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# Physical activity promotion in Saudi Arabia: A critical role for clinicians and the health care system

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ABSTRACT

This work aimed to summarize the benefits of physical activity and the importance of counseling by a physician to promote physical activity in a primary health care setting in Saudi Arabia. Despite established evidence that physical activity is effective for reducing the risk of non-communicable diseases, as well as the importance and cost-effectiveness of physical activity counseling in the primary care setting, few studies have been conducted regarding physical activity counseling in Saudi Arabia.


**Contents**



## 1. Introduction

Physical activity (PA) 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 [1]. According to the World Health Organization (WHO), physical inactivity is considered the fourth leading risk factor for global mortality [2] and is estimated to account for 6% of the global mortality rate [3]. In Saudi Arabia, 58.5% of the Saudi adult population was considered physically inactive [4]. In Saudi Arabia, the WHO estimated that 57% of children and 71% of youths were physically inactive [5]. According to a national survey, 60% of the entire Saudi Arabian population is physically inactive [6]. Furthermore, 90% sit consecutively for more than 2 h daily [6]. To counter this phenomenon, health education counseling should be provided in primary health care (PHC) centers to encourage PA.

Studies have suggested that physician-recommended PA is one of the most powerful health-promoting practices [7]. PA 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 [3]. Furthermore, evidence has shown that PA improves mental health by reducing anxiety, depression, and stress [8]. In addition, the health-related outcomes of PA are inversely associated with the amount of PA (Fig. 1). The health-related benefits of PA are summarized in Table 1 [9–12].Fig. 2

Worldwide, physical inactivity has been estimated to be the leading cause of most non-communicable diseases (NCD), 6% of coronary heart disease cases, 7% of type 2 diabetes cases, 10% of breast cancers, and 10% of colon cancers [10]. In 2008, physical

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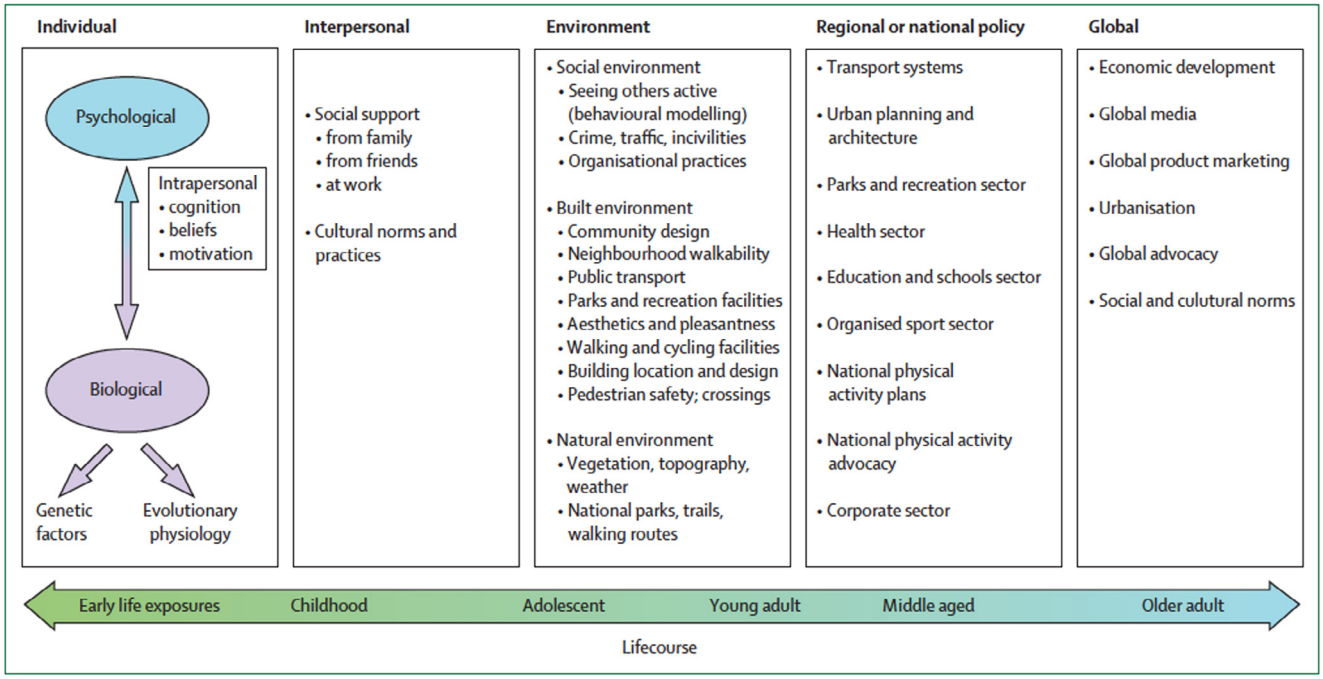


**Fig. 1.** Adapted ecological model of the determinants of physical activity. Used with permission from *Lancet* [30].

**Table 1**
Health-Related Benefits of Physical Activity.

| Health Outcome | Evidence of Inverse Dose–Response Relationship | Effect Size | Strength of Evidence* |
|---|---|---|---|
| All-cause mortality | Yes | 30% risk reduction | Strong |
| Cardiorespiratory health | Yes | 20%–35% lower risk of cardiovascular disease, coronary heart disease, and stroke | Strong |
| | _____ | Lower risk of high blood pressure<br>Aerobic activity decreases blood pressure by 6.9/4.9 mmHg | Strong |
| | Yes | Increased cardiorespiratory and muscular fitness | Strong |
| Metabolic health | Yes | 30%–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 |
| Musculoskeletal health | Yes | **Bone:** Reduced risk of hip fracture is 36%–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 |
| Mental health | Yes | There is an approximately 20%–30% lower risk of depression and dementia for adults participating in daily physical activity | Strong |
| | Yes | There is an approximately 20%–30% lower risk of distress for adults participating in daily physical activity | Weak |
| | _____ | Improved sleep quality | Moderate |

Adapted from [9–12].
*Strong: strong, consistent across studies and populations. Moderate: moderate or reasonable, reasonably consistent. Weak: weak or limited, inconsistent across studies and populations.
Evidence presented here is the result of clinical intervention as well as large-scale, population-based, observational studies. Evidence was summarized from ACSM-AHA recommendations for physical activity and the Physical Activity Guideline Advisory Committee.
Note: The Advisory Committee rated the evidence of health benefits of physical activity as strong, moderate, or weak. To do so, the Committee considered the type, number, and quality of studies available, as well as the consistency of findings across studies that addressed each outcome. The Committee also considered evidence for causality and dose-response when assigning the strength-of-evidence rating.

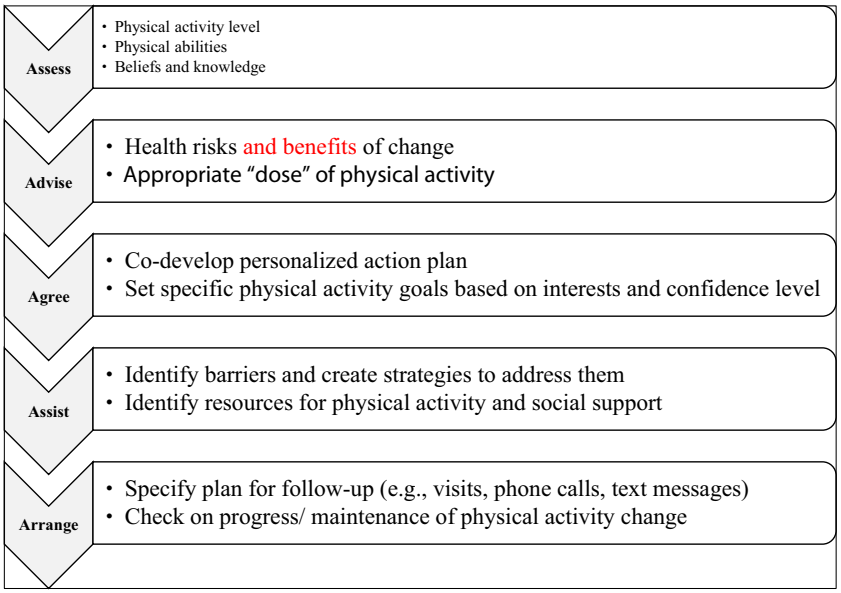


**Fig. 2.** How to use the 5As for physical activity counseling. Adapted from *The American Journal of Medicine* [23]. Infographic: Physical inactivity in Saudi Arabia. SA, Saudi Arabia. The prevalence of obesity is 33.7%. The prevalence of physical inactivity is 52.1% for Saudi males and is 67.79% for Saudi females.

inactivity caused more than 5.7 million deaths worldwide and 9% of premature mortality [10]. Moreover, in 2008, physical inactivity caused more than 5.7 million deaths worldwide and 9% of premature mortality [10]. Elimination of this unhealthy behavior is expected to increase the life expectancy of the world's population by 0.68 years [10]

In the region surrounding Saudi Arabia, more than 1.2 million people died due to NCD in 2008 [13]. With such a high prevalence, physical inactivity is a major public health burden in Saudi Arabia.

## 2. PA and inactivity in Saudi Arabia

NCD have become more prevalent in the oil-producing countries of the Arabian Peninsula (Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates) and account for a large portion of mortality and morbidity there [17]. Most NCD mortality is due to cardiovascular diseases, including hypertension, diabetes, dyslipidemia, and overweight/obesity. The increase in NCD mortality and morbidity in the Arabian Peninsula is partly caused by the rapid changes in lifestyle due to urbanization and motorization, which increase the level of physical inactivity in these communities [5,17]. This can be seen especially in Saudi Arabia, where a nationwide study showed that the prevalence of PA is very low (men, 6.1%; women, 1.9%) [17].

According to the WHO's 2016 diabetes country profile, 58.5% of the adult Saudi population were found to be physically inactive (52.1% of men and 67.7% of women) [4]. In another study, the prevalence of physical inactivity was found to be 66.6% for the overall Saudi Arabia population (60.1% for men and 72.9% for women) [18]. However, it was found that 16.8% of the population engaged in a moderate level of PA and 16.6% engaged in a high level of PA [18]. The estimated population-attributable fractions (PAF) in Saudi Arabia were calculated using adjusted relative risks and were 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 [10]. The estimated gains in life expectancy by eliminating physical inactivity are 1.51 years [10].

In addition to health-related problems, physical inactivity creates an economic burden in every country. In Saudi Arabia, using the PAF approach, the direct health care costs attributable to physical inactivity have been estimated to total $869,019, representing 1.71% of the total health care costs [19]. Indirect productivity costs ($169,442), which represent the financial value of lost productivity due to premature mortality using a friction cost approach, take into account replacements within the labor market (3-month friction period). Therefore, the total costs (direct and indirect costs) are estimated to be $ 1,038,461 in Saudi Arabia [19]. In 2013, the amounts of direct health care costs attributable to physical inactivity were $557,910 (64.2% of total direct costs) paid by the public sector, $172,066 (19.8% of total direct costs) paid by households, and $139,043 (16.0% of total direct costs) paid by the private sector [19].

To assess the health-related and economic-related burdens of physical inactivity as well as the effectiveness of PA interventions, a behavioral epidemiology framework has been developed to understand the patterns of PA and sedentary behavior to build evidence for public health action. This framework organized the research into six phases to help identify the research gaps and guide public health policy and practice [17]. These phases are as follows:

**Phase 1.** Identify relationships of PA and sedentary behavior with health outcomes (see Table 2)
**Phase 2.** Measure PA and sedentary behavior
**Phase 3.** Characterize the prevalence and variations of PA and sedentary behavior in populations (see Table 3)
**Phase 4.** Identify the determinants of PA and sedentary behavior (see Table 4)
**Phase 5.** Develop and test interventions that influence PA and sedentary behavior (see Table 5)
**Phase 6.** Use evidence to inform public health guidelines and policy [17]

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 PA promotion, and ineffective PA policies in colleges—all at the population-based policy level. However, at the individual-based policy level, studies have identified an inverse

**Table 2**
Studies of the Associations of Physical Activity and Sedentary Behavior with Health Outcomes in Saudi Arabia (Behavioral Epidemiology Framework, Phase 1).

| Lead Author (Year) | Study Design | Health Outcomes | Association with Physical Activity (Type) |
|---|---|---|---|
| *Prospective Studies* | | | |
| Al Saif (2015) | Aerobic and anaerobic intervention (3 months) | BMI<br>BP | Inverse association (aerobic intervention) |
| Al-Eisa (2014) | Exercise intervention (3 wk)<br>76 female university students aged 19–25 y | Insomnia<br>Depression<br>Attention span | Inverse association (exercise intervention)<br>Positive association (exercise intervention) |
| Alghadir (2016) | Exercise intervention (12 wk)<br>100 adults aged 30–60 y<br>Serum levels of calcium and manganese | BMI<br>WtHR<br>Serum levels of copper, zinc, and bone-specific alkaline phosphatase<br>Osteoporosis t-score<br>Bone mineral density<br>Serum levels of calcium and manganese | Inverse association (exercise intervention)<br>Positive association (exercise intervention) |
| Rouzi (2011) | Prospective cohort (6 y)<br>707 healthy post-menopausal women aged 50 y or older | All fragility-related fractures | Inverse association (total PA) |
| Salman (2009) | Exercise intervention (11 y)<br>916 normotensive adults with diabetes aged 20 y or older | Hypertension | Inverse association (leisure PA) |
| Tomar (2013) | Exercise intervention (12 wk)<br>24 adult men with type 2 diabetes aged 25–55 y | Glycemic control | Positive association (exercise intervention) |
| *Cross-Sectional: Adults* | | | |
| Al-Hamdan (2012) | Cross-sectional<br>4758 adults aged 15–64 y | Hypertension | Inverse association (work, transport, and leisure PA) |
| Almajwal (2015) | Cross-sectional<br>362 non-Saudi hospital nurses | BMI | Inverse association (total PA) |
| Al-Nozha (2007) | Cross-sectional<br>17,395 adults aged 30–70 y | BMI<br>WC | Inverse association (leisure PA) |
| Basulaiman (2014) | Cross-sectional<br>10,735 patients aged 15 y or older | Hypercholesterolemia<br>Borderline hypercholesterolemia | Non-signifiant (total PA) |
| El Bcheraoui (2013) | Cross-sectional<br>10,735 patients aged 15 y or older | Hypertension<br>Borderline hypertension | Non-significant (total PA)<br>Positive association (total PA, moderate active only) |
| Hegazy (2015) | Cross-sectional study<br>174 women, half with lower back pain for $\geq$ 3 mo aged 20–45 y | Lower back pain | Inverse association (total PA) |
| Memish (2014) | Cross-sectional<br>10,735 adults aged 15 y or older | BMI | Inverse association (total PA, men only) |
| Tuffaha (2015) | Cross-sectional<br>10,735 adults aged 15 y or older | Vitamin D deficiency | Non-significant (total PA) |
| *Cross-Sectional: Children and Adolescents* | | | |
| Al-Hazzaa (2012) | Cross-sectional<br>2906 school students aged 14–19 y | BMI<br>WtHR | Inverse association (vigorous PA)Non-signifiant (total PA) |
| Al-Hazzaa (2013) | Cross-sectional<br>2868 secondary-school students aged 15–19 y | Sleep duration | Positive association (total PA) |
| Al-Nakeeb (2012) | Cross-sectional<br>1138 school students aged 15–17 y | BMI | Inverse association (total PA and walking) |
| Al-Nuaim (2012) | Cross-sectional<br>1270 school students aged 15–19 y | BMI<br>WC | Inverse association (total PA) |
| Alqahtani (2015) | Cross-sectional<br>370 school children aged 14–19 y | BMI | Inverse association (total PA, boys only) |

BMI: body mass index; PA: physical activity; WC: waist circumference; WtHr: waist-to-hip-ratio.

association between PA and the following: lack of time for counseling, health personnel's limited knowledge/awareness of the benefits of PA, 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) [17].

## 3. PA promotion intervention

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

### 3.1. PA counseling

PA counseling in the PHC system can help achieve the main objectives of the WHO's Global Strategy for Diet, Physical Activity, and Health. These objectives include the following: reducing risk factors for chronic diseases; increasing the awareness and understanding of the influences of diet and PA on health and the positive impact of preventive interventions; developing, strengthening, and implementing global, regional, and national policies and action

**Table 3**
Prevalence of Physical Activity in Saudi Arabia.

| Author (Year) | Sample | Physical Activity Measurement Tool | Physical Activity Prevalence |
|---|---|---|---|
| *Adults* | | | |
| Al-Hazzaa (2007) | 1064 adults aged 15–78 y | IPAQ short | Men: 56.3%<br>Women: 65.7%<br>Total: 59.4% |
| Allam (2012) | 194 medical students | IPAQ short | Men: 36.2%<br>Women: 35.0%<br>Total: 35.5% |
| Al-Nozha (2007) | 17,395 adults aged 30–70 y | Validated questionnaire on leisure time physical activity and walking | Men: 6.1%<br>Women: 1.9% |
| Awadalla (2014) | 1257 health professional college students | IPAQ short | Men: 43.7%<br>Women: 41.2%<br>Total: 42.0% |
| Banday (2015) | 106 PHC physicians aged 27–63 y | GPAQ | Total: 65.2% |
| Khalaf (2013) | 663 female university students | ATLS | Women: 62.4% |
| Koura (2013) | 370 female university students | GPAQ | Women: 46.8% |
| *Children and Adolescents* | | | |
| Al-Hazzaa (2014) | 2866 school students aged 15–19 y | ATLS | Boys: 43.8%<br>Girls: 20.2%<br>Total: 31.5% |
| Al-Hazzaa (2011) | 2908 secondary-school students aged 14–19 y | ATLS | Boys: 55.5%<br>Girls: 21.9% |
| Author/Year | Sample | Physical Activity Measurement Tool | Physical Activity Prevalence |
| Al-Hazzaa (2013) | 2886 students aged 15–19 y | ATLS | Boys: 55.0%<br>Girls: 21.7% |
| Al-Hazzaa (2013) | 1648 students aged 14–18 y | ATLS | Boys: 53.4%<br>Girls: 19.1%<br>Total: 36.0% |
| Al-Nakeeb (2012) | 2290 school students aged 15–17 y | ATLS | Boys: 45.8%<br>Girls: 4.5%<br>Total: 26.0% |
| Al-Nuaim (2012) | 1270 school students aged 15–19 y | ATLS | Boys: 44.5%<br>Girls: 4.0% |

GPAQ: global physical activity questionnaire; IPAQ: international physical activity questionnaire; ATLS: Arab teens lifestyle student questionnaire. Physical activity is presented as the percentage meeting recommendations: 150 min of moderate-intensity activity per week for adults and 60 min of moderate-intensity activity 7 days per week for adolescents [17].

**Table 4**
Factors Associated with Physical Activity in Saudi Arabia.

| 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

plans to improve diets and increase PA that are sustainable and that comprehensively and actively engage all sectors; and monitoring science and promoting research on diet and PA [20]. Table 6 presents different organizations and evidence-gathering agencies and their recommendations for PA counseling within PHC centers.

### 3.2. PA counseling effectiveness

The American Heart Association has emphasized that "the advice from healthcare professionals significantly influences adoption of healthy lifestyle behaviors, including regular PA, and can

**Table 5**
Physical Activity-Related Interventions in Saudi Arabia.

| Lead Author (Year) | Target Group (Size) | Description of Intervention | Results |
|---|---|---|---|
| Al-Eisa (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 workout video (81% response rate) | Significant difference (?? = 0.04) between cases and controls regarding adherence to program; 17% exercised $\geq$ 8 times in the case group compared to 4% in the control group during the intervention period |
| Midhet (2011) | Community (population size not reported) | 1-year intervention at all PHC centers involving training physicians and comprising lifestyle counseling and regular health center–based lectures conducted by health educators and medical students | A pre-test and post-test community-based survey found significant increases in levels of brisk walking for men after adjustment for key demographic variables<br>Adjusted odds ratios, 1.91 (1.26–2.90) |
| Sharaf (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<br>Adjusted odds ratios, 0.81 (0.59–1.01) |

**Table 6**
Recommendations for Physical Activity Promotion within the PHC Context from Organizations and Evidence-Gathering Agencies (). Adapted from [29]

| Organizations | Recommendation | Description |
|---|---|---|
| Royal Australian College of General Practitioners (Royal Australian College of General Practice, 2012) | Grade A III evidence All adults should be advised to participate in 30 min of moderate activity on most (preferably all) days of the week | Interventions that have shown short-term benefits of changing physical activity include:<br>a) patient screening to identify current levels of activity (including use of a pedometer) and readiness to be more active;<br>b) provision of brief advice or counseling regarding exercise;<br>c) supporting written materials and/or written prescription for exercise;<br>d) d) pedometer step target of 10,000 steps per day or 2000 more than at baseline |
| U.S. Preventive Services Task Force (Moyer and U.S. Preventive Services Task Force, 2012) | Grade C evidence<br>There is sparse evidence indicating that the health benefits of initiating behavioral counseling in the primary care setting promote physical activity. Clinicians may choose to selectively counsel patients instead of incorporating counseling into the care of all adults in the general population | • Studies of medium-intensity and high-intensity behavioral counseling interventions have shown beneficial effects on behavioral and intermediate health outcomes<br>• Medium-intensity interventions involved a range of 3–24 phone sessions or 1–8 in-person sessions. High-intensity interventions involved a range of 4–20 in-person group sessions and were the only interventions to report sustained benefits beyond 12 months<br>• 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) | Grade B evidence<br>Adults who have been assessed as being inactive should be advised to perform 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; and d) health status<br>• Provide information about local opportunities to be physically active for people with a range of abilities, preferences, and needs<br>• Consider giving a written outline of the advice and goals that have been discussed<br>• Follow-up when there is another appointment or opportunity |
| U.S. Preventive Services Task Force 2014) [28] | Grade B evidence<br>Recommends that adults in primary care who are overweight or obeseand have known cardiovascular risk factors (including obesity, hypertension, hyperlipidemia, diabetes, and tobacco use) offer or refer to intensive behavioral counseling interventions topromote a healthful diet and physical activity | • Intensive behavioral counseling interventions are effective for creating small but important changes in health behavior outcomes (dietary intake and physical activity) and selected intermediate clinical outcomes (lipid levels, blood pressure, fasting glucose levels, diabetes incidence, and weight) after 12–24 mo<br>• Many types of intensive counseling interventions are effective. Such interventions focus on behavior change, include didactic education plus other components, such as audits and feedback, problem-solving skills, and individualized care plans, and are typically delivered by specially trained health professionals |

**Table 7**
Studies of Physical Activity Counseling at PHC Centers in Saudi Arabia.

| Authors (Year) | Study Objective | Study Type/Tool | Population/Sample Size | Key Finding |
|---|---|---|---|---|
| Al Shammari (2016) [24] | 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) | • The majority (>70%) of physicians had a low level of physical activity<br>• The majority (96%) did counsel their patients about physical activity, especially when the patient had diabetes |
| Al Jaberi (2014) [25] | Assess physical activity counseling provided by PHC physicians in the Aseer region, Saudi Arabia | Self-administered questionnaire; Physician-Based Assessment and Counseling for Exercise (PACE) Program | PHC physiciansin the Aseer region (n = 232) | • More than half of primary health care physicians in the Aseer region are physically inactive<br>• They show support for physical activity counseling to their clients<br>• Most of them consider that lack of time, lack of training, and shortages of health educational materials are the most common barrier to conducting effective counseling in their practices |
| Al-nahdi (2006) [27] | 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, Saudi Arabia (n = ?) | • Physicians believe it is important to talk to all patients regarding physical activity, especially patients with risk factors for chronic disease, such as being overweight and having diabetes<br>• Most physicians assess at least those patients with a pre-existing condition or a risk factor for chronic diseases<br>• Most of the physicians were not aware of the current physical activity guidelines.It was observed that lack of time was one of the main barriers to physical activity counseling |
| AlRashdi (2015) [26] | Determine the attitude of primary care physicians toward promoting regular physical activity;<br>determine the barriers to promoting physical activity | Cross-sectional | Prince Sultan Military Medical City Riyadh Kingdom of Saudi Arabia (n = 80 physicians) | The physicians' attitudes were good, but consideration should be given to overcome the barriers to achieve health goals related to promoting regular physical activity |

increase satisfaction with medical care" [21]. According to numerous studies, cardiovascular risk factors, mortality, and morbidity from stroke and heart disease can be reduced by lifestyle modifications (utilizing a number of clinician counseling strategies), including PA [21].

Trials and studies have been conducted to examine the effectiveness of brief counseling during PHC visits. In the Activity and Counseling Trial, primary care physicians were trained to deliver a brief, 3- to 4-min counseling session during routine office visits. This intervention was associated with increased levels of PA over the course of 2-year follow up. In the PREMIER trial, a brief lifestyle and PA counseling session was presented to adult patients with prehypertension or stage 1 hypertension. Strong evidence was found that counseling was effective; the intervention resulted in a risk reduction of 12%–14% over an 18-month period (based on the 10-year Framingham Coronary Heart Disease Risk Score) [21]. Moreover, a cohort study conducted in the United Kingdom found that brief PA counseling during primary care was a cost-effective way to promote and improve PA among adults [22].

PA counseling in a primary care setting can be delivered using the "5A" approach: assess, advise, agree, assist, and arrange. The 5A approach involves a sequence of counseling behaviors that are designed to engage the patient in developing a specific and realistic action plan for behavior change [23]. Figure 4 demonstrates how to use the 5A approach in PA counseling.

## 4. PA counseling in primary care in Saudi Arabia

### 4.1. Role of PHC centers

PHC centers serve as the frontline in health care systems because 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 health care needs for prevention and primary treatment. Of these, the promotion of PA is one of the most important services that physicians provide to their patients. Therefore, PA counseling interventions offered in PHC settings have emerged as a viable strategy to promote PA [14,15].

Because physical inactivity is a major public health burden in Saudi Arabia, assessing the knowledge, attitudes, and practices of PHC providers in Saudi Arabia with regard to PA is an essential step in implementing effective interventions and policies that encourage PA. This is especially true considering that in 2015, there were 49,615,932 visits to 2282 PHC centers in Saudi Arabia. Each center served an average of approximately 13,813 persons [16]. With regard to the work force in PHC centers, there were 9647 physicians and 18,745 nurses [16].

### 4.2. Studies in PA counseling

Despite the established evidence of the effectiveness of PA regarding NCD risk reduction, despite the high prevalence of physical inactivity, obesity, and NCD, and despite the importance and cost-effectiveness of PA counseling in the primary care setting, few studies have been conducted regarding PA counseling in Saudi Arabia. The available literature regarding PA is limited to certain regions, family physicians, and patients with chronic diseases. Furthermore, all studies that have assessed PA have done so in a general manner without specific and detailed data about PA counseling.

Only a few studies have been conducted on this topic in Saudi Arabia: two published articles and two unpublished research studies. These studies are discussed and summarized in Table 7.

Al Shammari (2016) studied the PA 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 worked in PHC centers, regardless of their specialties. The study was also limited to the assessment of counseling provided regarding specific diseases and did not include detailed information about the assessment process [24]. In 2014, Al Jaberi assessed PA counseling at primary care centers in the Aseer region. Data collected was related to PA counseling practice, opinions regarding PA behavior, main sources of information regarding PA, and perceived barriers to PA counseling [25].

In addition, family medicine residents in Saudi Arabia conducted two unpublished studies during their residency program. One of these studies assessed physicians' attitudes toward PA counseling and the barriers perceived by physicians in promoting PA counseling [26]. The other assessed physicians' knowledge of current PA guidelines and current practices of PA counseling in PHC and identified the barriers preventing the promotion of PA [27].

## 5. Conclusions

PA is a health behavior that helps prevent all causes of mortality, and different international agencies recommended PA counseling to patients within the primary health care context due to its effectiveness. However, currently, there are limited data available about PA counseling practice in PHC centers in Saudi Arabia, despite the high prevalence of obesity and physical inactivity and the high number of patient visits to PHC centers. Studies should be conducted to assess the PA knowledge and attitudes of all health care providers to put forth strategies for all health care providers regarding the promotion of PA. An assessment of PHC providers is needed to help shed light on the barriers that exist regarding PA counseling. Assessment can also help to improve continuous health education strategies. Providing the Ministry of Health with an assessment that defines the structure of PA counseling in PHC centers could help improve behavioral counseling, therefore potentially increasing PA levels among patients. In turn, this could possibly decrease NCD mortality.

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