **314**(24).
30. Anokye, N., J. Lord, and J. Fox-Rushby, *Is brief advice in primary care a cost-effective way to promote physical activity?* British Journal of Sports Medicine, 2014. **48**: p. 202-206.
31. AuYoung, M., et al., *Integrating Physical Activity in Primary Care Practice.* The American Journal of Medicine, 2016. **129**: p. 1022-1029.
32. Shammari, M.A.A., *Are family medicine residents physically active? And do they counsel their chronically ill patients about physical activity? A cross-sectional study among residents of the family medicine joint program, eastern province, Saudi Arabia.* International Journal of Medical Science and Public Health, 2016. **5**(9).
33. AlRashdi, M., *Attitudes of primary care physicians towards promoting regular physical activity in Prince Sultan Military Medical City, Riyadh, Kingdom of Saudi Arabia*, in *Family Medicine Recidency Program* 2015.
34. AL-nahdi, F., *Physical Activity Counseling Practice by Physician in Primary Health Care Centers in Jeddah city, Saudi Arabia 2006*, in *Joint program of Family and Community medicine in Jeddah*. 2006.
35. Douglas, F., et al., *Primary care staff's views and experiences related to routinely advising patients about physical activity. A questionnaire survey.* BMC Public Health, 2006. **6**(138).

36. Ribera, A.P., J. McKenna, and C. Riddoch, *Attitudes and practices of physicians and nurses regarding physical activity promotion in the Catalan primary health-care system.* European Journal of Public Health, 2005. **15**(6): p. 569–575.
37. Kennedy, M. and W.H. Meeuwisse, *Exercise counselling by family physicians in Canada.* Preventive Medicine, 2003. **37**: p. 226-232.
38. Abramson, S., et al., *Personal Exercise Habits and Counseling Practices of Primary Care Physicians: A National Survey.* Clinical Journal of Sport Medicine, 2000. **10**: p. 40-48.
39. Petrella, R., C. Lattanzio, and T. Overend, *Physical Activity Counseling and Prescription Among Canadian Primary Care Physicians.* Arch Intern Med, 2007. **167**(16): p. 1774-1781.
40. Florindo, A., et al., *Physical activity counseling in primary health care in Brazil: a national study on prevalence and associated factors.* BMC Public Health, 2013. **13**(94).
41. Persson, G., et al., *Physical activity on prescription (PAP) from the general practitioner's perspective – a qualitative study.* BMC Family Practice, 2013. **14**(128).
42. Bock, C., C. Diehm, and S. Schneider, *Physical activity promotion in primary health care: Results from a German physician survey.* European Journal of General Practice, 2012. **18**(2): p. 86-91.
43. Bizea, R., J. Cornuzb, and B. Martin, *Opinions and Attitudes of a Sample of Swiss Physicians about Physical Activity Promotion in a Primary Care Setting.* Sportmedizin und Sporttraumatologie, 2007. **55**(3): p. 97-100.
44. L M Buffart, et al., *General practitioners' perceptions and practices of physical activity counselling: changes over the past 10 years.* British Journal of Sports Medicine, 2009. **43**: p. 1149-1153.
45. Cho, H.-J., S. Sunwoo, and Y.-M. Song, *Attitudes and Reported Practices of Korean Primary Care Physicians for Health Promotion.* Journal of Korean Medical Sciences, 2003. **18**: p. 783-790.
46. HÉBERT, E., M. Caughy, and K. Shuval, *PROVIDER PERCEPTIONS OF PHYSICAL ACTIVITY COUNSELING: A SYSTEMATIC REVIEW.* British Journal of Sports Medicine, 2012. **46**: p. 625-631.
47. Van-der-Ploeg, H., et al., *Physical activity promotion: Are GPs getting the message?* Australian Family Physician, 2007. **36**(10).
48. Bélanger, M., et al., *Family Physicians' Perceptions toward Writing Physical Activity Prescriptions: I Tell Patients it's Like the Super Pill!* Quality in Primary Care, 2015. **23**(2): p. 113-121.
49. Smith, A., et al., *U.S. Primary Care Physicians' Diet, Physical Activity, and Weight-Related Care of Adult Patients.* American Journal of Preventive Medicine, 2011. **41**(1): p. 33-42.
50. Al-Othaimeen, A., M. Al-Nozha, and A. Osman, *Obesity: an emerging problem in Saudi Arabia. Analysis of data from the National Nutrition Survey.* East Mediterr Health J, 2007. **13**(2): p. 441-448.
51. Al-Hazzaa, H.M., *Prevalence of physical inactivity in Saudi Arabia: a brief review.* Eastern Mediterranean Health Journal, 2004. **10**(4/5).
52. NIH, *Physician Survey of Practices on Diet, Physical Activity, and Weight Control: Questionnaire on Adult Care*. 2008.

53. CDC, *Behavioral Risk Factor Surveillance System 2014 Questionnaire. Atlanta, Georgia: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention*. 2014, Atlanta, Georgia: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention.
54. Reshidi, F.S.A., *Level of Physical Activity of Physicians Among Residency Training Program At Prince Sultan Military Medical City, Riyadh, KSA 2014.* International Journal of Health Sciences, 2016. **10**(1).
55. Alzahrani, A.A., et al., *Physical activity among Saudi Board residents in Aseer region, Saudi Arabia.* International Journal of Medical Science and Public Health, 2015. **4**(6).
56. Nassar, S.A.A., et al., *Does adequate physical activity among medical health care professionals exist?* Saudi J Sports Med, 2013. **13**(1): p. 17-21.
57. Banday, A.H., et al., *A Cross-sectional Study on the Prevalence of Physical Activity Among Primary Health Care Physicians in Aljouf Region of Saudi Arabia.* Mater Sociomed, 2015. **27**(4): p. 263-266.

Appendices

Appendix 1

Knowledge, Attitude and practice of Primary Health Care Practitioners in Saudi Arabia toward Physical Activity

Dear respondent,

This questionnaire Is conducting to study the Knowledge, Attitude and Practices of health care practitioner in Saudi Arabia Towards physical activity counseling.

Participation in this study is voluntary, if you decide to participate we will ask you to sign consent. the following questions and the information gathered through this questionnaire will be confidential and used for health services improvements. However, you are free to withdraw from the study at any time, without providing any justification for that. This questionnaire will take about 15-20 minutes of your time.

☐ I agree to participate in this study
Signature:

Questionnaire number #:

Section A: Demographic data

Age in years						
Gender	Male	Female				
Nationality	Saudi	Non-Saudi				
PHC Sector						
Marital Status	single	Married	Divorced	other		
Doctor Specialty	General Physician	Family medicine	Internal medicine	Pediatric	Oby/gyn	Other :……
Education	Board certified	Diploma	Master	Doctorate	Bachelor	Other :……
Years of experience after graduation from medical school	. . . . . Year(s)					
Did you get training in medical school /specialty program about physical activity counseling	Yes	How many hours : …….				
	No					
Height	…….cm					
Weight	……kg					

Section B: Clinical practice

Average # of Adult patients	……/day		
Average # of Child/Adolescent patients	……/day		
Number of physician in your center	Circle the number apply to your setting	0-1-2-3-4-5-6-7-8-9-10	
Number of nurses in your center	Circle the range apply to your setting	4-6 8-10 12-14 16-18 20-22 >22	
Is there an electronic referral system in your center	Yes	No	

B1. During routine well-patient physical exams of your adult (18 years and older) patients:
Check one in each row

	Never	Rarely	Sometimes	Often	Always
How often do you assess physical activity?					
As a general policy, for your entire adult patient population, how often do you promote: Physical Activity					

B2. During routine well-patient physical exams of your pediatric and adolescent (2-17 years) patients:
Check one in each row

	Never	Rarely	Sometimes	Often	Always
How often do you assess physical activity?					
As a general policy, for your entire pediatric patient population, how often do you promote: Physical Activity					

B3. During routine well-patient physical exams of pregnant women:
Check one in each row

	Never	Rarely	Sometimes	Often	Always
How often do you assess physical activity?					
As a general policy, for your entire pregnant patient population, how often do you promote: Physical Activity					

B4. For your adult patients WITHOUT chronic disease (Diabetes, Hypertension, Dyslipidemia, Arthritis, chronic back pain, Cancer, coronary heart disease, Asthma) who are insufficiently active: How often do you…
Check one in each row

	Never	Rarely	Sometimes	Often	Always
Provide general counseling for physical activity?					
Provide verbal behavioral counseling on Physical Activity (e.g., "Increase your exercise by walking daily")?					
Provide written prescription on Physical Activity					
Refer these patients to another health professional or program outside of your practice for further evaluation and/or management? If you refer your patient Where do you refer your patient for further physical activity counseling/management? ☐ Physiotherapist ☐ Community centers (gym) ☐ Other:…….					
Systematically track/follow patients over time concerning behaviors or other measures of progress related to physical activity?					

B 5. For your adult patients WITH chronic disease (Diabetes, Hypertension, Dyslipidemia, Arthritis, chronic back pain, Cancer, coronary heart disease, Asthma) who are insufficiently active, or are overweight: How often do you…

Check one in each row

	Never	Rarely	Sometimes	Often	Always
Provide general counseling for physical activity?					
Provide verbal behavioral counseling on Physical Activity (e.g., "Increase your exercise by walking daily")?					
Provide written prescription on Physical Activity					
Refer these patients to another health professional or program outside of your practice for further evaluation and/or management? If you refer your patient Where do you refer your patient for further physical activity counseling/management? ☐ Physiotherapist ☐ Community centers (gym) ☐ Other:…….					
Systematically track/follow patients over time concerning behaviors or other measures of progress related to physical activity?					

B6. When you treat each of the following conditions, do you counsel physical activity,

	Do Not Treat This Condition	Physical Activity counseling	
		Yes	No
Abnormal body weight/BMI			
Abnormal lipid profile			
Hypertension			
history of thyroid disorders			
Eating disorders such as anorexia or bulimia			
Asthma			
Diabetes mellitus (Type II)			
Coronary heart disease			
Cancer			
Arthritis			
Sleep apnea			
Chronic obstructive lung disease			
Back pain/problems/injury			
Family history of diabetes mellitus			
Family history of heart disease			
Family history of cancer			

B 7. If you assess physical activity, HOW do you assess it?

Check one in each row

	Yes	No
General questions about amount of physical activity		
Specific questions about duration, intensity, and type of physical activity		
Standardized physical activity questionnaire		
Pedometer		
Other technology (phone application ,tablets ,fit pit …….)		

B8. Which of the following are the TOP 3 BARRIERS to evaluating and/or managing your patients' physical activity, in your practice?

Check the top 3 barriers

- ☐ No enough time
- ☐ Not part of my role
- ☐ I am not adequately trained in this area
- ☐ Too difficult to evaluate and manage
- ☐ Inadequate reimbursement
- ☐ Lack of adequate referral services for physical activity
- ☐ Patients are not interested in improving their physical activity
- ☐ Fear of offending the patient
- ☐ Too difficult for patients to change their behavior
- ☐ Lack of effective tools and information to give to patients
- ☐ Lack of effective treatment options
- ☐ Patients expect drug treatments when they visit their GP practice

Section C: Knowledge

C 1. According to current guidelines, for adults, 18 to 65 years, how much moderate to vigorous physical activity is recommended (minute/week) for general health and prevention of chronic diseases?

Check one box

- ☐ 20 minutes
- ☐ 30 minutes
- ☐ 40 minutes
- ☐ 60 minutes
- ☐ 90 minutes
- ☐ 120 minutes
- ☐ 150 minutes
- ☐ 250 minutes
- ☐ 300 minute
- ☐ Don't Know

C 2 According to current guidelines, for adults, 65 years and older, how much moderate to vigorous physical activity is recommended (minute/week) for general health and prevention of chronic diseases?

Check one box

- ☐ 20 minutes
- ☐ 30 minutes
- ☐ 40 minutes
- ☐ 60 minutes
- ☐ 90 minutes
- ☐ 120 minutes
- ☐ 150 minutes
- ☐ 250 minutes
- ☐ 300 minute
- ☐ Don't Know

C3. According to current guidelines, for children/adolescents, (2-17 years), how much moderate physical activity is recommended (minutes/every day) for general health and prevention of chronic diseases?

Check one box

- ☐ 20 minutes
- ☐ 30 minutes
- ☐ 40 minutes
- ☐ 60 minutes
- ☐ 90 minutes
- ☐ 120 minutes
- ☐ 150 minutes
- ☐ 250 minutes
- ☐ 300 minute
- ☐ Don't Know

C4. According to current guidelines, the total amount of minutes each week of physical activity of a moderate or vigorous effort can be spread for at least how many minute at time?

Check one box

- ☐ 10 minutes
- ☐ 15 minutes
- ☐ 20 minutes
- ☐ 25 minutes
- ☐ 30 minutes

C6. According to current guidelines, for pregnant how much moderate physical activity is recommended (minutes/week) for general health and prevention of chronic diseases?

Check one box

- ☐ 0 minutes/don't recommended
- ☐ 20 minutes
- ☐ 30 minutes
- ☐ 40 minutes
- ☐ 60 minutes
- ☐ 90 minutes
- ☐ 120 minutes
- ☐ 150 minutes
- ☐ 250 minutes
- ☐ 300 minute
- ☐ Don't Know

C7. According to current guidelines, for obese individual how much moderate physical activity is recommended (minutes/week) for general health and prevention of chronic diseases?

Check one box

- ☐ 20 minutes
- ☐ 30 minutes
- ☐ 40 minutes
- ☐ 60 minutes
- ☐ 90 minutes
- ☐ 120 minutes
- ☐ 150 minutes
- ☐ 250 minutes
- ☐ 300 minute
- ☐ Don't Know

Section D: attitude

D1. Please indicate how strongly you agree with each of the following statement

	Strongly agree	agree	Natural	disagree	Strongly disagree
It is important that physical activity programs for the community are offered by the health system.					
Patients are more likely to adopt healthier lifestyles if physicians counsel them to do so.					
There are effective strategies and/or tools to help patients: be adequately physically active					
I am confident in my ability to counsel my patients to: be adequately physically active					
I am effective at helping my patients: be adequately physically active					
specifically, a physician /nurse will be able to provide more credible and effective counseling if he/she: is adequately physically active.					

D2. Who is the main health professional responsible for promoting physical activity?

- ☐ Physician
- ☐ Nurse
- ☐ Physical education professional
- ☐ Nutritionist
- ☐ Physiotherapist
- ☐ Other

Section E: Personal behaviors

This section about your personal behaviors related to physical activity in your daily life

E1. Moderate physical activities make you breathe somewhat harder than normal. During the last 7 days, did you do any moderate physical activities for at least 10 minutes? Think about activities such as bicycling, swimming, brisk walking, dancing, or gardening.

- ☐ No Go to E2
- ☐ Yes

a. On how many of the past 7 days did you do moderate physical activities?

- ☐ Days

b. In the past 7 days, on a typical day in which you did moderate physical activities, how much time did you spend doing them?

- ☐ Minutes per day

E2. Vigorous activities make you breathe much harder than normal. Now think about vigorous activities you did that take hard physical effort, such as aerobics, running, soccer, fast bicycling, or fast swimming. During the last 7 days, did you do any vigorous physical activities in your free time for at least 10 minutes?

- ☐ No Go to E3
- ☐ Yes

a. On how many of the past 7 days did you do vigorous physical activities?

- ☐ Days

b. In the past 7 days, on a typical day in which you did vigorous physical activities, how much time did you spend doing them?

- ☐ Minutes per day

E3. Now think about activities specifically designed to STRENGTHEN your muscles, such as lifting weights or other strength-building exercises. Include all such activities even if you have included them before. During the last 7 days, did you do activities to strengthen your muscles?

- ☐ No
- ☐ Yes

E4. Would you say that in general your health is:

- ☐ 1 Excellent
- ☐ 2 Very good
- ☐ 3 Good
- ☐ 4 Fair

E5. Do you have any chronic disease:

Check <u>all</u> that apply

- ☐ Diabetes
- ☐ Hypertension
- ☐ Dyslipidemia
- ☐ Arthritis
- ☐ Chronic back pain
- ☐ Cancer
- ☐ coronary heart disease
- ☐ Asthma
- ☐ Thyroid disorders

E6. On average, how many hours of do you sleep?

Behavioral Risk Factor Surveillance System 2014

- ☐ 4
- ☐ 5
- ☐ 6
- ☐ 7
- ☐ 8
- ☐ 9
- ☐ 10

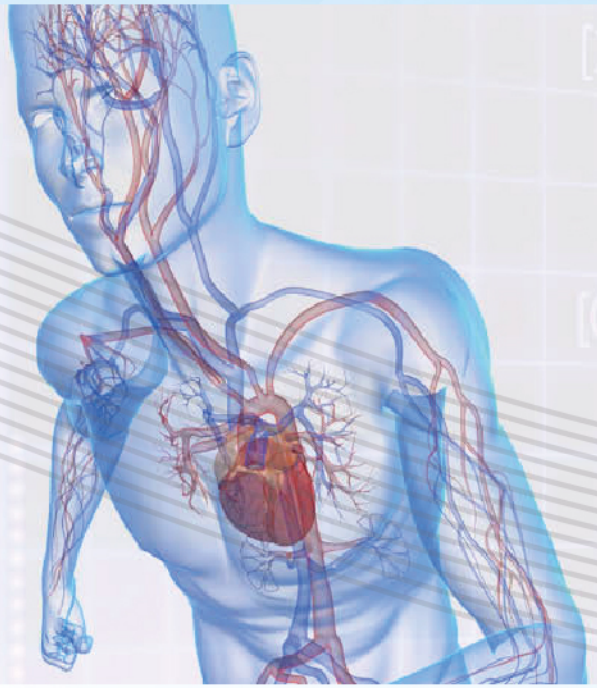
E7. Have you smoked at least 100 cigarettes in your entire life? Behavioral Risk Factor Surveillance System 2014

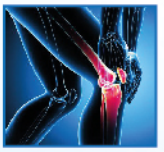
- ☐ No
- ☐ Yes → (how many **cigarettes** /day in last month) ----- **cigarettes** /day

Thank you for completing this questionnaire

Appendix 2

PHYSICAL ACTIVITY COUNSELING GUIDE





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The Miracle Drug: Exercise is Medicine®

Rationale

In an era of spiraling health care expenditures, getting patients to be more active may be the ultimate low-cost therapy for achieving improved health outcomes.[1] Studies show that regular physical activity (PA) has health benefits at any body weight and that it's critical for long-term weight management. In fact, recent work has shown that exercise is as effective as prescription medications in the management of several chronic diseases.[2] Consequently, PA promotion should be the foundation of clinical therapy and public health policy, whether to promote health or control weight. Just as weight and blood pressure are addressed in some manner at nearly every healthcare provider visit, so should attention be given to exercise prescription and the accumulation of [150 minutes of moderate intensity PA per week.[3]]

The Exercise is Medicine® (EIM) Solution

Assessment – Using the *Physical Activity Vital Sign* to Calculate Weekly PA Levels

1. On average, how many days/week do you engage in moderate to vigorous PA (like brisk walking)?
   _____ **days**
2. On average, how many minutes do you engage in PA at this level?
   _____ **minutes/day**
3. Total activity = days/week x minutes/day =
   _____ **minutes/week**

Prescription – Basic Exercise Recommendations

Sedentary adults should be encouraged to engage in low to moderate PA with a gradual progression to the recommended 150 minutes per week of moderate to vigorous PA.

Insufficiently active adults should be encouraged to achieve 150 minutes of moderate to vigorous PA each week.

Children and adolescents should obtain up to 60 minutes per day of moderate to vigorous PA each day including a mix of aerobic activity, muscle strengthening, and bone loading.

Physical Activity Guidelines[4]

Age	Aerobic Activity Recommendations	Muscle Strengthening Recommendations
6-17	60 minutes of moderate to vigorous physical activity (PA) per day	As part of their 60 or more minutes of daily PA, children and adolescents should include muscle-strengthening PA on at least 3 days of the week
18-64	150 minutes of moderate PA or 75 minutes of vigorous PA a week	Activities that are moderate or high intensity and involve all major muscle groups on 2 or more days a week
65+	150 minutes of moderate PA or 75 minutes of vigorous PA a week	Activities that are moderate or high intensity and involve all major muscle groups on 2 or more days a week

Resources and References

- Consider reaching out to a health and fitness professional to work with you and your patients. Together, you can establish realistic goals and design a safe, effective and enjoyable program.
- Lifestyle activities count! Encourage patients to take up gardening or take a brisk walk with their dog.
- Physicians who are more physically active, are more likely to counsel patients regarding physical activity. It's not enough to just "talk the talk," you have to literally "walk the walk."

Notes

1. Blair. et al. (2004). The Fitness, Obesity, and Health Equation: Is Physical Activity the Common Denominator? JAMA; 292(10), 1232-34.
2. Naci et al. (2013). Comparative Effectiveness of Exercise and Drug Interventions on Mortality Outcomes: Meta-epidemiological study. BMJ; 347, 1-14.
3. Boden et al. (2013). Physical Activity and Structured Exercise for Patients with Stable Ischemic Heart Disease. JAMA; 309(2), 143-4.
4. 2008 Physical Activity Guidelines for Americans. http://www.health.gov/paguidelines/guidelines/

Assessing the Physical Activity Levels of Your Patients

One of the most important decisions your patients will make regarding their overall health is to incorporate physical activity into their lifestyle. Your discussion of their current physical activity levels may be the greatest influence on their decision. The assessment of their physical activity levels initiates this discussion, highlights the importance of physical activity for disease prevention and management, and enables your healthcare team to monitor changes over subsequent medical visits.

While there are multiple advanced and comprehensive physical activity assessment tools available, time constraints often necessitate a simple and rapid tool. Assessing the current physical activity levels of your patients can be quickly achieved through the use of the Physical Activity Vital Sign (PAVS) - a tool designed to allow you, or members of your healthcare team, to assess and record the physical activity levels of your patients in less than a minute. Asking your patients about their PA levels requires a minimal time investment with a potentially high yield to their health.

The PAVS consists of two questions: “On average, how many days per week do you engage in moderate to strenuous exercise like a brisk walk?” and “On average, how many minutes do you engage in exercise at this level?” See **next page** for a printable version of the PAVS that can be used in your office. These two screening questions will provide you with a snapshot of whether your patients are meeting the current PA guidelines of 150 minutes of moderate intensity physical activity each week. By repeating the assessment of the PAVS at every clinic visit, you will be able to track changes in their physical activity levels over time. The PAVS is highly associated with decreased levels of BMI and odds of obesity[2] and has been tested for face and discriminant validity[3].

2. Greenwood LJ, Joy EA, and Stanford JB. The Physical Activity Vital Sign: A Primary Care Tool to Guide Counseling for Obesity. *J Physical Act & Health*. 2010, 7: 571-6.
3. Coleman KJ, Ngor E, Reynolds K, Quinn VP, Koebnick C, Young DR, Sternfeld B, and Sallis RE. Initial Validation of an Exercise “Vital Sign” in Electronic Medical Records. *Med Sci Sports Exerc*. 2012, 44(11): 2071-76.
4.

Physical Activity Vital Sign (PAVS)

The Physical Activity Vital Sign

1. On average, how many days per week do you engage in moderate to strenuous exercise (like a brisk walk)? _____ days

2. On average, how many minutes do you engage in exercise at this level? _____ minutes

3. Total minutes per week (multiple #1 by #2) _____ minutes per week

Using the Physical Activity Vital Sign – Aerobic Exercise

- Current guidelines recommend 150 minutes a week of moderate intensity activity. Moderate intensity activity is usually done at an intensity where an individual can talk, but would be unable to "sing". Example of moderate intensity activities include: *brisk walking, slow biking, general gardening*, and *ballroom dancing*.
- In place of moderate intensity activity, an individual can also complete 75 minutes of vigorous physical activity. Vigorous intensity physical activity is done at a pace where individuals can no longer talk and are somewhat out of breath. Examples of vigorous intensity activities include: *swimming laps, playing tennis*, and *fast bicycling*.
- Individuals can also complete a combination of 150 minutes of moderate and vigorous intensity activity, where vigorous activity is equal to 2 minutes of moderate intensity activity.
- Individuals are encouraged to perform their activity in "bouts" that are at least 10 minutes in length.
- If you patient is NOT achieving 150 minutes a week of activity, consider advising them to slowly increase their "dose" of activity, little by little each week until eventually are capable of safely achieving the national recommendations.

Using the Physical Activity Vital Sign – Other Considerations

- A comprehensive assessment of physical activity should include promotion of active living throughout the day to reduce sedentary time, as well as muscle strengthening as recommended by the Physical Activity Guidelines for Americans.

Prescribing Physical Activity to Your Patients

If there was one prescription that could prevent and treat dozens of diseases, such as diabetes, hypertension, and obesity shouldn't we be prescribing it to all of our patients? Certainly! Providing your patient with a physical activity prescription is the next key step you can take in helping your patients become more active. Given the growing evidence that increasing PA provides greater benefits to multiple health factors than any single pill, we urge healthcare providers to consider using physical activity prescription as a first-line therapy. Your encouragement and guidance may be the greatest influence on this decision as patient behavior can be positively influenced by physician intervention.

The steps provided below will give you guidance in assessing your patients and their needs in becoming more active. At this point, you've already determined their current physical activity level (the *Physical Activity Vital Sign*). Next, you will determine if your patient is healthy enough for independent physical activity. Finally, you will be provided with an introduction to the Exercise Stages of Change model to help determine which strategies will best help your patient become physically active.

Step 1 - Safety Screening

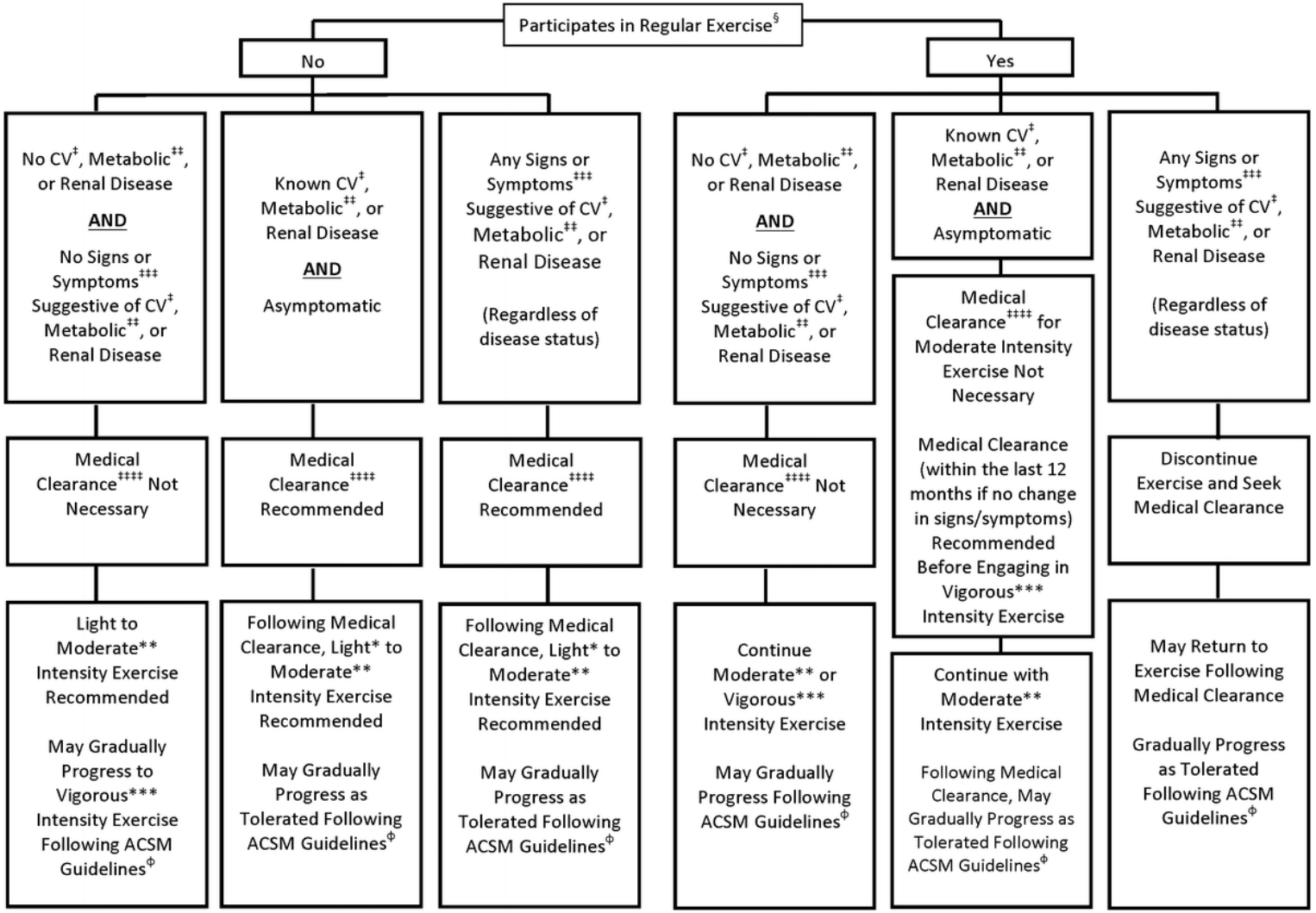
Before engaging a patient in a conversation about a physical activity regimen, it is necessary to determine if they are healthy enough to exercise independently. The American College of Sports Medicine has recently released updated recommendations for exercise preparticipation screening[5]. Previous recommendations may have presented unnecessary barriers for individuals seeking to become physically active by requiring excessive physician referrals and screening procedures, creating time and cost inefficiencies. To address these issues, new guidelines recommend considering:

1. *Initial determination of current physical activity status of an individual*. Habitual physical activity significantly decreases the risk of exercise-related cardiovascular events.
2. *Desired intensity of physical activity*. Most individuals now need no further screening if they wish to participate in low to moderate intensity activity. However, greater attention may need to be given to high risk individuals who wish to engage in vigorous physical activities.
3. *Signs and symptoms of disease*. Most exercise-related cardiovascular events are rare, do not occur suddenly, and are preceded by warnings and symptoms that can be identified beforehand.
4. *Elimination of the cardiovascular risk factor stratification system*. While healthcare providers are still recommended to assess cardiovascular disease risk factors, the stratification of individuals into low, moderate, or high risk categories is no longer a part of the new preparticipation guidelines.

For more information on the new ASCSM Preparticipation Screening Guidelines, please refer to Appendix C.

5. Riebe D et al. Updating ACSM's Recommendations for Exercise Preparticipation Health Screening. *Med Sci Sports Exerc*. 2015 Nov; 47(11).

Exercise Preparticipation Health Screening Logic Model for Aerobic Exercise



§ - Exercise participation, performing planned, structured physical activity at least 30 min at moderate intensity on at least 3 days/wk for at least the last 3 months.
*Light-intensity exercise, 30-60% HRR or VO2R, ≥6 METs, ≥14 RPE, an intensity that causes substantial increases in HR and breathing.
++CVD, cardiac, peripheral vascular, or cerebrovascular disease.
++++Metabolic disease, type 1 and 2 diabetes mellitus.
+++++++Signs and symptoms, at rest or during activity; includes pain, discomfort in the chest, neck, jaw, arms, or other areas that may result from ischemia; shortness of breath at rest or with mild exertion; dizziness or syncope; orthopnea or paroxysmal nocturnal dyspnea; ankle edema; palpitations or tachycardia; intermittent claudication; known heart murmur; or unusual fatigue or shortness of breath with usual activities.
++++++++Medical clearance, approval from a health care professional to engage in exercise.

Riebe et al. Updating ACSM's Recommendations for Exercise Preparticipation Health Screening. Med Sci Sports Exerc. 2015, 47(11):2473-2479.

Step 2 - Determining Your Patient's Readiness to Change

Individual behavior is a dynamic phenomenon. Individuals attempting to change their behaviors often go through a series of stages. Some patients may only be ready for encouragement, some will be prepared to take steps towards being more physically active, while others will be ready to receive a physical activity prescription and referral to certified exercise professionals. Therefore, prior to prescribing physical activity to your patients, it is important to determine their "Stage of Change".

Most commonly, there are 5 stages of change: precontemplation, contemplation, preparation, action, and maintenance. By determining your patient's stage of change, you can utilize the most appropriate steps and tailor your physical activity promotion strategy. The Exercise Stages of Change questionnaire (found in **next page**) consists of 5 questions and can be completed in a matter of minutes when your patient first checks in at your office.

The following table provides a brief outline of each of the five stages of change and recommended steps for patients in each stage.

Stage of Change	Action Step	
Precontemplation (Patient has no intention to be physically active)	• Promote being more physically active by discussing its health benefits, emphasizing the pros of changing their behavior, and helping work through the cons of being more physically active. • The individual is likely not ready to receive a physical activity prescription at this point.	
	Independent	***Supervision Necessary***
Contemplation (Patient is thinking about becoming physically active)	Write prescription; refer to exercise professional.	Refer to clinical exercise professional.
	• Continue to emphasize the pros and reducing the cons of being more physically active. • The individual may be becoming receptive to receiving basic guidance on becoming more physically active.	
Preparation (Patient is active and making small changes, but not meeting PA guidelines*)	Write prescription; refer to non-clinical exercise professionals.	Refer to clinical exercise professionals.
Action (Patient is meeting the physical activity guidelines but for less than 6 months)	Encourage continued exercise.	Encourage continued supervised exercise training.
	Strengthen their commitment to change and ability to fight urges to slip back into unhealthy behaviors.	
Maintenance (Patient is meeting the physical activity guidelines for the last 6 months or more)	Encourage continued exercise.	Encourage continued supervised exercise.
	Encourage them to spend time with people with similar healthy behaviors; continue to engage in healthy activities to cope with stress instead of relying on unhealthy behavior.	

Exercise Stages of Change Questionnaire **Goal: To do**

physical activity or exercise regularly, such as accumulating:

- 150 minutes of moderate physical activity per week, or
- 75 minutes of vigorous physical activity per week, or
- a combination of moderate and vigorous physical activity each week, such as
  - 75 minutes of moderate and 40 minutes of vigorous physical activity, or 90 minutes of moderate and 25 minutes of vigorous physical activity

Examples of Moderate-Intensity Activity

- Brisk walking
- Biking<10 mph (16kph)
- Ballroom dancing
- General gardening, such as weeding
- Golfing (no cart)
- Any other physical activity where the exertion is similar to these

Examples of Vigorous-Intensity Activity

- Jogging, running
- Tennis
- Biking>10 mph (16kph)
- Aerobic dancing
- Heavy gardening, such as digging
- Any other physical activity where the exertion is similar to these

Regular physical activity means meeting or exceeding the physical activity goal described above.

For each statement, please mark yes or no.

1. I am currently physically active (at least 30 minutes per week). ☐ Yes ☐ No
2. I intend to become more physically active in the next 6 months. ☐ Yes ☐ No
3. I currently engage in **regular** physical activity. ☐ Yes ☐ No
4. I have been **regularly** physically active for the past 6 months. ☐ Yes ☐ No

Exercise Stages of Change - Scoring Key

- *No* to 1, 2, 3, and 4 = Pre-contemplation stage
- *No* to 1, 3, and 4, Yes to 2 = Contemplation stage
- *Yes* to 1 and 2, No to 3 and 4 = Preparation stage
- *Yes* to 1 and 3, Yes or No to 2, No to 4 = Action stage
- *Yes* to 1, 3, and 4, Yes or No to 2 = Maintenance stage

Step 3 - Providing Your Patient with an Exercise Prescription

For patients who have been cleared for independent exercise and are in the Preparation, Action, or Maintenance stage (and maybe even some in Contemplation), the next step is to provide them with a physical activity prescription. The simplest prescription that you can provide your patient with is to participate in 150 minutes of moderate intensity physical activity each week as suggested in the 2008 Physical Activity Guidelines for Americans[6]. Using the basic EIM Physical Activity Prescription Pad (see **next page**), you can also provide your patients with a basic, written physical activity prescription. Studies have shown that simply providing a written prescription is an effective means of motivating patients to be more physically active, sometimes by as much as one hour per week[7].

6. The 2008 Physical Activity Guidelines for Americans (www.health.gov/paguidelines/guidelines) recommend a minimum of 150 minutes of moderate, or 75 minutes of vigorous, physical activity a week (for example, 30 minutes per day, five days a week) ***and*** muscle-strengthening activities on two or more days a week. Moderate physical activity means working hard enough to raise your heart rate and break a sweat, yet still being able to carry on a conversation. Examples include: brisk walking, ballroom dancing or general gardening.
7. Elley et al. Effectiveness of counselling patients on physical activity in general practice: Cluster randomized controlled trial. *BMJ*, 2003; 326.

EIM Physical Activity Prescription Pad

Name: _____ Date: _____

❑ Aerobic Activity

Type: Walk Run Swim Bike Other_____

Frequency (days/week): 2 3 4 5 6 7

Intensity:	Light (A Casual Walk)	Moderate (A Brisk Walk)	Vigorous (Jogging or Running)

Time (minutes/day): 10 20 30 60 More than 60

Steps/day: 2,500 5,000 7,500 10,000 More than 10,000

❑ Strength Training

- Muscle strengthening should be done at least two days per week
- Exercise should be done to strengthen all major muscle groups: legs, hips, back, chest, abdomen, shoulder, arms
- For each exercise, 8-12 repetitions should be completed
- Examples include bodyweight exercises (e.g. push-ups, lunges), carrying heavy loads, and heavy gardening

Physician Signature: _____

Published: 10 May 2011

Contraindications for physical activity/ exercise

Obtaining the appropriate consent from patients before writing a prescription (Rx) for physical activity/exercise (PA/Ex) has ethical and legal consideration. It is important for the patient to understand the purposes and risks associated with the physical activity/exercise Rx.

Absolute

- A recent significant change in the resting ECG suggesting significant ischaemia, recent myocardial infarction (within 2 days) or other acute cardiac event
- Unstable angina
- Uncontrolled cardiac dysrhythmias causing symptoms or hemodynamic compromise
- Symptomatic severe aortic stenosis
- Uncontrolled symptomatic heart failure
- Acute pulmonary embolus or pulmonary infarction
- Acute myocarditis or pericarditis
- Suspected or known dissecting aneurysm
- Acute systematic infection, accompanied by fever, body aches, or swollen lymph glands

Relative [a]

- Left main coronary stenosis
- Moderate stenotic heart disease
- Electrolyte abnormalities (e.g. hypokalemia, hypomagnesemia)
- Severe arterial hypertension (i.e. systolic BP of >200mm Hg and/or a diastolic of BP of >110mm Hg) at rest
- Tachydysrthythmia or bradydsrhythmia
- Hypertrophic cardiomyopathy and other forms of outflow tract obstruction
- Neuromuscular, musculoskeletal, or rheumatoid disorders that are exacerbated by exercise
- High-degree atrioventricular block
- Ventricular aneurysm
- Uncontrolled metabolic disease (e.g., diabetes, thyrotoxicosis, or myxedema)
- Chronic infectious disease (e.g. mononucleosis, hepatitis, AIDS)
- Mental or physical impairment leading to inability to exercise adequately

[a] *Relative contraindications can be superseded if benefits outweigh risks of exercise. In some instances, these individuals can be exercised with caution and/or using low-level end points, especially if they are asymptomatic at rest.*

References

Modified from Gibbons RJ, Balady GJ, Bricker J et al. ACC/AHA 2002 guideline update for exercise testing: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines (Committee on Exercise Testing) [Internet]. 2002. Cited 2007 June 15]. Available from www.acc.org/clinical/guidlines/exercise/dirIndex.htm

Thompson, Walter R. Gordon Neil F. Prescatello, Linda S. ACSM's Guidelines for Exercise Testing and Prescription Eighth Edition. Lippincott Williams and Wilkins, Baltimore 2010. Pg. 54.

Source: ACSM's Guidelines for exercise testing and prescription, 8th edition (2010).

Age	WHO (World Health Organization) & CDC (Center of Disease Control and prevention) recommendation and guideline			
	Type of exercise	**Intensity**	**Duration**	**Frequency**
Adult 18–64 years	Aerobic exercise (for heart and lung fitness)	Moderate (i.e., brisk walking)	2 hours and 30 minutes (150 minutes) per week	per week
		OR		
		Vigorous (i.e., jogging or running)	1 hour and 15 minutes (75 minutes) per week	per week
	AND			
	Resistance training (for muscle and bone strength	Moderate work all major muscle groups (legs, hips, back, abdomen, chest, shoulders, and arms).	Depend on the exercise person do	2 or more days a week
Children 5-17 years	Aerobic exercise (for heart and lung fitness)	Moderate - to vigorous	60 minutes per day	Daily
	AND			
	Resistance training (for muscle and bone strength		Depend on the exercise person do, time included in the previous 60 minute or more	3 times per week
Elderly	Aerobic exercise (for heart and lung fitness)	Moderate (i.e., brisk walking)	150 minutes per week	per week
		OR		
		Vigorous (i.e., jogging or running)	75 minutes per week	per week
	AND			
	Resistance training (for muscle and bone strength	Moderate work all major muscle groups (legs, hips, back, abdomen, chest, shoulders, and arms).	Depend on the exercise person do	2 or more days a week
Healthy Pregnant	Aerobic exercise (for heart and lung fitness)	Moderate	150 minutes (2 hours and 30 minutes)	per week

Sources: CDC; http://www.cdc.gov/physicalactivity/basics/ WHO; http://www.who.int/dietphysicalactivity/factsheet_recommendations/en/

Regimen	American College of Sports Medicine (ACSM) recommendations for exercise regimens	
	Recommendation	**ACSM Evidence Category**
For weight loss	moderate intensity physical activity recommended ➢ < 150 minutes/week promotes minimal loss ➢ > 150 minutes/week can result in loss of 2-3 kg (4.4-6.6 lbs) ➢ > 225-425 minutes/week can result in loss of 5-7.5 kg (11-16.5 lbs)	Category B
To prevent weight gain	150-250 minutes/week of moderate intensity physical activity recommended	Category A
For weight maintenance after weight loss	200-300 minutes'/week physical activity recommended	Category B

Source: DONNELLY, J. E., BLAIR, S. N., JAKICIC, J. M., MANORE, M. M., RANKIN, J. W., & SMITH, B. K. (2009). Appropriate Physical Activity Intervention Strategies for Weight Loss and Prevention of Weight Regain for Adults. *Medicine & Science in Sports & Exercise*, *41*(2), 459-471. doi:10.1249/mss.0b013e3181949333, http://journals.lww.com/acsm-msse/Fulltext/2009/02000/Appropriate_Physical_Activity_Intervention.26.aspx

Exercise Session Phase

1- Warm-Up

- at least 5–10 min of light-to moderate intensity cardiorespiratory and muscular endurance activities

2- Conditioning

- at least 20–60 min of aerobic, resistance, neuromotor, and/ or sports activities

3- Cool-down

- at least 5–10 min of light-to-moderate intensity cardiorespiratory and muscular endurance activities

4- Stretching

- at least 10 min of stretching exercises performed after the warm-up or cool-down phase

Source: Lww. (2014). *Acsm's Guidelines for Exercise Testing and Prescription*. Lippincott Williams & Wilkins.

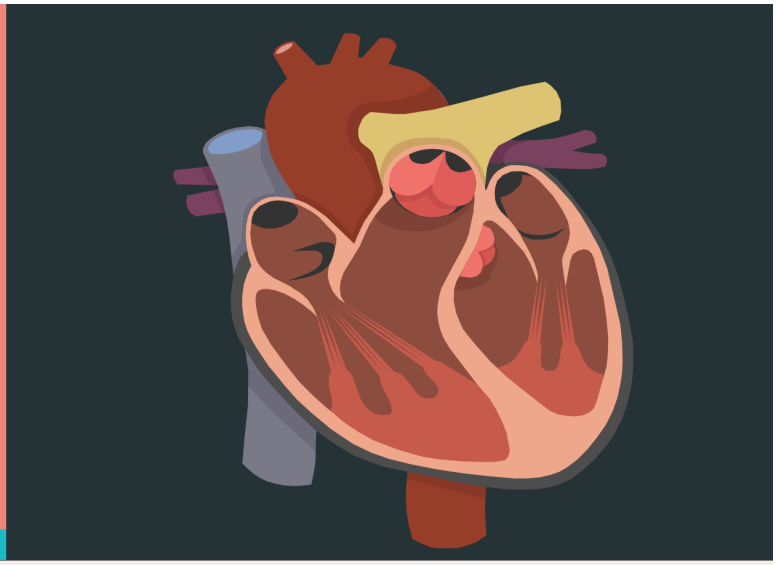
FITT recommendations for individuals with Hypertension

Aerobic& Resistance Exercise

F	Frequency
Aerobic exercise on most, preferably all days of the week; resistance exercise 2–3 day per week	
I	**Intensity**
Moderate intensity, aerobic exercise supplemented by resistance training	
T	**Time**
• 30–60 min per day of continuous or intermittent aerobic exercise. If intermittent, use a minimum of 10 min bouts accumulated to total 30–60 min per day of exercise. • Resistance training should consist of at least one set of 8–12 repetitions for each of the major muscle groups.	
T	**Type**
• Emphasis should be placed on aerobic activities such as walking, jogging, cycling, and swimming. • Resistance training using either machine weights or free weights may supplement aerobic training. Such training programs should consist of 8–10 different exercises targeting the major muscle groups	

Source: Lww. (2014). *Acsm's Guidelines for Exercise Testing and Prescription*. Lippincott Williams & Wilkins.

Special consideration for hypertension patient



If you take a beta-blocker or any other medication that affects your heart rate, exercise at an intensity that you feel is "somewhat hard."

Always cool down slowly. Some blood pressure medications may reduce your blood pressure too much if you stop exercising too quickly. These include alpha-blockers,calcium-channel blockers, and vasodilators.

Be sure to drink plenty of fluids before, during, and after exercise, especially if you plan to exercise on a hot day or for a long time. Beta-blockers and diuretics may affect your body's ability to regulate its temperature in hot, humid conditions.

If possible, measure your blood pressure before you exercise.

http://exerciseismedicine.org/assets/page_documents/EIM%20Rx%20series_Exercising%20with%20Type%202%20Diabetes_2.pdf

FITT recommendations for individuals with Diabetes

Aerobic& Resistance Exercise

F	Frequency
3–7 days/week	
I	**Intensity**
Moderate intensity, aerobic exercise supplemented by resistance training	
T	**Time**
• Individuals with Type 2 DM should engage in a minimum of 150 min/week of exercise undertaken at moderate intensity or greater. • Aerobic activity should be performed in bouts of at least 10 min and be spread throughout the week. Moderate intensity exercise totaling 150 min/week is associated with reduced morbidity and mortality in observational studies in all populations. • Additional benefits are accrued by increasing to 300 min/week of moderate-to-vigorous intensity, physical activity	
T	**Type**
Emphasize activities that use large muscle groups in a rhythmic and continuous fashion. Personal interest and desired goals of the exercise program should be considered.	

No more than two consecutive days of physical inactivity per week should be allowed.

Source: Lww. (2014). *Acsm's Guidelines for Exercise Testing and Prescription*. Lippincott Williams & Wilkins.

Special consideration for Diabetics patient

Hypoglycemia

Hypoglycemia can occur in T2DM patients, although rarely.
The combination of exercise and diabetic medications may decrease blood glucose levels to a dangerous level.
Educating your patients about monitoring their glucose and warning symptoms can help prevent hypoglycemic episodes from occurring

blood sugar

Before Physical Activity

If the blood sugar is:
*less than 5.6 mmol/L, it may be too low to be physically active at that time.
*advice your patient to eat a small snack before he/she begin activity (15 grams of carbohydrate, such as a piece of fruit or a slice of bread).

During Physical Activity

* Ask your patient to Monitor blood sugar every 30 minutes.
* Watch for signs of low blood sugar, such as dizziness, headache or feeling confused.

After Physical Activity

* Check blood sugar levels right away.
* Check 2-3 times over the next two hours.
If blood sugar is low (less than 4.0 mmol/L): have a snack (15 grams of fast-absorbing carbohydrate, such as a glucose tablet or candy with sugar); then test blood sugar 15 minutes later.

General Consedration

- Check the blood sugar levels before, during and after physical activity.
- not be active right after have taken insulin.
- Avoid being active late in the evening, to prevent low blood sugar as he/she sleep.
- Carry a form of fast-acting sugar with them. For example, carry glucose tablets, or small candies with sugar in them

Risk of cardiac events in diabetic during exercise

Remaining inactive usually outweighs the risk of a cardiac event at the onset of regular exercise, but T2DM patients are at higher risk for cardiovascular disease. Patients with additional risk factors such as age, smoking, or high cholesterol as well as the desire to exercise vigorously should consult a General Practitioner (GP) before beginning an exercise program

Peripheral neuropathy in diabetic

This is a later stage complication of T2DM resulting in diminished sensation in the feet. Appropriate footwear, regular foot inspection, and low impact exercises should be incorporated in exercise programs for patients with peripheral neuropathy to prevent the cause and progression of infections going unnoticed.

http://exerciseismedicine.org/assets/page_documents/EIM%20Rx%20series_Exercising%20with%20Type%202%20Diabetes_2.pdf

FITT recommendations for individuals with Dyslipidemia

Aerobic Exercise

F	Frequency
> 5 days per week to maximize caloric expenditure.	
I	**Intensity**
Moderate intensity, aerobic exercise supplemented by resistance training	
T	**Time**
• 30–60 min/day. However, to promote or maintain weight loss, 50–60 min/day or more of daily exercise is recommended. • Performance of intermittent exercise of at least 10 min in duration to accumulate these duration recommendations is an effective alternative to continuous exercise	
T	**Type**
The primary mode should be aerobic physical activities that involve the large muscle groups. As part of a balanced exercise program, resistance training should be incorporated.	

Source: Lww. (2014). *Acsm's Guidelines for Exercise Testing and Prescription*. Lippincott Williams & Wilkins.

FITT recommendations for individuals with overweight and obesity

Aerobic& Resistance Exercise

F	Frequency
> 5 days per week to maximize caloric expenditure.	
I	**Intensity**
Moderate-to-vigorous intensity aerobic activity should be encouraged. Initial exercise training intensity should be moderate. Eventual progression to more vigorous exercise intensity may result in further health/fitness benefits.	
T	**Time**
• A minimum of 30 min/day (i.e., 150 min/week) progressing to 60 min/day (i.e., 300 min/week) of moderate intensity, aerobic activity. • Incorporating more vigorous intensity exercise into the total volume of exercise may provide additional health benefits. However, vigorous intensity exercise should be encouraged in individuals who are both capable and willing to exercise at a higher than moderate intensity levels of physical exertion with recognition that vigorous intensity exercise is associated with the potential for greater injuries. • Accumulation of intermittent exercise of at least 10 min is an effective alternative to continuous exercise and may be a particularly useful way to initiate exercise .	
T	**Type**
The primary mode should be aerobic physical activities that involve the large muscle groups. As part of a balanced exercise program, resistance training should be incorporated.	

Source: Lww. (2014). *Acsm's Guidelines for Exercise Testing and Prescription*. Lippincott Williams & Wilkins.

Tips and consideration for physical activity

Aerobic exercise

(for heart and lung fitness)

1. If you have been inactive for a long time, start with short sessions (ten to 15 minutes). Add five minutes to each session, increasing every two to four weeks.

2. Gradually build up to being active 30 minutes a day for most days of the week.

3. If you exercise at a high intensity, you will not be able to exercise for a long time. That means you will use less total energy. Also, you have a higher risk of injury.

4. Drink plenty of fluids before, during, and after exercise.

5. Be careful not to overdo it! Extra weight makes it easier for the body to overheat.

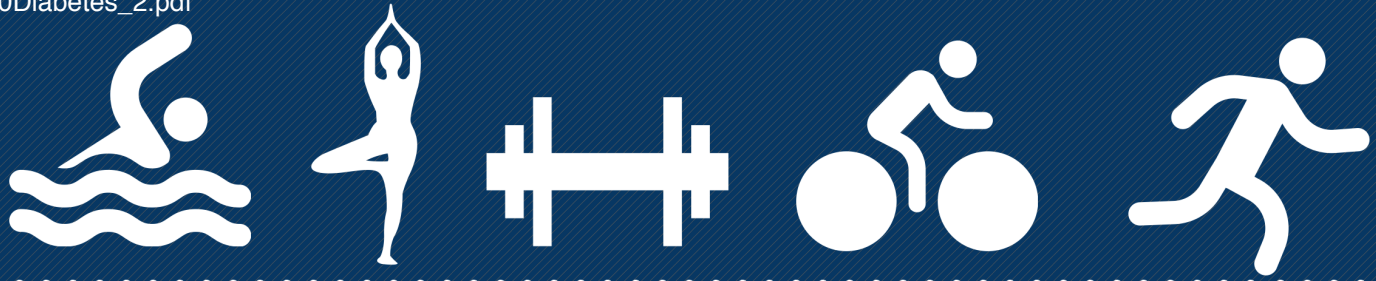
Resistance exercise

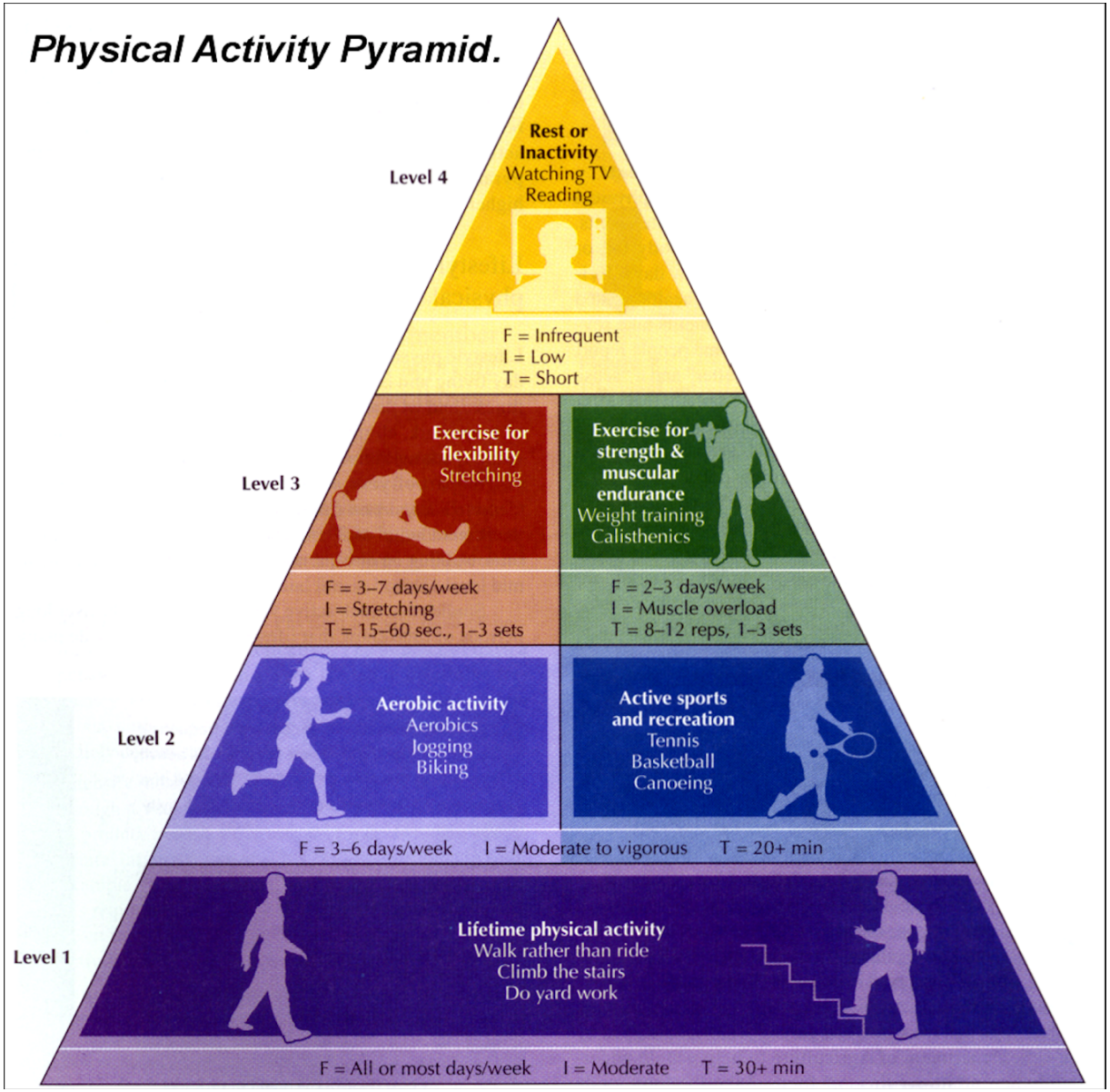
(for muscle and bone strength

1.Avoid holding your breath when lifting. This can cause large changes in blood pressure. That change may increase the risk of passing out or developing abnormal heart rhythms. This is especially true if you also have high blood pressure.

2. If you have joint problems or other health problems, do only one set for all major muscle groups. Start with 10 to 15 repetitions. Build up to 15 to 20 repetitions before you add another set.

source: http://exerciseismedicine.org/assets/page_documents/EIM%20Rx%20series_Exercising%20with%20Type%202%20Diabetes_2.pdf





F: Frequency, I: Intensity, T: Time

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PHYSICAL ACTIVITY COUNSELING GUIDE

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