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Developing an exercise program for healthy aging

Charles Blum

Narrative: Healthy aging depends on sustained physical activity that preserves function, independence, and quality of life. This narrative review examines principles for developing individualised exercise programmes integrating aerobic activity, resistance training, flexibility, and balance. Drawing on published literature and clinical considerations.

I describe the cardiovascular, metabolic, cognitive, and musculoskeletal benefits of regular exercise, including maintenance of muscle mass, bone health, joint mobility, and capacity for activities of daily living. Particular emphasis is placed on recognising asymmetries in strength and flexibility and modifying exercise to address individual limitations rather than applying uniform routines. Obesity and generalised joint hypermobility illustrate the need to adjust exercise priorities: aerobic activity supports metabolic health and weight management, whereas hypermobility warrants greater attention to strength, neuromuscular control, and joint stability. Gradual progression, sustained participation, varied activities, and cautious stretching are advocated to support safe adaptation.

Periodic reassessment enables programmes to evolve with changing health status and functional goals. An individualised, adaptable approach to exercise offers a practical strategy for maintaining resilience and promoting healthy aging throughout life.

Indexing terms: Chiropractic; aging/ageing; exercise; health; fitness.

Introduction

Developing a healthy lifestyle is important for healthy aging. The choices we make today will affect our health, capacity to function, and ability to enjoy our lives as we age. While there are many aspects of a healthy lifestyle (not smoking cigarettes, having a healthy weight, limiting alcohol intake, partaking in a healthy diet and lifestyle, etc.) this article will focus on one of the most important of these, exercise. (1)

'... Building healthy exercise programs should include not only aerobic, strength, and flexibility training, but also balance training and symmetrical dexterity practices ...'

Biological aging takes place regardless of what we do or don't do, however we can minimise the biological affects of aging with regular exercise. Regular exercise can '*increase active life expectancy by limiting the development and progression of chronic disease and disabling conditions*'. (2) There is also emerging evidence for

significant psychological and cognitive benefits accruing from regular exercise participation by older adults. Ideally, exercise prescription should include aerobic exercise, muscle-strengthening exercises, flexibility exercises, and balance training. For the purposes of this article, activities of daily living (ADLs) refer to essential tasks such as walking, climbing stairs, dressing, bathing, carrying objects, and maintaining balance during everyday activities.

Together, these forms of exercise help preserve cardiovascular health, muscular strength, mobility, and functional independence throughout the aging process. Being physically active in younger years translates into a higher likelihood of being both physically and mentally healthy as we age into our 80's, 90's, and even into our 100's. Ultimately this means as we age our quality of life and activities of daily living do not have to precipitously decline. (3, 4, 5, 6)

There are four important factors when considering the development of a healthy exercise lifestyle, and these include:

1. Performing aerobic, muscle strengthening, flexibility, and balance exercises;
2. Developing symmetry in muscle use and function-strength and flexibility;
3. Understanding your body type and what proportion of aerobic, strengthening, flexibility, and balance exercises should be performed based on individual strengths and weaknesses; and
4. Periodically reassessing your exercise program as your body, health status, and goals change over time.

Performing aerobic, muscle strengthening, and flexibility exercises

The evidence supports that participation in regular physical activity (both aerobic and strength exercises) elicits a number of favourable responses that contribute to healthy aging. Ideally the benefits associated with regular exercise and physical activity contributes to a healthier independent lifestyle, greatly improving the functional capacity and quality of our lives. (7) It is fairly evident that cardiovascular fitness is associated with decreases in cardiovascular disease risk. (8, 9) Along those lines, research demonstrates that regular physical activity can help reduce the cognitive decline associated with aging. (4, 6) More and more studies are supporting the notion that there is '*a strong biological basis for the role of aerobic fitness in maintaining and enhancing central nervous system health and cognitive functioning in older adults*'. (5)

Key takeaways for aerobic exercise

- Supports cardiovascular health and endothelial function (the ability of blood vessels to dilate and function properly);
- Helps maintain cognitive function and brain health;
- Assists with weight management and metabolic health; and
- Contributes to independence and quality of life as we age.

It is commonly understood that calcium and vitamin D supplementation along with weight bearing exercise are important for post-menopausal women to prevent osteoporosis. Currently the research supports that exercise as a means of preventing osteoporosis needs to be performed both frequently and sustained over the course of a lifetime. (10) The studies are showing that being consistent with nutritional supplementation and exercise can '*go far in preventing the development of this disorder*'. (11)

Osteoporosis and age-related muscle loss (sarcopenia) frequently occur together because bone and muscle function as an interconnected system. Muscles provide mechanical loading to bones during movement and exercise, helping stimulate bone maintenance and remodelling. As muscle mass and strength decline with age, bone density may also decrease, increasing the risk of osteoporosis, falls, and fractures.

While men are usually not concerned with osteoporosis as they age, skeletal muscle decreases in both men and women, particularly after the age of 50-60. While aerobic activity helps improve endothelial function, the ability of blood vessels to relax, dilate, and maintain healthy circulation, as we age and prevents cardiovascular diseases, regular strength training prevents the loss of muscle mass as we age. (12) Therefore sustaining an exercise friendly lifestyle that incorporates strength training improves muscle function and functional activities in men and women, even in subjects over 75 years old. (13)

Key takeaways for strength training

- Helps preserve muscle mass and strength;
- Supports bone health and osteoporosis prevention;
- Improves balance, stability, and functional capacity;
- Enhances the ability to perform activities of daily living; and
- Remains beneficial even when initiated later in life.

While strength and aerobics are important for health, the third part of this equation is flexibility. Some studies note that building strength can be accomplished in weeks to months whereas building flexibility takes months to years of regular stretching. Stretching of muscles is not something that can be performed quickly and adequate time is needed with stretching to develop the needed flexibility to help increase ranges of motion. (14, 15) Creating long term flexibility in muscles can be quite challenging. For instance one study found that '*long-term stretching (three weeks) increased joint range of motion as a result of a change in stretch tolerance rather than in the passive properties*'. (16) This means that while the subjects could tolerate the stretching the actual length of the muscle had not changed over the three-week trial period.

Clinically, long-term improvements in flexibility appear to require regular, sustained stretching performed over months and years rather than days or weeks. While strength and cardiovascular adaptations may occur relatively quickly, flexibility improvements often develop more gradually. Therefore, patience, consistency, and appropriate progression are essential components of an effective flexibility program.

Along with aerobic and strength exercises '*flexibility training should be incorporated into one's musculoskeletal program, as well as into the overall fitness program*'. (2) Just as strength training serves to preserve, protect and develop abilities related to the successful completion of activities of daily living, flexibility training is beneficial in that it develops and maintains one's ranges of motion. (2)

Key takeaways for flexibility training

- Maintains joint mobility and range of motion;
- May help preserve movement efficiency and comfort;
- Requires long-term consistency for meaningful change; and
- Should emphasise muscles and joints that demonstrate limitations rather than simply stretching all regions equally.

While it's important to perform aerobic, muscle strengthening, and flexibility exercises for our long term health, how we perform these activities is essential in order to gain the optimal effects.

Developing symmetry in muscle use and function – strength and flexibility

It is not uncommon for someone to say '*this is my stronger side*' or '*this is my more flexible side*'. Asymmetry of strength from one side to the other is commonly found since we all tend to have a dominant side, either right or left. Sometimes body use or imbalance will also cause asymmetry in flexibility from one side to the other or even greater flexibility in the flexor compartment of a limb (e.g. hamstring) versus the extensor (e.g. quadriceps). When attending exercise classes it is common that a standard group of exercises are taught with the goal of spending the same time on all muscles, with the goal of not favouring one side of the body. While this seems like a logical approach in general, we need to consider how this approach can lead to the perpetuating of our personal body asymmetries while exercising.

To optimise our exercise program it starts with us becoming aware of our own bodies, this can be aided by answering the following questions:

1. Assess asymmetry of our strength by asking 'Is one side of my body stronger than the other'?
2. Assess asymmetry of our flexibility by asking '*Is one side of my body more flexible than the other*'?
3. Assess asymmetry of the body from top to bottom by asking 'Are my arms stronger or more flexible than my legs'? and
4. Assess asymmetry of the body from front to back by asking a question such as, "Are the biceps in my arm as strong or flexible as the triceps in my arm?"

Developing an awareness of our own body can help us modify our strengthening and stretching exercise program to fit what our body needs. We may need to strengthen our weaker side by performing more repetitions or stretch a tighter side by extending the time we stretch that side. This asymmetry of exercise activity will help build better symmetry in how our body functions. Along

with classes or guidance that focuses on working the body equally, it is good to also do the extra asymmetrical strengthening or stretching as a means to build better symmetry and ultimately healthy aging.

Building healthy exercise programs should include not only aerobic, strength, and flexibility training, but also balance training and symmetrical dexterity practices. Balance is a critical component of healthy aging because it contributes to fall prevention, confidence during movement, and the ability to safely perform daily activities. Balance exercises can range from simple single-leg standing activities to more advanced dynamic movements and can often be incorporated into existing strengthening and flexibility routines.

Balance training

Balance training can easily be incorporated into an exercise program of strengthening and stretching. To help improve our symmetrical dexterity we can utilise lifestyle modifications, such as brushing our teeth with the opposite hand, using the opposite hand to hold a utensil, etc. Becoming aware of our body's preferences can help us develop personal exercise and lifestyle modifications that can enhance our body's function as we age. (17)

> Understanding your body type and whether amounts of aerobic, muscle strengthening, and flexibility exercises are evenly distributed or unequally weighted.

How might the individuality of our body type affect our aerobic, strength, and flexibility exercises? What body types dictate the type, amount, and proportion of exercise activities we should optimally perform?

Obesity and health

While there can be many factors utilised for directing the development of an exercise program, two major issues that should be considered involve conditions related to obesity or generalised hypermobility syndrome (GHS). (18) Understanding your body type can help determine how to balance the optimal percentages of aerobic, strengthening, and flexibility exercises.

> '*Obesity is a multifactorial disease that results from a combination of both physiological, genetic, and environmental inputs*' (19) and '*has become a major public health concern in the United States and the rest of the world*'. Obesity is associated with adverse health consequences, including type two diabetes mellitus, cardiovascular disease, musculoskeletal disorders, obstructive sleep apnea, and many types of cancer. (20, 21, 22, 23)

Even recent research is finding an adverse relationship between obesity and long-term brain function and cognition. (24) The good news is that the 'probability of developing adverse health outcomes can be decreased with maintained weight loss of 5% to 10% of current body weight'. (25)

While we may be aware that weight loss is important for our health, it is not an easy task to lose weight since there can be many psychological factors making the process challenging. This is usually the case with dietary modification so in some instances it may be easier to initially focus on exercise when starting a weight loss program since exercise may be a more important factor for weight loss than dietary control. (26)

Obesity and mitochondrial function

The mitochondria are the part of our body's cells associated with energy production and utilisation and are vital for maintaining metabolic homeostasis. (27) Current research '*strongly suggests that the lower mitochondrial capacity associated with obesity, type 2 diabetes and aging is not an irreversible lesion. However, weight loss does not appear to affect this response, even when the weight loss is extreme. In contrast, increasing physical activity improves mitochondrial content and perhaps the function of individual mitochondrion*'. (28) Advancing age and increased adipose tissue contribute to the development of sarcopenic obesity, a condition characterised by the coexistence of excess body fat and reduced muscle mass and function.

Weight loss solely related to dietary control does not tend to have an affect on sarcopenic obesity, whereas exercise does. (29) It is crucial to understand when performing the necessary moderate-intensity aerobic exercise program to facilitate weight loss that the process will take approximately six to twelve months to induce a modest reduction in weight and waist circumference. (30)

Benign joint hypermobility syndrome

Generalised joint hypermobility (GJH) is a hereditary connective tissue condition characterised by increased joint mobility beyond normal ranges, often accompanied by musculoskeletal symptoms, pain, instability, or recurrent injury. The syndrome has been under-recognised and has only recently been taken more seriously. (31, 32, 33) The research suggests that GJH may be found as a normal variant in 20% of the population with a greater prevalence in women than men. Those with GHJ have a tendency to prefer flexibility exercises (e.g., yoga) whereas those without commonly prefer strengthening exercises (e.g., weight lifting). An easy way to determine if you have GJH is if you give a positive answer to any two questions in the following five-part questionnaire: (18)

1. Can you now [or could you ever] place your hands flat on the floor without bending your knees?
2. Can you now [or could you ever] bend your thumb to touch your forearm?
3. As a child, did you amuse your friends by contorting your body into strange shapes or could you do the splits?
4. As a child or teenager, did your kneecap or shoulder dislocate on more than one occasion?
5. Do you consider yourself 'double-jointed'?

Individuals with generalised joint hypermobility should generally prioritise muscular strength, neuromuscular control, joint stability, and balance training. Flexibility exercises should be used judiciously and directed only toward areas that demonstrate true movement restrictions rather than routinely attempting to increase mobility throughout the body.

Flexibility training

Flexibility training involves important considerations such as which joints are best to focus on with our stretching? The type of joint and its function gives clues to this answer:

- Ball and socket joints such as the hip and shoulder generally need to maintain good flexibility for walking, balance, and upper body use;
- Hinge joints such as the knee and elbow usually are not a region we will need to focus for flexibility; and
- Saddle joints like the ankle and wrist are a bit complex due to the ankle joint being an important weight-bearing joint, whereas the wrist is not.

Most commonly we want to maintain adequate ankle forward bending (dorsiflexion) as a means to keep our Achilles tendon flexible for walking. Ideally we need to focus on maintaining good hip ranges of motion, good shoulder ranges of motion (particularly at the front of the shoulder), and good ankle dorsiflexion.

The spinal column is also an important region of the body to maintain flexibility but it is crucial to maintain a high degree of exercise awareness and caution in the process. With all spinal movements that involve flexion and extension and right and left lateral flexion or rotation the first concept with stretching should be to focus upon the feeling of our body lengthening. It is important that before we stretch the spine we initiate any motion by first attempting to lengthen our spine and then move as if we are using the whole spine, from head to tailbone, and not focusing solely on one segment or portion.

When considering a stretching program it is important to focus on the joints to determine where to best focus our attention and how to maintain a manner of stretching that will optimise the body and spinal column's health. But while joints are one region of focus for stretching, another is the muscles. There are many muscles of the body that need attention when developing a flexibility based exercise program and each body has its own patterns as well as symmetry issues. One important factor is that when stretching muscles it is important to feel the stretch in the muscle and not within the joint. For instance, when stretching the hamstring we don't want to over stretch the knee and hyperextend, or when we are attempting to stretch the hip joint we don't want to inadvertently overstretch the weight-bearing sacroiliac joint.

Strength training

Developing a general strengthening and stability exercise program is especially important for post-menopausal women and anyone with GHS, but also of value for healthy functioning in the general population. One important caution is lifting weights in a manner that overloads our sacroiliac joint, vertebral discs, and even the vertebral bodies. When beginning a strengthening program it is usually best to start with low weights and build up over time. This gives both your muscles, joints, and bones the ability to adapt to the new loads. It is also helpful to use activities that utilise your own body's weight or incorporate springs or stretch bands for resistance. One key factor to consider is that it is better to have an eclectic exercise program that uses different parts of the body in different ways so that the body is challenged differently each day.

When developing an exercise program it is important to determine if you need to focus on weight loss and/or a program that involves more stability versus flexibility training. If obesity is an issue then aerobics will be an essential part of a lifestyle exercise program. If GHS is a factor then you would want to limit excessive stretching and focus more on strengthening and stability training. On the other hand if you have reduced flexibility and ranges of motion you may want to limit your strength or stability exercises and focus more on stretching or flexibility training. Whatever type of training you find best for your body it is always a good idea to vary your activities so you are stimulating your myofascial, skeletal and neurological systems in a manner that will not cause repetitive trauma to your body over time.

Exercise priorities for healthy aging

Although exercise programs should be individualised, several general principles apply to most adults:

- Perform regular aerobic exercise to support cardiovascular, metabolic, and cognitive health;
- Engage in strength training to preserve muscle mass, bone health, and physical function;
- Maintain flexibility through consistent stretching focused on areas of restriction;
- Incorporate balance training to reduce fall risk and improve confidence in movement;
- Address asymmetries in strength and flexibility whenever possible;
- Modify exercise emphasis according to personal factors such as obesity, hypermobility, injury history, and mobility limitations; and
- Periodically reassess your program and adjust it as your body and health status change.

Conclusion

Exercise is an important part of a healthy lifestyle, which can be used for disease Exercise is one of the most powerful lifestyle interventions available for promoting healthy aging. Regular participation in aerobic, strength, flexibility, and balance activities can help prevent disease, preserve physical and cognitive function, and maintain independence throughout life. However, exercise programs are most effective when they are individualised to address personal asymmetries, strengths, weaknesses, health conditions, and functional goals.

As our bodies change with age, our exercise programs should also evolve. Through ongoing self-assessment and thoughtful adjustment, exercise can serve not only as a means of maintaining health, but also as a lifelong strategy for maximising function, resilience, and quality of life.

Charles L Blum
DC
Director of Research
Sacro Occipital Technique Organization - USA
Private practice of Chiropractic
Santa Monica, CA
drcblum@aol.com

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