The Relationship Between Physical Activity Guidelines and Metabolic Equivalent Tasks

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Abstract: Physical activity (PA) is included in recommendations and health guidelines because of the benefits it produces. The metabolic equivalent task (MET) is a widely used physiological concept that is considered to be a simple procedure for expressing the energy cost of physical activities as a common descriptor of workload levels across most modalities and all populations. According to the, longitudinal and cohort studies there is a dose-response relationship between physical activity and chronic diseases and conditions. With higher “doses” of physical activity, risks for cardiovascular disease have been lower but the exact magnitude of this “dose” according to the metabolic equivalent task (MET) is still unknown. Thus far, this may be helpful to use of the energy expenditure as exercise volume in realizing health and fitness outcomes. That being the case, researchers may require to use a mixture of physical activity (PA) and metabolic equivalent (MET) according to the American physical activity guideline in different population to explore its health benefit consequences to prevent and/or control many divergent illnesses.

Key words: Physical Activity • Metabolic Equivalent Tasks • Health

INTRODUCTION

Recognition of the health and functional hazards of a sedentary way of life has led numerous groups to promulgate public health recommendations for physical activity (PA) [1]. In 1970s and 1980s, the available evidence suggested that vigorous-intensity activity and the pursuit of cardiorespiratory fitness were appropriate (the terms cardiorespiratory fitness and aerobic fitness can be used interchangeably and both terms refer to the ability of the lungs, heart, blood and vascular system to transport oxygen and the ability of the tissues and organs to extract and use oxygen) [2,3]. In the 1990s, it became apparent that moderate-intensity aerobic activity also offered substantial health benefits and the 1995 report from the Centers for Disease Control and Prevention and the American College of Sports Medicine (CDC/ACSM) recommended that “every US adult should accumulate 30 minutes or more of moderate-intensity physical activity on most, preferably all, days of the week”[4]. Reports from a National Institutes of Health consensus conference, the US Surgeon General and the American Heart Association (AHA) presented very similar recommendations in 1996 [5-7]. Physical activity guidelines have changed over time to reflect the relationship between physical activity and health [8]. Subsequently, the most recent American College of Sports Medicine (ACSM) Position Stand of quantity and quality of physical activity guidelines recommends that ”most adults engage in moderate-intensity cardiorespiratory exercise training for =30 minutes per day on =5 days each week for a total of =150 minutes per week, vigorous-intensity cardiorespiratory exercise training for =20 minutes per day on =3 days each week (=75 minutes per week), or a combination of moderate-and vigorous-intensity exercise to achieve a total energy expenditure of=500 to 1000 MET per minutes per week” [9]. This recommendation is congruent with the U.S. physical activity guidelines for Americans in 2007 and 2008 years which stated “to promote and maintain health, all healthy adults aged 18 to 65 years need moderate-intensity aerobic (endurance) physical activity for a minimum of 30 min on five days each week or vigorous-intensity aerobic physical activity for a minimum of 20 min on three days each week or an equivalent combination of moderate-and vigorous-intensity aerobic activity. Aerobic activity should be performed in episodes of at least 10 minutes and preferably, it should be spread throughout the week” [10]. Although, there are no official
recommendations for the European Union [11] both the World Health Organization (WHO) and the British Association of Sport and Exercise Sciences have confirmed the recent US guidelines [12, 13].

**Metabolic Equivalent Task (MET):** Physical activity is included in recommendations and health guidelines because of the benefits it produces [14]. Aerobic activity whether of moderate- or vigorous-intensity is the cornerstone of most Physical activity guidelines. Moderate-intensity aerobic activity, which is generally equivalent to a brisk walk and noticeably accelerates the heart rate, can be accumulated toward the 30-min minimum by performing bouts each lasting 10 or more minutes. Vigorous-intensity activity is exemplified by jogging and causes rapid breathing and a substantial increase in heart rate. Physical activity recommendations use absolute aerobic intensity in terms of METs [15]. The metabolic equivalent task (MET) is a widely used physiological concept that is considered to be a simple procedure for expressing the energy cost of physical activities as a multiple of resting metabolic rate (RMR) [16]. Metabolic equivalent is commonly viewed as a measure that has the advantage of providing a common descriptor of workload levels across most modalities and all populations [17]. METs are also routinely utilized to describe the functional capacity or aerobic power of an individual [18]. One MET represents the resting energy expenditure during quiet sitting and is commonly defined as 3.5 mL O₂·kg⁻¹·min⁻¹ / kcal·kg⁻¹·h⁻¹ or ~250 mL/min of oxygen consumed, which represents the average value for a standard 70-kg person. These values represent approximations, because factors of sex, age and body composition will affect measures of resting energy expenditure and thus, actual MET values is varied [19]. An early experimental study also has shown one size of metabolic equivalent does not fit for all people [20].

The metabolic equivalent based upon the compendium of physical activities in 1993 classified as light (less than < 3 METs), moderate (3 to 6 METs) or vigorous (more than > 6 METs) intensity [21]. According to this classification, longitudinal and cohort studies suggest that there is a dose-response relationship between physical activity and chronic diseases and conditions. Activities = 6 METs are associated with lower risk of cardiovascular disease [22]. Significantly lower risks of coronary heart disease or cardiovascular disease have been related with as little as 2.6-5.0 MET.h.wk⁻¹ of walking, approximately 45-75 minutes per week of brisk walking in the Women’s Health Initiative [23], 60-90 min.wk⁻¹ of walking in the Women’s Health Study [24] and 3.9-9.9 METs min.h.wk⁻¹ of walking, approximately 60-150 min.wk⁻¹ at a brisk pace in the Nurses’ Health Study [25]. Haskell and colleagues [15] have stated that the risks for cardiovascular disease (CVD) have been much lower with higher “doses” of physical activity, however, the exact magnitude of this “dose” is not still fully determined.

**CONCLUSION**

Garber [26] recently have recommended that MET kilograms per minutes per week and kilocalories per minute per week is a criteria to use for estimating exercise intensity in research, but these quantifications are rarely used for exercise prescription program. Thus far, this may be helpful to use of the energy expenditure as exercise volume in realizing health and fitness outcomes [26]. That being the case, researchers may require to use a mixture of physical activity (PA) and metabolic equivalent (MET) according to the American physical activity guideline in different population to explore the its health benefit consequences to prevent and/or control many divergent illnesses.

**REFERENCES**


