
Let Us Talk About Moving: Reframing the Exercise and Physical Activity Discussion

Ross Arena, PhD, PT, Amy McNeil, BA, Steven Street, PhD,
Samantha Bond, MA, Deepika R. Laddu, PhD,
Carl J. Lavie, MD, and Andrew P. Hills, PhD

Abstract: Noncommunicable and chronic disease are interchangeable terms. According to the World Health Organization, “they are of long duration and generally slow progression. The 4 main types of chronic diseases are cardiovascular diseases (ie, heart attacks and stroke), cancers, chronic respiratory diseases (such as chronic obstructive pulmonary disease and asthma), and diabetes.” We have known about the benefits of physical activity (PA) for thousands of years. Perhaps our approach, from public health messaging to the individual clinical encounter, as to how PA and exercise are discussed and prescribed can be improved upon, with the ultimate goal of increasing the likelihood that an individual moves more; ultimately moving more should be the goal. In fact, there is an incongruence between the evidence for the benefits of physical movement and how we message and integrate PA and exercise guidance into health care, if it is discussed at all. Specifically, evidence clearly indicates any migration away from the sedentary phenotype toward a movement phenotype is highly beneficial. As we necessarily move to a proactive, preventive healthcare model, we must reconceptualize how we evaluate and treat conditions that pose the greatest threat, namely chronic disease; there is a robust body of evidence supporting the premise of movement as medicine. The purpose of this perspective paper is to

propose an alternate model for promoting, assessing, discussing, and prescribing physical movement. (Curr Probl Cardiol 2018;43:154–179.)

Introduction

Noncommunicable and chronic disease are interchangeable terms. According to the World Health Organization, “they are of long duration and generally slow progression. The 4 main types of chronic diseases are cardiovascular (CV) diseases (CVD; ie, heart attacks and stroke), cancers, chronic respiratory diseases (such as chronic obstructive pulmonary disease and asthma), and diabetes mellitus.”¹ Chronic disease accounts for 38 million global deaths each year; CVD and respiratory diseases, certain forms of cancer and diabetes mellitus combine to account for 82% of these deaths. Evidence suggests that the most low-to-middle income countries are particularly vulnerable to the devastating effect of chronic diseases,^{2,3} and there is global recognition that we are in the midst of a chronic disease crisis.^{4–6} At the same time, there is a recognition that we are simultaneously experiencing a global unhealthy living crisis, which is the primary driver of the increased risk of chronic disease and its associated poor health trajectory (ie, increased health care uses and adverse events as well as decreased functional capacity and quality of life).^{7–9} Physical inactivity is a primary unhealthy living characteristic that dramatically increases the risk of chronic disease.^{7,10–13} Physical inactivity is in itself a risk factor for chronic disease and also raises the likelihood for other risk factors to develop, such as systemic inflammation, excess body mass, and hypertension.¹⁴

Moving forward, there must be a global shift in our approach to health care; prevention of chronic diseases from ever developing is the optimal approach.^{15–17} Instead of the traditional reactionary approach of waiting for “bad things”¹⁸ to be on the verge of happening (ie, the full manifestation of multiple chronic disease risk factors) or have already happened (ie, diagnosis of one or more chronic diseases), we must take a proactive approach, doing all that is possible to keep people healthy where they live, work, and go to school.^{15,16,19–21} A primary component of a proactive health care model to prevent and treat chronic disease is viewing healthy living as medicine, with physical activity (PA) being a primary ingredient of the healthy living polypill.^{22–24} We have known about the benefits of PA for thousands of years.²⁵ According to the Greek philosopher Plato, “lack of activity destroys the good condition of every

human being, while movement and methodical physical exercise save it and preserve it.” The Greek physician Hippocrates wrote “in order to remain healthy, the entire day should be devoted exclusively to ways and means of increasing one's strength and staying healthy, and the best way to do so is through physical exercise.” Yet, as we know that exercise and increased PA are good for health, essentially a medicine, the sedentary and physically inactive phenotypes persist with disconcerting future trends.^{8,26–28}

Perhaps our approach, from public health messaging to the individual clinical encounter, as to how PA and exercise are discussed and prescribed can be improved upon, with the ultimate goal of increasing the likelihood that an individual *moves more*. In fact, there is an incongruence between the evidence for the benefits of physical movement and how we message and integrate PA and exercise guidance into health care, if it is discussed at all. Specifically, evidence clearly indicates that any migration away from the sedentary phenotype toward a movement phenotype is highly beneficial.^{29–34} The greatest improvements in health outcomes are realized when a sedentary individual moves more but at a level still well below recommended PA guidelines. Despite this, we often seem to commonly take a dichotomous all or nothing approach, with the current threshold for success defined as 150 minutes or more of moderate-intensity aerobic exercise on most if not all days of the week.³⁵ Although this dichotomous approach is likely unintentional, there seems to be little consideration as to how the message regarding PA and exercise is interpreted by the individual receiving it, particularly those who are chronically sedentary and in greatest need of movement as a medical intervention.

The purpose of this perspective article is to propose an alternate model for promoting, assessing, discussing, and prescribing physical movement.

Current State of the Evidence: The Link between Leisure-Time PA and Health

The general CV and metabolic benefits of PA are indisputable. Consensus from systematic reviews, and reviews by 2008 PA Guidelines Committee report a 20%-30% risk reduction in various chronic conditions^{36–38} and a median risk reduction of 30%-35% for developing coronary heart disease (CHD) among active vs inactive or least active adults.^{39–41} Unfortunately, very few people meet PA guidelines, a situation that is nothing less than a public health crisis. Reasons for the deficit are multiple, complex, and beyond the scope of this review. However, literature examining PA behavior often cites lack of time as an important

barrier.⁴² It logically follows that altering the perception of PA recommendations as a time cost may contribute to increased population level engagement in PA. A relatively straightforward way to alter this perception may be to reduce the recommended threshold (ie, 150 minutes of moderate-intensity PA/week or 7.5 metabolic equivalent (MET)-hours/week) for health benefits of PA engagement. Such a threshold reduction might help the least fit, who make up the largest population segment, to move just a little further along the PA continuum toward meeting current recommendations. On the way to meeting PA guidelines, incremental increases in PA will improve the health of the least fit the most; as will be outlined below, the greatest proportion of reductions in all-cause and CVD morbidity and mortality as a function of PA accrue at the low-fitness end of the PA continuum. If sedentary individuals across the lifespan^{43,44} are encouraged to make small, subthreshold changes in PA, large population health benefits will follow.⁴⁵

Evidence supporting the population health benefits of PA that is in deficit of current recommendations has increased in recent years. A 2008 report by the US Department of Health and Human Services was one of the first systematic reviews of more than 100 epidemiological studies to support a curvilinear reduction in health benefits as a function of increasing PA.⁴⁶ In other words, increases in PA are associated with a gradual reduction in the size of health benefits obtained, with the largest gains to health obtained at the low-fitness end of the PA continuum. As the publication of the Health and Human Services report, several prospective cohort and pooled cohort analyses have replicated this curvilinear relationship demonstrating the greatest reductions in disease and mortality risk with increasing subthreshold PA increases among people who are the least active.⁴⁷⁻⁴⁹ Additional and compelling evidence from population-wide longitudinal studies, such as the Aerobics Center Longitudinal Study (mean age = 44 years) reported no significant differences in all-cause and CVD mortality between participants engaging in lower (5-10 minute/day) and higher doses of running (all $p > 0.10$).⁵⁰ In fact, the Aerobics Center Longitudinal Study reported that running < 51 minutes/week and slow speeds < 6 mph, 1-2 times a week, < 506 MET-minutes, or < 6 miles per hour (9.6 km per hour) was associated with markedly reduced risks of all-cause mortality.⁵⁰ Notably, compared to never-runners, those who identified as persistent runners had the most significant benefits with 29% and 50% lower risks of all-cause and CVD mortality, respectively, suggesting that frequency of running even 5-10 minutes per day, at slow speeds (< 6 mph) may be more important than intensity for longevity benefits.⁵⁰ These findings are congruent with other large epidemiological

studies that focused on the cumulative doses of exercise, and reported a U or reverse J-shaped relationship between high doses of Leisure-Time PA (LTPA) and CVD and all-cause mortality.^{51,52} For example, the Million Women Study showed that any form of exercise at least once a week reduced CHD incidence in active compared to inactive women. However, PA greater than once a week was associated with smaller benefits up to a certain point beyond which there was no additional risk reduction in vascular outcomes.⁵¹

Pooled data from prospective cohort studies also report a trend of diminishing health returns with increasing amounts of PA and small but nonetheless significant increases in mortality risk at the highest levels of the PA continuum. For example, in the Copenhagen City Heart Study, moderate and strenuous joggers had significantly higher mortality risk (HR = 3.06 [95% CI: 1.11–8.45] and 9.08 [95% CI: 1.87–44.01], respectively), compared to light joggers after adjusting for various CVD risk factors. Moore et al.⁵³ and Arem et al.⁵⁴ also reported a mortality risk reduction of 20% in adults (aged 21–96 years) completing less PA than recommended from data pooled across 6 prospective cohort studies in the United States (US) and Europe. In a prospective cohort study in Taiwanese adults (aged 20 years to over 60 years), 15 minutes of self-reported low-volume PA per day (ie, 3.5–7.49 MET-hour) was associated with a 14% reduction in all-cause mortality over approximately 8 years of follow-up. Additionally, active individuals also had 3 years greater life expectancy compared to inactive individuals (ie, <3.75 MET-hour) who experienced a 17% increased mortality risk over follow-up.³³ Importantly, authors emphasized that every additional 15 minutes of daily PA (up to a maximum of 100 minutes a day) provided an additional risk reduction of 4% for all-cause and 1% for all-cancer mortality, and benefits were seen across both sexes, all age groups, and among those with CVD risk.³³ These findings align with earlier recommendations suggesting that exercising in 10-minute bouts of moderate-intensity PA to meet the minimum of 30 minutes of moderate-intensity PA on 5-days a week may provide similar CV and metabolic benefits as 1 continuous 30-minute bout,⁵⁵ and greater volumes or intensities of PA will provide more benefit.^{56,57} Importantly, these findings together call into question the notion that more exercise, and at high intensity levels, is really better for chronic disease risk reduction, CVD protection, and overall mortality risk reduction.^{58,59} That is, the “optimum” dose of PA to derive CV and longevity benefit exercise (ie, intensity, frequency, duration, and type) remains inconclusive. We have recently reported that PA that increases heart rate levels produces greater benefits, using a personalized activity intelligence (PAI), with 100 PAI

points per week producing maximal benefits, although most of the benefit was obtained with the first 50 points per week. Although details of the intriguing PAI approach is beyond the scope of this commentary, this idea emphasizes that short bouts of more intense exercise that increases ones heart rate may be producing maximal health benefits and protection against CVD—and all-cause mortality.^{60,61}

The dose-response relationship between PA and chronic disease is irrefutable, as greater doses of PA have consistently shown to be associated with improvements in cardiorespiratory, metabolic, musculoskeletal, and functional health, and various cancers.⁵⁷ That being said, the health benefits received from engaging in lighter levels of PA (ie, 100 to <500 MET-minute/week) should not be discredited, particularly in middle-to-older age populations. Compelling evidence from epidemiological studies and systematic reviews argues that health benefits and reductions in chronic disease risk can be achieved at lower intensity and lower volumes of PA or both^{36,37,62–65} in both healthy, active individuals and those with existing medical conditions. The common theme in the aforementioned epidemiological findings, as well as by Wen et al.⁶⁶ and others,^{44,63,65,67} is that regular LTPA participation at volumes as low as half of currently recommended guidelines⁶⁷ compared to inactivity (or sedentary lifestyles) is sufficient to reduce mortality from CVD, CHD, or other causes. Of course, lower volumes of PA are likely to be more achievable and adaptable for previously inactive, and older and frail adults,⁶⁸ in whom recommended PA guidelines are the same as they are for middle-aged adults.^{68–70} Clearly, much more data are needed to determine the adherence and acceptability of lower volume PA over the arbitrary threshold of 150 minute/week of moderate-intensity PA for primary and secondary prevention in the general population, and among those with existing chronic comorbidities. In fact, in a recent study, those who did not reach their PA guidelines but achieved 100 PAI points had considerably lower mortality than did those who reached the PA guidelines but lacked PAI points.⁶⁰

Just as PA engagement, regardless of volume, may lead to clinically relevant health changes, particularly in those unaccustomed to routine PA participation,³⁶ a small changes approach is a well-replicated finding in the literature.⁷¹ For example, small changes in cardiorespiratory fitness (CRF) among the least fit, relative to those who are most fit, are associated with protection against all-cause and CVD mortality.⁷² In other words, people who *move least* have the most to gain by *moving more* with diminishing health benefits occurring as a function of increase in CRF. This curvilinear response in health outcomes as a function of incrementally increased

movement has profound implications for public health and health promotion. In contrast to the threshold set for health benefits by current guidelines, a message that subthreshold activity levels can provide important health benefits may strike a balance between a perception of PA as an imposition, and PA being an important health choice. Such an approach could increase the likelihood of discretionary PA engagement at a population level with the aim of increasing PA engagement to levels recommended by most national guidelines. The epidemiological literature reflects this view with a shift away from studies focusing on the “150 minutes of moderate-intensity PA per week vs none” principle to studies suggesting that even smaller amounts of PA may be associated with reduction in CHD or CVD risk in unfit or low PA-engaged individuals (in intensity, type, and quantity).^{13,73,74}

In short, an evidence-based public health program promoting a shift in population PA levels such that people in the least fit category move along the PA continuum to the next least fit category will yield a significant population health dividend. Getting the public health message right is a complex issue and remains a topic for another review. Such a message should include information on the relative effect on health of sedentary behaviors. Although it is a somewhat controversial topic, public health messages could potentially include information about the harms that might result from engaging in too much PA. Notwithstanding these caveats about the limitations of this review, and given the relatively low rates of PA reported internationally, a public health program that promotes positive messaging about movement, with translatable and feasible goals, may encourage more individuals to “move just a little more” and might be a good start to making improvements in public health outcomes.

The Current and Emerging Evidence Discussing the Importance of Other Forms of PA

Clearly, participation in regular PA confers numerous health benefits and protection against poor health outcomes, including the prevention of chronic disease. The traditional benchmarks for insufficient PA are the widely promulgated PA guidelines for health^{75,76}; however, increasing evidence suggests that we should consider all forms of PA for their potential to confer health benefits. More specifically, all forms of *movement* should be considered beneficial rather than benefit being ascribed solely based on the basis of whether an individual meets or exceeds the volume of activity consistent with a consensus statement or guideline.

Globally, population declines in PA participation in both the developed and developing world have been associated with significant and progressive lifestyle changes in recent decades.²⁷ Such has been the speed of change that Katzmarzyk and Mason⁷⁷ have referred to this progressive lifestyle transition as a “rapid acculturation to sedentary living.” In short, habitual levels of PA have declined or been replaced or both by an increase in inactive or sedentary behaviors and inextricably linked to increased risk of hypokinetic diseases (diseases of inactivity).^{10,78} Indeed, Kohl et al.¹¹ and others⁷⁹ have suggested that global levels of physical inactivity be described as a pandemic and consistent with the statement that physical inactivity is the “greatest public health challenge of the 21st century.”⁸⁰

The current historically high levels of physical inactivity are due to a combination of insufficient participation in LTPA and an increase in sedentary behavior as a function of reduced movement in occupational and domestic activities. These changes in activity or movement have also coincided with a reduction in active transport. A major challenge is to increase knowledge and understanding of the importance of all forms of movement at the population level, including the consideration that movement should be seen as an opportunity rather than a chore. An important part of the armory in relation to our knowledge and understanding of movement is the potential scope or extent of an individual's movement repertoire or portfolio. If all forms of movement are deemed to be important, every effort must be made to increase an individual's habitual movement portfolio by making every opportunity to move count and be celebrated; *movement is medicine*.

One of the most common approaches to framing movement as an opportunity is to encourage and monitor movement in step counts. Like generic PA guidelines, step count targets can provide useful and personalized reference points for many individuals, and increasing research evidence has linked step counts to health outcomes. Such evidence maps to the wider PA literature and the suggestion of a dose-response relationship between activity or movement or steps such that being active (increasing number of steps per day) is preferable to being inactive or sedentary (and completing a smaller number of steps per day).^{81–84}

It is worth noting that the greatest health benefits are typically associated with transitioning a previously sedentary individual to a more active lifestyle. With so many adults insufficiently active, greatest health gains may be associated with the promotion of movement as an increase in number of steps beyond the inactive starting point. Such an approach may

be eminently more sensible than simply linking benefit to generic PA guidelines, or even step count guidelines as a minimum.

A focus on increased movement may provide the greatest effect on current lifestyle practices dominated by reduced movement in the form of low levels of habitual PA and an environment supportive of reduced daily energy expenditure.⁷⁸ A major public health challenge is to encourage a largely sedentary population to increase daily movement counts and as a consequence improve health status.⁸⁵

Tudor-Locke has been one of the main champions of increasing PA or movement using number of steps per day as a benchmark and alternative to PA guidelines.^{86–89} In generic movement terms, objectively counting the number of steps (commonly using a pedometer or accelerometer) provides a useful approximation of daily PA volume; however, there is widespread discrepancy in the step counts reported. Like generic PA guidelines, step counts have been framed as “how much is enough for health” (ie, number of steps per day rather than simply encouraging an increase in steps above a baseline or minimal level for an individual). The literature is replete with such articles for children, adolescents, and older adults.^{86,87} Step counting has more recently been used to define a sedentary lifestyle based on increasing evidence of poor cardiometabolic and body composition health markers in adults who accumulate <5000 steps/day. However, to date, there is insufficient evidence for a step-defined index in children and adolescents.⁸⁸

It is logical that step-based recommendations be consistent with public health PA guidelines; however, there is considerable confusion in this space. The consensus message that “some PA is better than none” may be easier to promulgate if we express engagement in PA in terms of all movement being useful. Accordingly, a simpler and more common sense notion regarding movement would be to suggest that for population health, everyone move more! There is considerable evidence to suggest that metabolic benefits are derived if adults break up extended bouts of sitting with movement.⁹⁰ For encouraging a reduction in sedentary behaviors and increase in movement, Tudor-Locke and Shuna's call to “walk more, sit less, and exercise” is eminently sensible.⁸⁹

The detrimental effects of inactivity can also be illustrated by examples of transitioning to various forms of physical inactivity including bed rest, increased sitting time, reduced daily activity, and resultant rapid decline in metabolic health.⁹¹ Flipping such transitions to increase *movement at every opportunity*, including in movement-limited individuals, has the potential to arrest health declines, or ideally, achieve progressive increase in health and physical function.

It is also important to realize that health improvements are possible in habitually sedentary individuals with relatively small increase in movement and certainly well below recommended levels of PA.⁹² The power of such a message should not be underestimated given the significant proportion of the population whose levels of movement or activity are very low.^{93,94}

Increasing evidence suggests that sedentary behavior may be associated with increased CVD and overall mortality; however, PA guidelines do not typically contain information specific to sedentary behavior.⁷⁵ Where public health guidelines incorporate generic statements with respect to sedentary behavior, for example in Australia and the United Kingdom, they state that adults should minimize the amount of time spent being sedentary (sitting) for extended periods.^{76,95} However, there is insufficient evidence to be more specific regarding the strength of the association. It is important to note that increasingly moderate-to-vigorous PA, physical inactivity, and sedentary behavior are being considered separate behaviors with unique determinants and health consequences. As the field becomes more sophisticated, greater confusion is possible regarding terminology, particularly among the general public. Therefore, we contend that a greater emphasis must be placed on simple and straightforward messaging such as moving more.

The Current Platform for PA and Exercise Messaging, Assessment, Counseling, and Prescription

The merits of routine PA or exercise participation or both for primary and secondary prevention of various chronic health conditions are indisputable. Numerous global and national health authorities, such as the World Health Organization (WHO),⁵⁷ the US Department of Health and Human Services,⁷⁰ the Public Health Agency of Canada (PHAC),⁹⁶ and the Australian Government, Department of Health⁷⁶ have adopted recommendations of 150 minute/week moderate (or 75 minute/week vigorous) intensity PA. Additionally, many such agencies, including the US and Australia, advocate that adults limit sedentary behavior time.^{76,97} These evidence-based guidelines were developed following scientific support for a dose-response relationship between PA and improved health outcomes, wherein the benefits of PA are accrued at the 150 minutes of moderate-intensity PA threshold, with the greatest health benefits observed among previously sedentary or inactive individuals participating at moderate and vigorous exercise intensities.^{36,37,64,98,99}

More recently, an increasing body of evidence has challenged the contention that 150 minutes of moderate-intensity PA is needed to achieve marked health benefits.^{36,66,100–102} Specific arguments point to the observation that dichotomous thresholds may only be realistic among those who are currently engaged in these levels, and rather, create unnecessary barriers to PA participation particularly among those who are inactive or may benefit the most from *any* PA engagement. To put this into perspective regarding current PA epidemiology, the average US adult engages in an estimated 90–102 minute/week of moderate-intensity PA, with only 49% of the population meeting PA recommendations.^{103–105} Likewise, only 37% of the US older adult population aged 65 years and above report engaging in at least 150 moderate-intensity PA or 75 minutes of vigorous activity.^{101,106} Given that PA recommendations for most older adults are the same as they are for younger and middle-aged adults, there is general agreement in many^{66,68,107} but not all aging studies^{108,109} that PA recommendations are set too high.

Along these lines, national surveillance systems have dichotomized participants as being active vs inactive or insufficiently active, according to whether adherence to 150 minutes moderate-intensity PA or a similar upper threshold of PA across a population is met; moreover, doing small bouts of activity, even at low doses, often is discredited in younger populations or overlooked in older populations.¹⁰⁶ The benefits associated with activity levels lower than 150 minutes of moderate-intensity PA appear to be particularly important to older populations^{50,62,66,68,110,111} and among those with musculoskeletal, pulmonary, psychiatric, and neurological disorders,^{38,49} as well as in cardiac rehabilitation patients.¹¹² Other studies have also suggested that several bouts of smaller doses of 10–15 minutes of exercise per day, totaling volumes half of or less that current recommendations, are associated with significant improvement in health outcomes (ie, CVD and total mortality)^{38,49,66} and better measures of quality of life (ie, more energy, better physical function and sleep, and improved cognition).^{38,113} Additionally, substituting sedentary time with short bouts of moderate-intensity PA throughout the day may bestow greater benefits among individuals with substantial disease burden or in older adults or both.^{36,68,114} As such, breaking up total PA, by virtue of engaging in more frequent bouts of movement, may be an ideal goal in vulnerable populations and a more reasonable target for those transitioning from an inactive or sedentary lifestyle.

Promotional messaging within current PA recommendations has included “some PA is better than none”⁷⁰ in the 2008 Guidelines, with similar positive messaging found in UK’s “Change4Life campaign,”^{105,115}

Singapore's "PA Program,"¹¹⁶ and Australian Department of Health's "Make your move, sit less, be active for life" campaign.⁷⁶ However, these examples of messaging designed to be motivational and encourage activity appear to be lost in translation when followed by an arbitrary threshold of 150 minutes of moderate-intensity PA "to achieve most health benefits."⁷⁰ A review by Ding et al¹¹⁷ further noted that the use of overexaggerated text in the literature including "should, must, only, better or best approach to longevity" contributes to the somewhat confusing PA messaging for the general public. Further, despite impressive clinical evidence showing benefits of PA on premature mortality and various chronic health conditions.^{36,49,66,67} PA counseling by clinicians in a primary care setting remains inadequate. A recent review of physician-directed PA counseling showed that only about a third of patients reported receiving PA counseling by their primary care physician (PCP).¹¹⁸ One could assume that for many in public health and clinical care communities, PA is still considered to be a personal choice, and place it as a lower priority when consulting patients on their health status.¹¹³ Time constraints and case overloading are other explanations as to why PA and other lifestyle prevention measures may not be adequately discussed with patients. Similarly, when PA is discussed, conversations are generally unidirectional, and physicians often default to the common guidelines in their messaging (ie, 150 moderate-intensity PA minute/week), with little discussion on how a patient is perceiving the message or meeting PA goals. Figuratively speaking, if PA were a pill, physicians would be more compliant with prescribing (and discussing) PA with their patients, and individuals would not struggle as much with taking the recommended dosage every day. However, PA is not a pill nor a quick fix, and compliance and adherence to a PA "prescription" relies on both adequate counseling by a physician, reciprocated with feedback by the patient.¹¹³ In fact, physician-guided PA plans appear to have profound effects on behavior change, as 1 study reported that the number of patients who improved their PA level increased by 50% after receiving physician advice.¹¹⁹ Given that on average, 84% of Americans consult a health care professional each year (with 53% being a PCP),¹²⁰ primary care practice appears to be the ideal setting, and most cost-effective strategy for physicians to make a cumulative effect on individual health. This reliance on PCPs to counsel on PA, and the push for more efficient, translatable PA messaging, is desperately needed to encourage people to develop a habitual pattern of PA for improved health promotion and quality of life.

In conclusion, it is beyond question that PA provides the "best health bang for the buck";¹²¹ yet current campaign strategies appear to have created larger gaps in the knowledge translation and dissemination of PA

recommendations to the public. Although dichotomous thresholds (eg, 150 moderate-intensity PA minutes/week) are instructive, and play a role in initial PA promotion, they are generally ineffective in informing individuals that “some PA is better than none.”^{70,76} Importantly, threshold messaging neglects other core fundamentals of goal theory, which suggests motivating individuals on behavior adjustments should include specific, measurable, attainable, realistic, and time-managed goals to encourage long-term sustainability and compliance.^{122,123} In turn, a paradigm shift in PA guidelines that move away from threshold messaging is urgently needed. Perhaps modifications to current PA recommendations that emphasize health benefits at lower doses can be achieved. For example, 90 minutes of exercise, at any volume, may be more feasible and realistic for the general population.^{44,63,67,68,105} This gradual and progressive form of messaging may also improve perception of PA and adherence to a routine activity plan.¹⁰⁵ Moreover, given that older adults are most vulnerable to multiple chronic diseases, and account for a majority of health care expenditures (eg, approximately 66% of the healthcare budget in the US¹²⁴), the diffusion of age-appropriate messages that emphasize lower doses of moderate-intensity PA may encourage older adults to include habitual PA in their daily activities.⁶⁸ Other modifications to the current guidelines may include guidance on how to displace sedentary time with light activity into routine lifestyles. Some research suggests incorporating lighter-intensity activities, with a greater emphasis on other domains of aerobic activity (eg, transportation, occupation, and household activity). However, a foreseeable caveat to this strategy is that people will commonly only strive for the bare minimum and will not challenge themselves to go beyond this.¹²⁵ Perhaps a better focus would be to create more “generic” guidelines that emphasize positivity such as “‘just move a little more’; ‘do as much as possible’; ‘move more, sit less’”, augmented with more specific “measurable” smaller goals that are individualized to a person's current status, and adaptive as status improves. Along the same lines, improvements in clinical practice are also needed, such that there needs to be a greater push for clinicians to facilitate the conversation about PA to their patients, rather than cite guidelines verbatim without any discussion. Counseling on strategies to include PA into daily life and incorporating patient-specific PA goals is an ideal prescription plan that is likely to be mutually beneficial and more cost-effective for clinicians and patients alike. Clearly, more research is needed to determine whether and how current PA guidelines influence general public perception of the PA and whether this drives behavior change in the general population, before policy-level changes in nonthreshold PA messaging are disseminated.

Nonetheless, to create a stronger, more sensible physically active culture, current guidelines will likely need to evolve by including more translatable, goal-oriented “small-step” messaging that encourages individuals to increase PA levels, rather than follow an “all or nothing” principle. Certainly, more motivated individuals may be able to seek goals, such as 10,000 or even 15,000 steps per day or 50 or 100 PAI per week; however, some would say that those with higher levels of motivation are probably already achieving higher levels of PA, and those who are at lower natural levels are more in need of the encouragement discussed in this review.

Reframing the Movement Conversation

Lower health literacy increases the risk of exhibiting faster physical decline over time among older adults.¹²⁶ However, if health literacy is broken down to its components, ideas surrounding physical literacy can be explored as a means to increase practitioners' ability to engage in bidirectional conversations that elucidate contextual evidence from patients to increase not just PA, but also, and more importantly, an individual's movement throughout their day. [Despite a lack on consensus] the current definition of physical literacy is an alternative to “physically educated”¹²⁷ and allows for a more holistic approach for the individual's real life, not just their gym and exercise life.^{128,129} Characteristics of physical literacy include, but are not limited to, motor skills, cognitive skills, PA, physical fitness, value of physical fitness, motivation, confidence, interaction with others, perception of environment, and responsibility.¹³⁰

Owing to the prolific nature of technology and the language associated with activity, particularly step trackers, social media, television, and radio advertisements, everyone knows they “should” be getting exercise or PA. However, the “how” to increase PA is unattractive or elusive for some patients. Comprehensive discussion of the multitude of reasons for “why” people do not increase their activity levels is beyond the scope of this article. More importantly, people have yet to fully embrace the idea that “all movement is good movement.” An example of technology encouraging movement was the burst of movement individuals and researchers witnessed with the introduction of Pokémon Go.¹³¹ “Players who used to be sedentary benefited the most from Pokémon Go. The game can be used as a starting point for sedentary people to begin an active lifestyle. The effect of Pokémon Go on PA can provide insights to public health workers in using novel strategies in health promotion.¹³¹” While the effects of getting people to move more throughout their day only seemed to last for

6 weeks,¹³¹ the phenomena revealed the power to get people moving more if they are asked to do things they enjoy, rather than being prescribed a set number of hours or steps in a day. The notion of capitalizing on the things people enjoy doing that may increase their movement throughout the day is particularly important and relates to a key, as yet to be measured aspect of physical literacy, motivation. Physical literacy is not just the knowledge of PAs combined with the ability to execute those activities but also includes an individual's motivation to engage in PA.¹³²

Yet, the complexities why individuals do not or cannot achieve the recommended guidelines on PA are far too varied and individual to include here.¹³³ However, unlike a static article, practitioners are uniquely positioned to begin bidirectional conversations with their patients not only to educate them on the how much PA they “should” be getting but also to assess where exactly the patient is getting PA, and how they might extend that movement first.

If practitioners want to help patients with their understanding and appreciation of and motivation to engage in PA, they must first find out the patient's existing knowledge of PA and movement. However, these kinds of conversations are not necessarily interview questions that occur, such as “how many steps do you take in a day?” The conversation that evokes the most response is one that asks directed open-ended questions. Motivational interviewing strategies could be helpful here, but in recent studies conducted at Jesse Brown VA in Chicago, IL,¹³⁴ where physicians were recorded by patients, the questions were rarely open-ended and only evoked limited responses that could not address the patient motivation.¹³⁵ For example, an essential and ethical care component for patients with heart failure should be an ongoing assessment of their experience of the situation that they live with.¹³⁶ These details or context clues are exposed when a bidirectional conversation occurs that may lead to ideas for increased movement. Practitioners must be active in their pursuit of information from the patient; they cannot wait for patients to offer the information. As Schwartz et al¹³⁷ point out, “In encounters where addressing patient contextual factors may play an important role in care decisions, factors that are elicited actively by the provider are more likely to be incorporated in the care plan than factors revealed spontaneously by the patient.”

Conversations that occur with the staff checking the patient in, paperwork the patient fills out, information gathered by the nurses before seeing the doctor could all include an open-ended question or 2 that would allow practitioners to have a better understanding for the context¹³⁸ of the patient's life. There are many points along in a visit that to seeing the

physician could collect contextual information about how much a person moves throughout their day, rather than looking for how much time the person spends sitting. Small things like getting the mail and walking down their stairs could be counted in a manner that both acknowledges some movement and begins to set a plan for an individual to expand on what they are already doing.

Visualizing a New Movement Portfolio

A strong case can be made for reframing how individuals are encouraged and counseled to increase their daily PA; a message of all movement is good for you is scientifically sound. We present a new way to visualize all aspects of one's movement portfolio in the [Figure](#). There are several key components of this graphic that warrant recognition: (1) a circular pattern does not give credence to any one form of movement over another, giving an individual flexibility in how they choose to begin moving more and increase movement over time and (2) the center of the circle, depicting no movement on a daily basis is red, a color that denotes the importance of not emulating this pattern. However, moving outside of

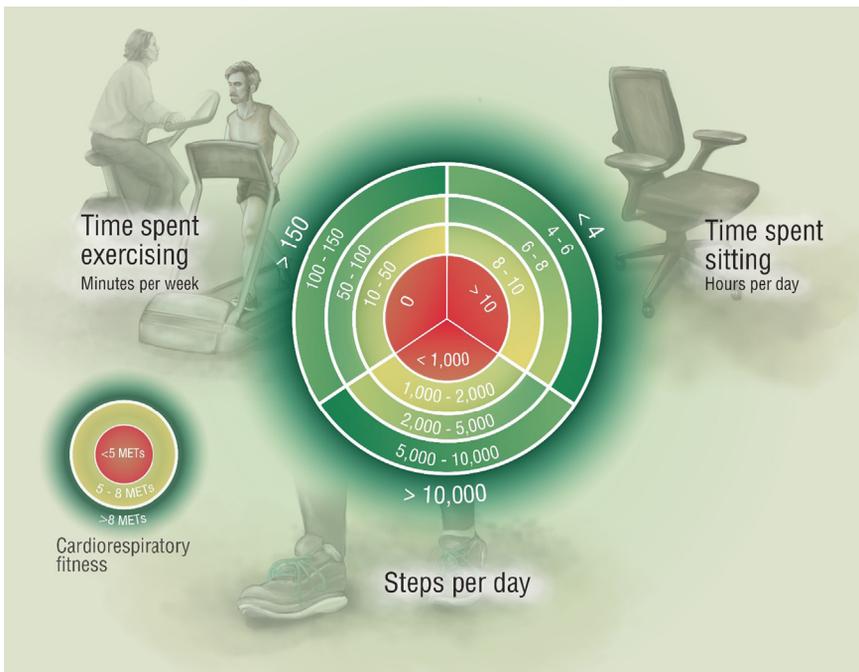


FIG. A newly proposed model for assessing and tracking movement.

the center, there is an immediate transition to varying shades of green, becoming darker as the circle fills. This highlights the fact that any level of movement is highly beneficial, moving away from the dichotomous all or none message (ie, 150 minutes or more of moderate-intensity PA per week and 10,000 or more steps). Although these are goals all individuals should strive for, any adoption of moving more should be celebrated and aligned with the body of evidence demonstrating the incremental(?) health benefits derived from continually increasing movement toward ideal levels. (3) There is a side circle for CRF, when data are available as the independent prognostic value of CRF is undeniable. A low CRF should prompt a more aggressive approach to increasing one's movement portfolio to increase CRF and referral to a health professional with advanced expertise in exercise prescription should be considered in those with a low CRF—low movement phenotype as they are at greatest risk for poor health outcomes.

Conclusions

As we necessarily move to a proactive, preventive health care model, we must reconceptualize how we evaluate and treat conditions that pose the greatest threat, namely chronic disease. There is a robust body of evidence supporting the premise of *movement as medicine*. Our hope is the new model proposed in the current perspectives paper is considered a viable approach to promoting more movement and thereby enhancing health outcomes.

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The prevention of chronic diseases such as, cardiovascular diseases (i.e., heart attacks and stroke), are paramount in the today's health care. It is known that physical activity plays a major role in the management and prevention of cardiovascular diseases. The approach, from public health messaging to the individual patient, as to how physical activity and exercise is prescribed it should be improved in order to achieve the final goal of increasing the chances that an individual patient *moves more*.

Several perspectives can be taken from these interesting manuscripts.

First, moving more throughout each and every day is now considered a vital issue of one's personal healthcare plan. Moreover, exercise is a therapy. The risk of adverse events with physical exertion is extremely low, however there is a risk in individuals that are sedentary and have poor health. The latter should undergo additional tests and assessments prior to initiating a movement or exercise plan, particularly those with active signs and symptoms of chronic disease.

There is a strong case to reframe how individuals should be counseled to increase their daily physical activity. Thus, the authors present a new way to visualize all aspects of one's movement portfolio (Figure 1). This portfolio has several key components 1) Flexibility in how an individual choose to begin moving more and increase movement over time; 2) Any level of movement is highly beneficial 3) A low cardiorespiratory fitness (CFR) should prompt a more aggressive approach to increase an individual own exercise and a referral to a health professional with expertise in exercise prescription in order to improve health outcomes.

I want to thank the authors for these two excellent manuscripts on physical activity and its prescription and I hope the readers of the Journal will find a very helpful guide of the different aspects of exercise and its importance in improving cardiovascular risk.
