

# IMPROVING FLEXIBILITY

## WHY IS FLEXIBILITY IMPORTANT?

The role of flexibility in physical fitness has been debated since the 1950's, and studies have shown inconsistent results when measuring flexibility outcomes with physical activities. That being said, few clinicians would argue against the benefits of maintaining range of motion to effectively perform activities of daily living (22). Moreover, some studies show reasonable benefit from stretching in the setting of age-related loss of functionality and management of chronic illnesses [1-3].

While more research is still needed regarding the specific role of flexibility in overall physical fitness and health, most experts agree that structured flexibility exercises improve patients' general health.[1-3] Preliminary studies have suggested that flexibility may reduce arterial stiffening, which could theoretically reduce cardiovascular disease rates.[4, 23] Stretching can also improve heart rate variability, reduce resting heart rate in patients, and decrease blood pressure. [5, 24, 25] Finally, flexibility exercises have consistently demonstrated benefits in short-term and long-term balance performance.[6,7]

Current research suggests that warm-up stretching does not immediately reduce the risk of athletic injuries.[1, 20] However, with regular stretching over weeks, there appears to be a long-term benefit in improving muscle power and force, which can positively impact athletic performance (26). Some studies have also shown a correlation with less work-related injuries when chronically stretching in the workplace (21). Additionally, certain medical conditions such as osteoarthritis[8] and adhesive capsulitis[9] often warrant special attention to chronic flexibility training to preserve or regain function and reduce discomfort.

Despite inconsistencies in current research on flexibility training, being able to move the body in a wider range of positions and movements gives us more options for accomplishing work, enjoying play, and expressing ourselves. When flexibility increases, our range of possibility increases.

## WHAT FACTORS AFFECT FLEXIBILITY?

There are a variety of factors that contribute to a given person's tendency to be more flexible or stiff. Females tend to be more flexible than males, and flexibility generally declines with age.[3] Numerous genetic conditions such as Marfan's syndrome and other connective tissue disorders affect flexibility. Joint hypermobility and joint hypermobility syndrome are two overlapping and somewhat poorly understood conditions associated with pronounced flexibility. These conditions exist on a continuum of severity,[10] affect up to 30% of the population,[10] and exhibit a strongly heritable risk pattern.[11,12]

High degrees of flexibility achieved at a young age may be subsequently maintained into adulthood. For example, athletes and artists who exhibit high degrees of flexibility, such as gymnasts and contortionists, typically require initiation of flexibility training at a young age. Long-term conditioning through training and habit undoubtedly contributes to long-term flexibility differences.

## HOW CAN FLEXIBILITY BE MEASURED?

Though the sit and reach test primarily focuses on hamstring extensibility (and is not a reliable measure of lumbar flexibility), it has been used around the world as a basic instrument for measuring baseline flexibility).[13,14] If patients are interested in establishing their baseline flexibility, consider providing the instructions included at the end of this handout under additional resources. Other measures of flexibility include the zipper test, which evaluates shoulder flexibility, and the sitting-rising test, which may also predict overall mortality risk.

## HOW CAN FLEXIBILITY BE DEVELOPED?

The American College of Sports Medicine recommends that healthy and older adults perform stretching exercises at least 2 days per week, spending about 1 minute on each major muscle tendon group (shoulder girdle, chest, neck, trunk, lower back, hips, posterior and anterior legs, and ankles) for about 10 minutes per session.[1,3] Many studies have noted benefit in improving range of motion in joints with just 10-30 seconds of stretching on a regular basis (27, 28). Current literature does not consistently suggest immediate benefit from performing static or dynamic stretching before exercise, but warming up with light aerobic activity and, in some cases, stretching, is still recommended due to the long-term benefits of these activities.[15,16]

There are many forms of exercise and physical activity that emphasize flexibility. The following is a short list to consider recommending to patients interested in improving their flexibility:

- **Yoga**—Research supports the use of yoga to increase flexibility.[17]
- **Pilates**—Research also supports Pilates for increasing flexibility.[18]
- **Massage**—Many types of massage seek to maintain flexibility of the joints and soft tissues.
- **Tai chi**—This “inner” martial art expresses the ideal of strength with flexibility and has been consistently observed to facilitate flexibility.[19]
- **Other martial arts**—These often work explicitly to develop flexibility.
- **Dance**—In many forms from around the world, dance is a fun way to stay flexible.
- **Gardening**—For much of human history, humans have been bending, squatting, and kneeling for horticulture.
- **Housework**—Depending on how it is done, housework can be a great way to exercise the ability to stretch, bend, and reach.

Keep flexibility in mind as part of a broad-based approach to [Moving the Body](#). Patients may see long-term improvement in range of motion and muscle power along with other systemic health benefits if engaging in a consistent stretching regimen.

## RESOURCES

- [Mayo Clinic](#)
  - Illustrated guide to basic stretches
- [WebMD](#)
  - Guide to stretching
- [Yoga Journal](#)
  - “What Science Can Teach Us About Flexibility” article
- [Australian College of Sports and Fitness](#)
  - Description of how to perform sit and reach test for flexibility assessment
- “[Moving the Body](#)”: <https://www.va.gov/WHOLEHEALTHLIBRARY/self-care/moving-your-body.asp>

## AUTHORS

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## REFERENCES

1. American College of Sports Medicine. Position stand. Quantity and quality of exercise for developing and maintaining cardiorespiratory, musculoskeletal, and neuromotor fitness in apparently healthy adults: guidance for prescribing exercise. *Med Sci Sports Exerc.* 2011;43(7):1334-1359.
2. Warburton DE, Nicol CW, Bredin SS. Health benefits of physical activity: the evidence. *CMAJ.* 2006;174(6):801-809.
3. American College of Sports Medicine. Position stand. Exercise and physical activity for older adults. *Med Sci Sports Exerc.* 2009;41:1510-1530.
4. Yamamoto K, Kawano H, Gando Y, et al. Poor trunk flexibility is associated with arterial stiffening. *Am J Physiol Heart Circ Physiol.* 2009;297(4):H1314-1318.
5. Peak Health Advocate. A Healthier Heart in 10 Minutes a Day. <https://www.peakhealthadvocate.com/753/stretching-shown-to-improve-heart-health/>. Accessed September 20, 2018.

6. Costa PB, Graves BS, Whitehurst M, Jacobs PL. The acute effects of different durations of static stretching on dynamic balance performance. *J Strength Cond Res.* 2009;23(1):141-147.
7. Bird M, Hill K, Ball M, Hetherington S, Williams A. The long-term benefits of a multi-component exercise intervention to balance and mobility in healthy older adults. *Arch Gerontol Geriatr.* 2011;52(2):211-216.
8. Uthman OA, van der Windt DA, Jordan JL, et al. Exercise for lower limb osteoarthritis: systematic review incorporating trial sequential analysis and network meta-analysis. *Br Med J.* 2013;347:f5555.
9. Diercks RL, Stevens M. Gentle thawing of the frozen shoulder: a prospective study of supervised neglect versus intensive physical therapy in seventy-seven patients with frozen shoulder syndrome followed up for two years. *J Shoulder Elbow Surg.* 2004;13(5):499-502.
10. Grahame R, Hakim A. Joint hypermobility syndrome. *UpToDate, version 10.0* [www.uptodate.com](http://www.uptodate.com). Published 2014. Accessed July 19.
11. Hakim AJ, Cherkas LF, Grahame R, Spector TD, MacGregor AJ. The genetic epidemiology of joint hypermobility: a population study of female twins. *Arthritis Rheum.* 2004;50(8):2640-2644.
12. Hakim AJ, Sahota A. Joint hypermobility and skin elasticity: the hereditary disorders of connective tissue. *Clin Dermatol.* 2006;24(6):521-533.
13. Mayorga-Vega D, Merino-Marban R, Viciano J. Criterion-related validity of sit-and-reach tests for estimating hamstring and lumbar extensibility: a meta-analysis. *J Sports Sci Med.* 2014;13(1):1-14.
14. Cuberek R, Machova I, Lipenska M. Reliability of V sit-and-reach test used for flexibility self-assessment in females. *Acta Univ Palacki Olomuc, Gymn.* 2013;43(1):35-39.
15. Thacker SB, Gilchrist J, Stroup DF, Kimsey CD, Jr. The impact of stretching on sports injury risk: a systematic review of the literature. *Med Sci Sports Exerc.* 2004;36(3):371-378.
16. McHugh MP, Cosgrave CH. To stretch or not to stretch: the role of stretching in injury prevention and performance. *Scand J Med Sci Sports.* 2010;20(2):169-181.
17. Field T. Yoga clinical research review. *Complement Ther Clin Pract.* 2011;17(1):1-8.
18. Cruz-Ferreira A, Fernandes J, Laranjo L, Bernardo LM, Silva A. A systematic review of the effects of pilates method of exercise in healthy people. *Arch Phys Med Rehabil.* 2011;92(12):2071-2081.
19. Kuramoto AM. Therapeutic benefits of Tai Chi exercise: research review. *WMJ.* 2006;105(7):42-46.
20. Small K, McNaughton L, Matthews M. A systematic review into the efficacy of static stretching as part of a warm-up for the prevention of exercise-related injury. *Res Sports Med.* 2008;16(3):213-231
21. Bracko, M.R. 1998. Fit for duty, *Canadian Occupational Safety*, 36(3), 20-23.
22. J Brent Feland, J William Myrer, Shane S Schulthies, Gill W Fellingham, Gary W Measom, The Effect of Duration of Stretching of the Hamstring Muscle Group for Increasing Range of Motion in People Aged 65 Years or Older, *Physical Therapy*, Volume 81, Issue 5, 1 May 2001, Pages 1110-1117, <https://doi.org/10.1093/ptj/81.5.1110>

23. Bisconti, A. Cè, E. et al. (2020) Evidence for improved systemic and local vascular function after long-term passive static stretching training of the musculoskeletal system. *The Journal of Physiology*.
24. Thomas, E. et al. (2021) Cardiovascular Responses to Muscle Stretching: A Systematic Review and Meta-analysis. *International Journal of Sports Medicine*.
25. Ko, J. Deprez, D. Shaw, K. Alcorn, J. et al. (2020) Stretching is Superior to Brisk Walking for Reducing Blood Pressure in People With High-Normal Blood Pressure or Stage I Hypertension. *Journal of Physical Activity and Health*
26. Shrier, I. (2005) When and Whom to Stretch? Gauging the Benefits and Drawbacks for Individual Patients. *The Physician and Sportsmedicine*. 33(3):22-6.
27. McHugh MPMagnusson SPGleim GWNicholas JA. Viscoelastic stress relaxation in human skeletal muscle. *Med Sci Sports Exerc*. Dec 1992;24(12):1375-1382
28. Bandy WDIrion JM. The effect of time on static stretch on the flexibility of the hamstring muscles. *Phys Ther*. Sep 1994;74(9):845-850; discussion 850-842