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HEALTHY AGING RESEARCH

Impact of government-sponsored nutrition education and physical activity programs on healthy aging in the United States

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Abstract

With the population of individuals over the age of 65 years expanding, the health of America's aging population is of increasing concern. Preserving the physical wellbeing of this group is a critical part of minimizing aging-related health care costs and maximizing individuals' quality of life. Nutrition education and physical activity programs have been shown to improve health measures such as nutritional status, mobility, and balance skills, which can help prevent chronic disease and enable elderly individuals to remain independent. Government-sponsored programs can potentially integrate nutrition and activity programs into pre-existing systems, such as meal delivery and assistance programs, in order to make them accessible to vulnerable aging demographic populations, both at home and in group settings. These programs must be periodically assessed in order to determine the areas that may need improvement. Programs funded by the government have the capability to reach highly vulnerable populations and improve their quality of life, as well as their ability to live independently for longer periods of time. A review of nutrition education, counseling, and physical activity programs demonstrates the effectiveness of these age-targeted programs and indicates the benefits of such combined programs on participants' health and wellbeing.

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Introduction

As the aging population continues to grow in the United States, keeping the elderly healthy and independent is a major healthcare priority and an important challenge. The United States Census Bureau predicts that people aged 65 years and older will account for 16.87% of the population by 2020 and will only continue to grow, reaching 20.62% by 2030 [1]. This shift in population demographics means there are now 44.7 million individuals aged 65 years and older in the U.S., and while this segment grew by 24.7% between 2003 and 2013, it is expected to double by 2060. Life expectancy in the U.S. is increasing, with people reaching the age of 65 now expected to live an additional 19.2 years [2]. However, this is still a shorter predicted longevity than that of other developed countries including Japan, Australia, and the United Kingdom, highlighting the urgent need to determine effective programs to prevent chronic diseases of aging, protect the wellbeing of the aging population, and promote healthy lifestyles [3].

Although people are living longer lives on average, fewer than half of people aged 65 years and older self-identify as being in 'excellent' or 'very good' health. The most common ailments in this age group are arthritis (49%), heart disease (31%), cancer (25%), diabetes (21%), and hypertension (71%), and many individuals report having multiple comorbidities [2]. Heart disease remains the primary leading cause of death. Diabetes is the sixth greatest cause of death overall, but fourth greatest for black and Hispanic populations, indicating the need to focus on

behavioral lifestyle changes that can help prevent or mitigate the effects of such disease [3,4].

While few individuals report certain known negative health behaviors—only 9%, for example, identify as cigarette smokers, and 7% state that they consume excessive amounts of alcohol—diet and exercise tend to be neglected [2]. Between 2007 and 2008, the diets of those aged 65–75 were evaluated by their comparison to the Healthy Eating Index 2005, and received an overall average score of 66 out of 100 (100 representing a diet that would completely meet the recommended intake for a given category). Though this age group consumed an adequate amount of whole fruits, meat and beans, and total grains, low scores indicate they consumed significantly inadequate amounts of vital dark green and orange vegetables (score of 36 out of 100), whole grains (32 out of 100), and milk (58 out of 100), and excessive intake of sodium (32 out of 100), saturated fat (59 out of 100), and calories from solid fat, alcohol, and added sugar (59 out of 100) [3]. The National Report Card on Healthy Aging reports that 41.8% of adults aged 65 years and older consume at least two daily servings of fruit, while only 29.6% consume at least three daily servings of vegetables [3]. Healthy eating is critical for elderly populations as healthy eating measures are consistently associated with lowered rates of cardiovascular disease, cancer-related mortality, and all-cause mortality in elderly populations [5, 6]. Diet quality is also tied to weight status; currently, more than one third of people aged 65 years and over are obese, compared with 22% in the late 1980s, indicating a dangerous weight trend [3].

Although physical activity is beneficial for mental health, improves quality of life, and minimizes the prevalence of chronic diseases, physical activity decreases with age; only 14% of those aged 65–75 years met the 2008 Federal guidelines for activity [3]. People over the age of 65 years spend approximately half of their waking hours participating in leisure activities, yet only 3–4% of that leisurely time is spent actively exercising; more than half is spent watching television and being sedentary [3]. Physical limitations become a barrier for elderly individuals to participate in active physical activity, with 23% reporting ambulatory issues. When assessed via their ability to perform activities of daily living (ADLs), 33% of community-dwelling individuals aged 65 years and older who receive Medicare reported issues with at least one ADL [2]. These findings indicate the need for programs to incorporate appropriate, modifiable forms of physical activity that are tailored to their age group to help prevent the development or worsening of physical ailments.

The Administration on Aging reports that 97% of elderly individuals have access to a regular medical care provider, but healthcare costs account for 12.2% of their expenses [2]. Medicare is a major source of support, with 93% of non-institutionalized individuals reporting that they rely on Medicare coverage for part of their insurance, and 54% also relying on private companies. Government assistance or externally funded programs can play a major role in the health of the aging population as financial circumstances are often tight; 86% report reliance on Social Security, 51% rely on personal assets, 27% receive pensions, 28% continue to earn money, 14% receive government pensions, and 9.5% live below the poverty line. [2]. Multi-dimensional programs, which provide nutrition education and nutrition counseling combined with physical activity, can be cost effective [7]. Medicare coverage is limited, covering long-term hospital stays, nursing care in nursing facilities for up to 100 days, certain home health care benefits, and hospice care, but not long-term daily living (custodial) care [8].

Programs that promote healthy lifestyles may prevent chronic diseases and therefore should be among the priorities of any national policy. The impact of these programs on older adults' wellbeing needs to be periodically evaluated and modified accordingly. Several studies have shown that programs combining nutrition education and physical activity have produced positive outcomes. Assessing different demographic groups to understand the appropriate nutrition education and counseling strategies for each group can improve seniors' health and wellbeing. This paper aims to review some of these programs, specifically those providing nutrition education and age-appropriate physical activity, and to evaluate their outcomes. The programs of primary focus include those sponsored by the federal government which are available to all qualified citizens.

Government-sponsored programs in the United States

In 1965, the Older Americans Act (OAA) was passed to support the aging population of the United States through community engagement, development of a steady support system, and promotion of health and wellness. Title III of the OAA funded the Aging Services Network, which targets those most at need of assistance, and provides services such as transportation, case management, and support for caregivers [9]. Through the OAA Nutrition Program (NP), the Aging Services Network funds the distribution of nutritious meals, utilizing a Home and Community-Based Service (HCBS) system, meaning that it delivers services to both locations to support health promotion, combat food insecurity, promote wellness, and provide social interaction [9]. Food distribution is generally coordinated by State Units on Aging (SUAs), operationally developed by Area Agencies on Aging (AAAs), and implemented by Local Service Providers (LSPs) [10].

According to the Administration for Community Living [11], 2.3 million elderly individuals benefit from this service, and 62% receive assistance within their own home. Meals can also be distributed in a congregate method to groups of individuals in senior and community centers, and both nutrition education and counseling are offered when possible [9]. Recipients of federal assistance are high-risk individuals; 45% of congregate recipients and 63% of home delivery recipients have six or more medical issues, while 44% of congregate and 62% of home delivery recipients take at least five daily medications [9].

Evaluations of these nutritional services indicate a high quality of care, with 93% of LSPs serving congregate meals and 87% serving home-delivered meals, 77% offering nutrition education, 52% performing nutritional screening and assessment of participants, and 28% providing nutritional counseling services [10]. More than half of the AAAs and LSPs also utilize nutritional professionals for nutrition education (58% and 64%, respectively), and nutritional counseling (76% and 52%, respectively) [10]. Approximately two-thirds of LSPs also offer modified diets for specific medical restrictions, with 42% offering low-sodium meals, 24% diabetic-appropriate meals, and 10% meals with modified textures. One weakness of the program, however, is that meals are rarely delivered on weekends (only 12% of LSPs report weekend delivery) [10].

Additional nutrition-related services include the Commodity Supplemental Food Program, which provides food to almost 600,000 low-income individuals aged 60 years and older in the U.S., and the Child and Adult Care Food Program, which funds free and reduced-cost meals to eligible adult day care centers that are not live-in facilities [12,13].

Analysis of nutrition and physical activity program outcomes

Providing nutritional services and physical activity programs to the elderly population appears to improve the quality of life and overall health of participants, although outcome analysis of such programs can be difficult to quantify. A broad review of 80 journal articles focusing on the concrete effects of home meal delivery programs found that the majority of these reports were descriptive in nature, providing information such as dietary self-report rather than actual nutritional outcome measures [14]. In general, individuals receiving home-delivered meals were considered more vulnerable but were less likely to be admitted to a hospital than similar individuals who did not receive assistance; this may indicate that nutritional deliveries preserve health status even among at-risk groups [14]. This is mirrored in surveys of recipients of both congregate and home-delivery meals; respectively, 75.3% and 83.6% report eating healthier as a result of the food being delivered, 83.1% and 90.4% feel better because of the meals, 86.3% and 85.5% feel that it helps them continue to live independently, and 68.4% and 92.2% report that it is helping them to stay in their own home, a preferred living situation [11].

Several studies have also shown that home-delivery meal programs improve health markers such as nutritional status, anxiety, and loneliness [14]. In a focused review of eight studies examining home-delivery programs, six studies found significant improvement in key domains including quality of diet, regularity of intake, intake of nutrients, and decreased nutritional risk [15]. Examination of diets using

NHANES 2003–2012 data found that participation in home-delivery meal services increased intake of nutrients such as magnesium, potassium, selenium, calcium, and sodium, as well as both protein and fiber, but not overall energy [16]. Additional studies included in the Campbell review examined the modification of home-delivered meals, such as incorporating nutrition education or expanding food options, and all found improvements [14].

The United States Department of Agriculture (USDA) provides funding for nutrition education programs to provide information on caloric balance, daily physical activity, and the consumption of fruit, vegetables, whole grains, and low-fat dairy, using a variety of methods including social marketing campaigns and more traditional educational programs. A review of money allotment found that increased funding of such programs is tied to decreased Body Mass Index (BMI) and a decreased rate of overweight [17]; however, the general trend is not necessarily mirrored uniformly across all campaigns. In a one-year randomized controlled trial of mostly overweight and obese elderly individuals with hypertension or hyperlipidemia, daily receipt of a Dietary Approaches to Stop Hypertension (DASH) meal was not correlated to a significant change in BMI, energy intake, or percent of energy needs actually consumed [18]. However, other studies that had added interactive components, such as cooking demonstrations, show promising results. Researchers offered a group of congregate meal recipients nutrition education and counseling, including cooking demonstrations, group discussions, and informational handouts, and a group of home-delivery meal recipients received the educational handouts and telephone-delivered counseling. Those receiving education and counseling had improved nutrition risk, along with non-significant improvement in the number of meals consumed, and fruit and fresh vegetables consumed [19]. A study of high-risk elderly individuals participating in government-sponsored programs found some stratification of diet quality based on factors such as race, gender, marital status, and educational background; for example, Asian populations and college-educated individuals were more likely to consume healthy diets, and married participants were more likely to consume at least two meals a day [20].

Nutrition programs are frequently integrated into physical activity programs, and these are also crucial for the aging population. A 2012 Cochrane Review of programs aiming to decrease incidence of falls in the elderly—a major health concern among the aging—found that multiple-component group exercise programs significantly reduced both the rate and risk of falling, and Tai Chi programs significantly reduced the risk of falling though not the rate [21]. A review of ten Pilates-based programs found that Pilates training had positive effects on walking ability (effect strength, ES = 1.30), muscle strength (ES = 1.39), quality of life in terms of both daily activity and moods (ES = 0.94), and dynamic balance (ES = 0.77), as well as smaller but noticeable improvements in static balance (ES = 0.34), flexibility (ES = 0.31), and cardio-metabolic conditions (E = 0.07) [22]. While the improvements in walking, strength, and balance during motion are promising, effectiveness was limited in studies lasting five weeks or fewer, as well as home-based studies without extra equipment [22]. Further research also supports static and dynamic balance among women, in particular [23].

Other programs focusing on factors such as walking frequency and mobility measures can also improve other health measures. A pilot study as part of OAA's Eat More Move More initiative provided individuals aged 60 years and older with wristband activity trackers, weekly 45-minute nutrition education and activity lectures, and a weekly 30-minute walk. Though steps-per-day initially increased sharply, they fell slightly during the second half of the study, resulting in a non-significant increase in activity overall (week 1 [$M = 3128 \pm 2262$] to week 11 [$M = 3768 \pm 2590$]). However, there was a significant increase in Timed Up and Go (speed of standing up from a chair, walking a short distance, and walking back to the chair to sit ($M = 7.86 \pm 1.29$ versus $M = 9.44 \pm 1.66$, $p < 0.001$), and a decrease in waist circumference in inches ($M = 41.8 \pm 3.83$ versus 40.6 ± 4.21, $p < 0.009$) [24]. A 12-week study of community-dwelling individuals tested the effects of twice-weekly sessions of warm-ups, strength training, and balance training along with nutritional interventions examining meal records, personal needs, and meal patterns, followed by six months of home exercise after such training. Participation in physical training was tied to a near-significant increase in

walking duration at both a first follow up ($p < 0.08$) and a second follow up ($p < 0.06$). Personal ADL improvements were correlated to this increase in walking duration ($r = 0.36$), walking frequency ($r = 0.42$), number of occasions of home-based exercises ($r = 0.52$), and months of home-based exercise ($r = 0.50$) [25]. However, impact on cardiovascular improvement is mixed and may be activity-specific; reviews of Pilates indicate minimal impact, but community-based nutrition and activity programs have seen improvements in female blood pressure and pulse rates [22, 26]. Alternate methods of increasing heart rate should also be explored. For example, 15 minutes of participating in an active Wii™ bowling video game has been shown to raise elderly participants' heart rate to the appropriate level (69% of maximum heart rate), as moderate physical activity should [27].

Conclusions

Despite the challenges associated with quantitatively evaluating programs for the elderly, review of nutrition and physical activity-focused programs shows overall positive effects. Programs funded under the OAA have the capability to reach highly vulnerable populations and improve their quality of life, as well as their ability to live independently for longer periods of time, which would ease the burden of an increasingly aging population. Nutritional deficiencies and physical decline can contribute to poor quality of life, increased risk of falling, and increasing health issues, all of which increase health care costs in the form of hospital care, medications, nursing facilities, skilled practitioners, and rehabilitative care.

Government-funded home and community-based services provide an opportunity to deliver nutritional education and appropriate physical activity to aging populations in need of health preservation. Low-impact activities such as Pilates and Tai Chi can increase heart rate and improve stability without high risk of injury, while nutritional education and delivery of nutrient-dense foods can provide high-quality food throughout the week. Further research should examine the long-term effects of related programs, examining prevention or management of diseases, longevity, mobility, nutritional status, BMI, and participants' ability to remain independent as time progresses during or after long-term programs.

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