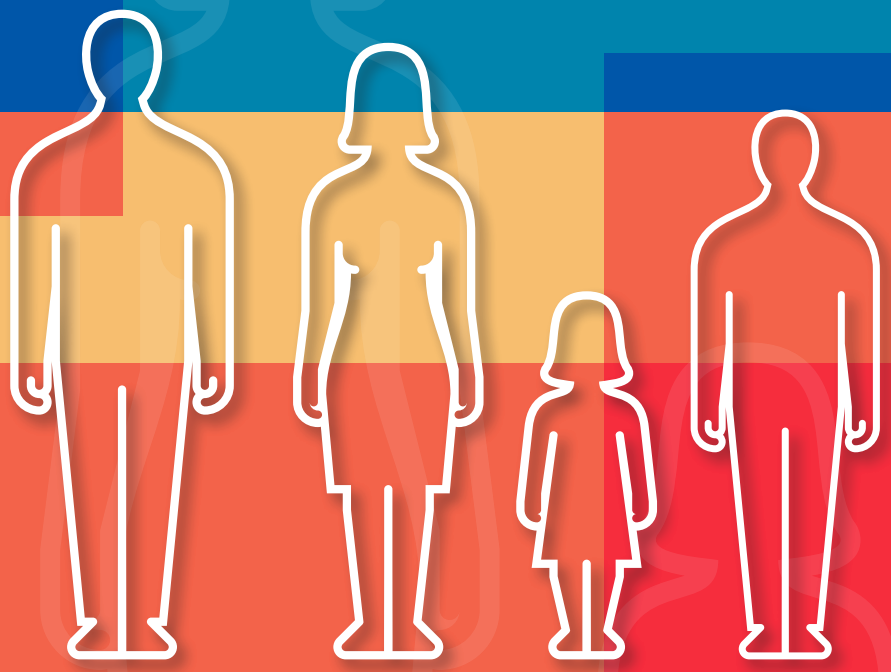
3rd Edition

The **Impact** of Musculoskeletal Disorders on Americans —

Opportunities for Action



Executive Summary of *The Burden of Musculoskeletal Diseases in the United States: Prevalence, Societal and Economic Cost*

Bone and Joint Initiative USA

THE BONE AND JOINT DECADE 2000-2010 JOINT MOTION

www.boneandjointburden.org

Introduction

Do you have a parent or friend with arthritic joints who has trouble opening jars or walking a short distance without wincing?

What about a running buddy who is contemplating or has already had a knee replacement?

Perhaps a colleague in the next cubicle has missed work because of recurring chronic neck or back pain or carpal tunnel syndrome?

Has a teenager close to you—your own or a neighbor's—confronted a serious sports injury that took her off the field or court for a season or longer?

Perhaps a senior you know fell, at home or while out and about, then experienced a sharp decline from that point on?

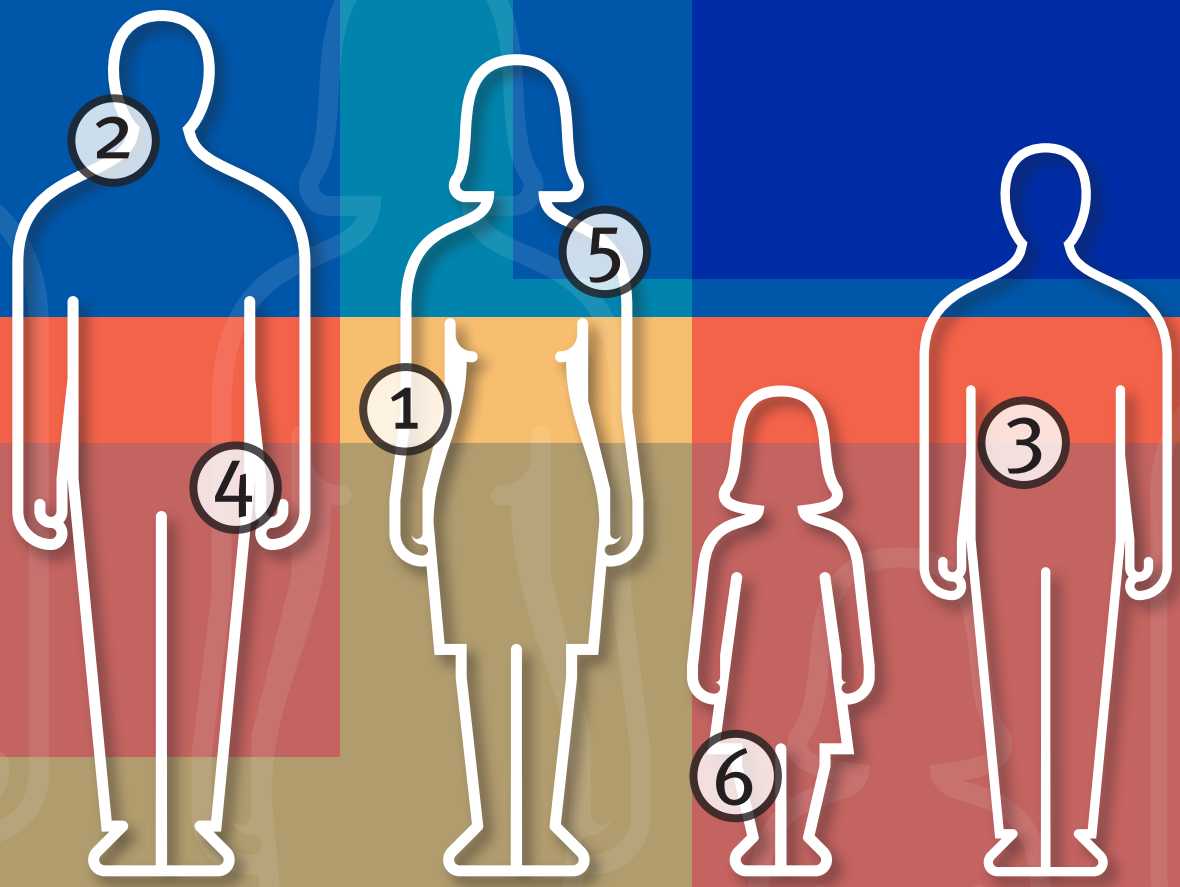
Or maybe a relative or acquaintance has had surgery for severe back pain or scoliosis, or you've known a child with scoliosis or someone who has had a bone tumor?

Most Americans are surrounded by neighbors, colleagues, and relatives with pain and disability from bone and joint diseases and disorders. Public health experts refer to the total impact of a disease on those affected as the "burden" of that disease. A look at the burden of musculoskeletal disorders reveals that from childhood through adolescence and adulthood, these conditions rob millions of individuals of their mobility, function, and a pain-free existence. Musculoskeletal disorders and conditions also incur tremendous costs, not only in pain and suffering, but also in the procedures and interventions demanded of an overburdened health system. When musculoskeletal disorders that could be prevented or ameliorated are not addressed in a timely manner, we miss opportunities to intervene earlier and more effectively in the disease process—a problem exacerbated by lack of access to both screening and treatment. These missed opportunities rob people of their ability to work and live full lives, and add unnecessary expenditures to the healthcare system.

Musculoskeletal disorders are common already, and will become even more so as the population ages. However, we do not have to accept the scenario of unchanged or increased burden. Advances in science have led to many significant improvements in treatment, in a number of cases permitting people to regain mobility and function, but cures for the most common disorders remain elusive. Until scientific research provides answers, people will suffer and healthcare costs will continue to grow. If research and clinical investments came closer to matching the burden of these disorders on our society, we could improve access to earlier screening, diagnosis, and treatment. This, in turn, would allow us to intervene sooner and more effectively, and reduce the toll—both in pain and suffering and in costs from treatment and lost productivity—that musculoskeletal disorders take.

This summary presents data demonstrating how common these conditions are, why this matters, and what we can do differently to address and—ideally—reverse these trends. The full volume, *The Burden of Musculoskeletal Diseases in the United States: Prevalence, Societal and Economic Cost*, offers a much more comprehensive set of data on each musculoskeletal condition, as well as cross-cutting issues such as the implications of an aging population. The full report is available from www.boneandjointburden.org.

Musculoskeletal Disorders are Common



Musculoskeletal disorders cover the human body from head to toe. They include:

1 Arthritis and other rheumatic conditions (such as osteoarthritis, rheumatoid arthritis, gout, and lupus);

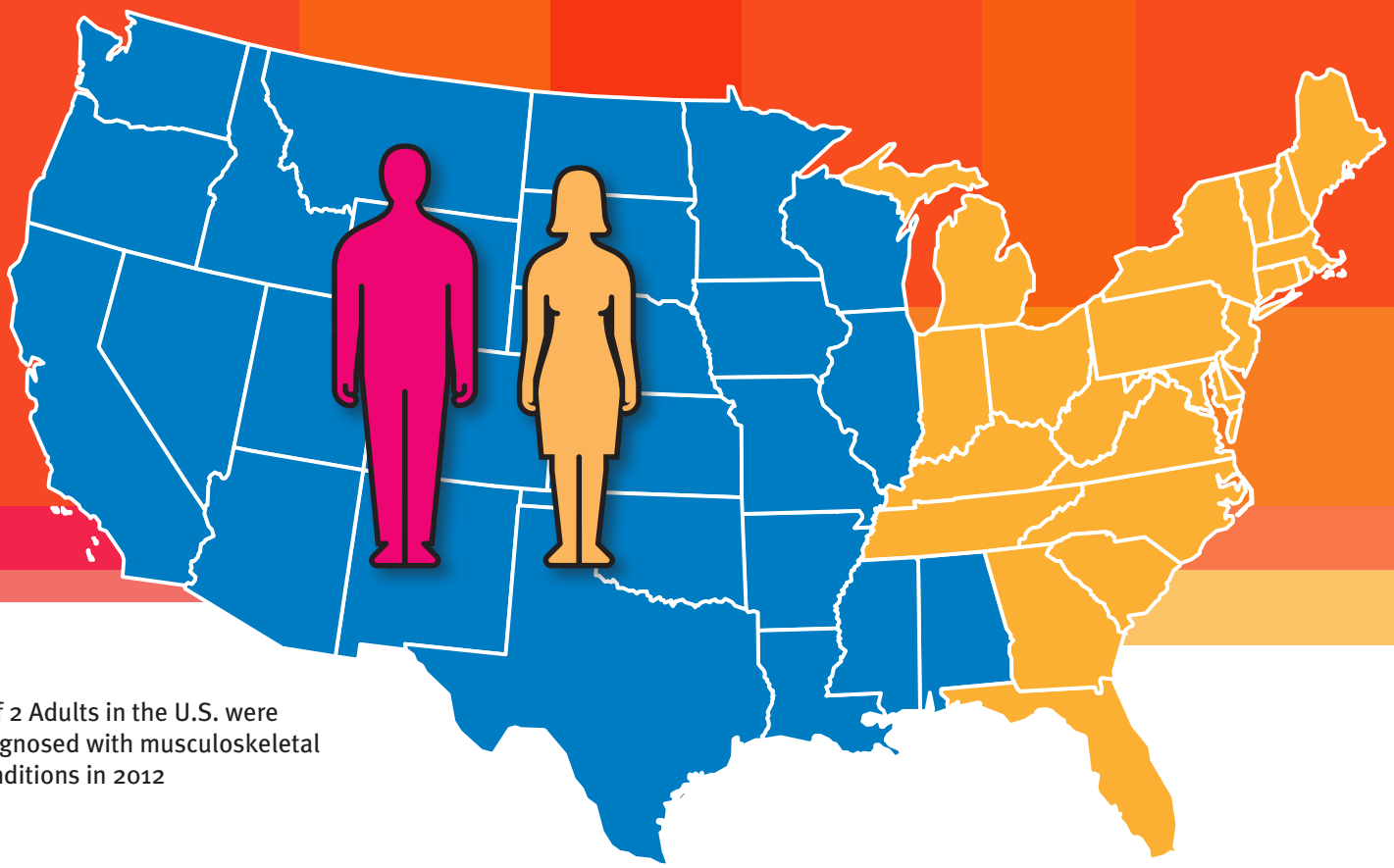
2 Disorders and conditions of the spine, such as low back and neck pain;

3 Spinal deformity and related conditions (such as scoliosis, which causes side-to-side curvature);

4 Osteoporosis (a condition characterized by low bone mass and deterioration of bone structure that can increase the risk of fracture);

5 Cancers of bone and connective tissue (such as bone and joint cancers and myeloma, a malignant primary tumor of the bone marrow); and

6 Musculoskeletal injuries to the neck, spine, pelvis, and extremities, including sprains and strains.



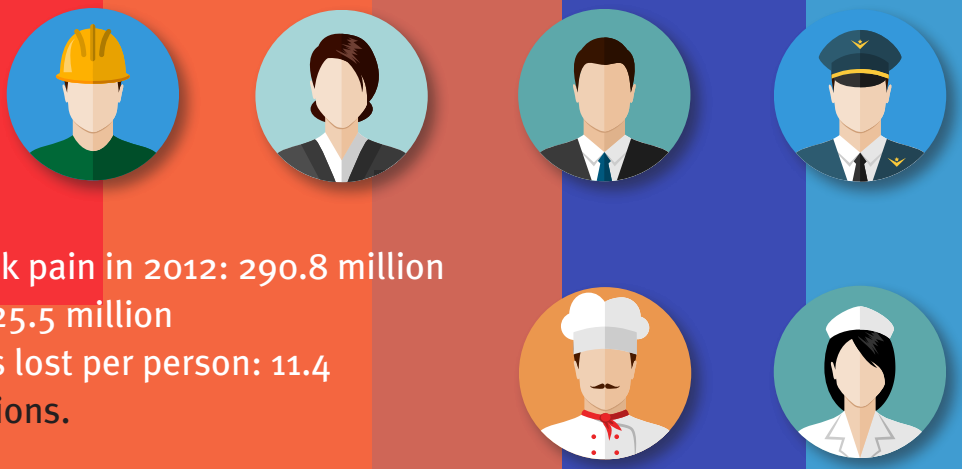
1 of 2 Adults in the U.S. were diagnosed with musculoskeletal conditions in 2012

Musculoskeletal Disorders Affect Americans of All Ages

They include:

- Children and adolescents (who suffer from arthritis, trauma, sports injuries, deformities, and rare but significant conditions such as skeletal dysplasias and cancers);
- Working-age adults, including military personnel; and
- Older adults, an age group that continues to grow.

Given the many forms these disorders can take over the lifespan, it's not surprising that musculoskeletal conditions are reported by half of all American adults: 126.6 million of U.S. adults over the age of 18 reported being diagnosed with these conditions in 2012.[1] This is twice as many as any other medical condition. Arthritis alone, which is the most common cause of disability among adults in the United States, is projected to affect 67 million people—25% of the adult population—by 2030.[2] Back and neck pain affects nearly 1 in 3 adults every year,[3] while osteoporosis affects 10 million Americans, with 18 million more (mostly women) at risk for the "silent disease" that progresses without symptoms.[4]



Workdays lost to back or neck pain in 2012: 290.8 million
Number of people affected: 25.5 million
Average number of workdays lost per person: 11.4
These stats cover all professions.

Why Musculoskeletal Disorders Matter

Behind each of the millions with these conditions, affecting half of all U.S. adults, are significant losses that sometimes accrue for decades, making them costly to affected individuals and to society, exacerbated as the population ages.

Musculoskeletal disorders are painful, limiting, and debilitating, adversely—and often needlessly—affecting the daily lives and productivity of millions of people.

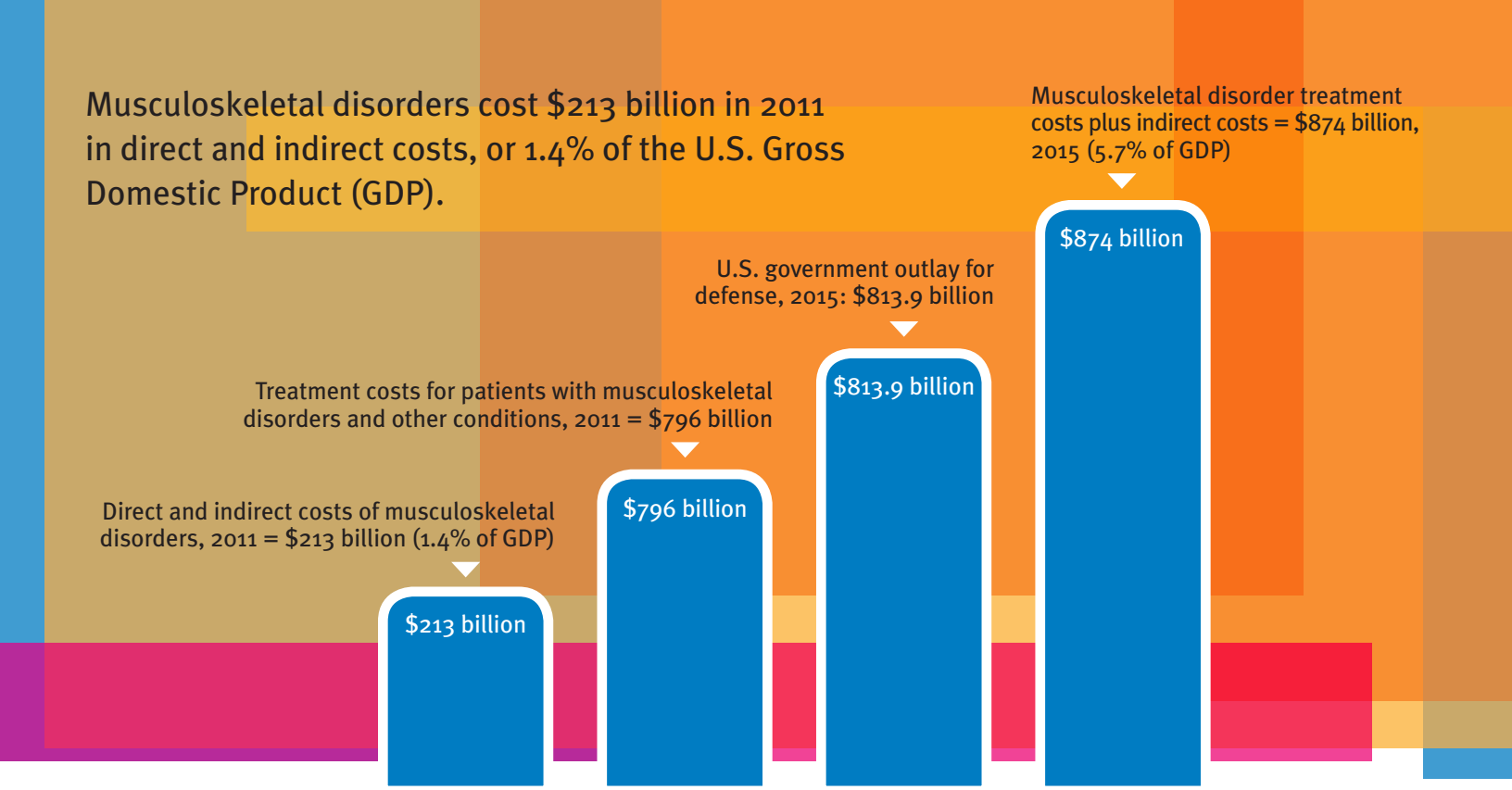
Some musculoskeletal disorders are diagnosed, treated, and resolved without lasting harm or costs. Even in their milder forms, though, these disorders can wreak havoc with daily life at home, at work, and at school.

Nearly 18 million adults (6% of the U.S. population) reported being unable to perform at least one common activity unaided (such as walking, getting out of a chair, or self-care like bathing or going to the bathroom) because of these conditions.[5]

Often, these disorders interfere with work. In 2012, 25.5 million people lost an average of 11.4 days of work due to back or neck pain.[6] That adds up to 290.8 million lost workdays in 2012 alone. Among children and adolescents, musculoskeletal conditions are surpassed only by respiratory infections as a cause of missed school days.[7]

They have ripple effects across the life span.

Musculoskeletal disorders affect people of all ages, although their prevalence increases with the wear and tear of aging. Still, changing behaviors and interventions early in life can affect the progression of musculoskeletal disorders over time and have important implications for healthy aging. For example, vitamin D deficiency and childhood obesity are implicated in poor bone health. For most people, the possibility of future low bone mass (implicated in osteoporosis) is set in the late teens and early 20s, when bone density and quality are built for life. Joint injuries from sports can include sprains and strains and other injuries that lead to lifelong chronic pain and instability. Bone, joint, and other musculoskeletal cancers, while rare, disproportionately affect young people, and their treatment—while lifesaving—can last a lifetime.



They're costly and will only become more so.

Musculoskeletal disorders cost $213 billion in 2011 in direct and indirect costs, or 1.4% of the U.S. Gross Domestic Product (GDP).[8] For patients with both musculoskeletal and other conditions (such as diabetes or heart disease), treatment costs reached $796 billion in 2011 (5.2% of GDP).[9] Approximately half of people diagnosed with heart disease or diabetes and a third of those with obesity also are affected by arthritis and rheumatic conditions, so these co-morbidities are very common. In addition to direct treatment costs, if indirect costs are taken into account (mainly in the form of lost wages from those unable to work because of these conditions), the cost jumps to $874 billion, or 5.7% of GDP.[10] (That's more than the entire 2015 U.S. government budget outlay for defense, which was $813.9 billion.[11])

If these high costs were stable, they would still be of concern—but they are increasing steadily. In 2011, the estimated annual cost for medical care to treat all forms of arthritis and joint pain was $580.9 billion, which represented a 131% increase (in 2011 dollars) over 2000.[12] Prescription drugs have helped people return to work and live with less pain and discomfort, but account for about a quarter of arthritis-related expenses; these, too, are increasing.[13]

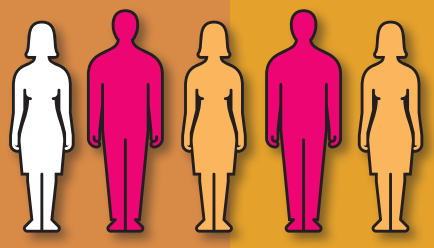
A similar trend is found in the cost of treating back pain. In 2011, the estimated annual direct cost of treating back pain was $284.4 billion.[14] The cost of treating spine conditions increased by 52% between 2000 and 2011 (in 2011 dollars), with the largest share of this increase related to prescription medications.[15]

Joint replacements, while successful in most cases, are extremely costly; in 2011, the estimated total cost for joint replacements was $66 billion.[16]

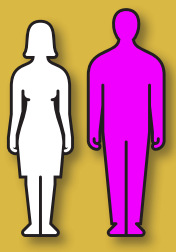
The costs for treatment and hospitalizations are just part of the cost picture. Treating patients hospitalized with spinal deformity diagnoses cost $75.8 billion in 2011, with discharge to long-term care nearly twice as likely for these conditions as for any other health care problem.[17]

By 2040, 1 in 5 people in the United States will be 65 or older—about equal in size to the cohort of those who are 18 years of age or younger. One in two adults aged 65 and older already has some form of arthritis, but nearly two-thirds of those with arthritis are under 65.

20% / 1 in 5
of U.S. population 65 or older in 2040



50% / 1 in 2
of U.S. adults 65 and older have a form of arthritis



An aging population portends more prevalence and more costs.

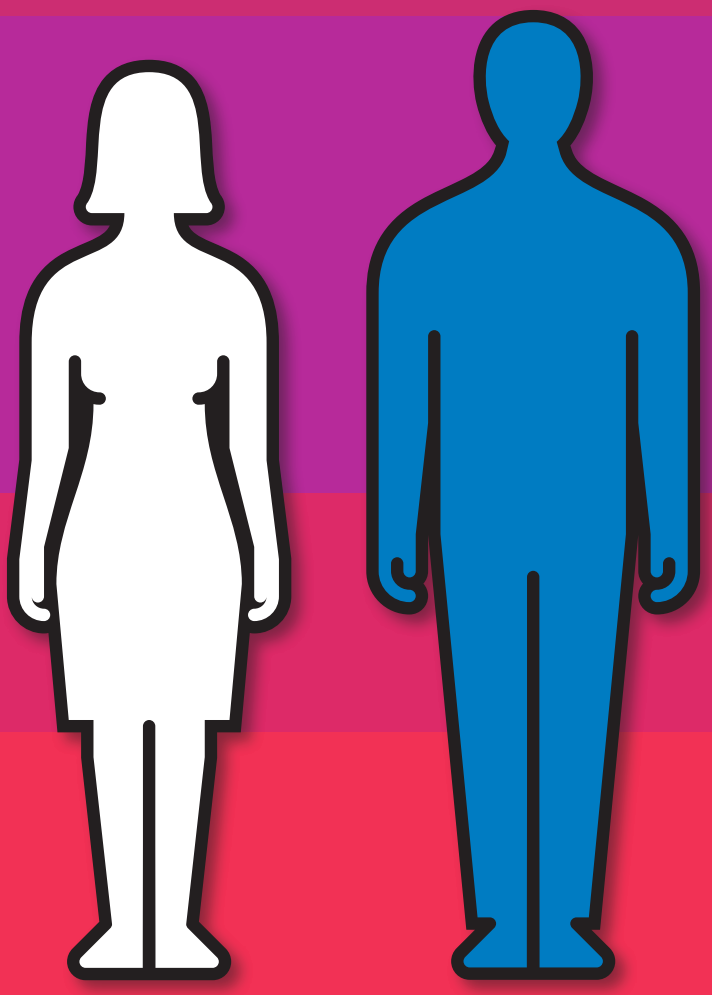
By 2040, 1 in 5 people in the United States will be 65 or older—about equal in size to the cohort of those who are 18 years of age or younger.[18] One in two adults aged 65 and older already has some form of arthritis, *but* nearly two-thirds of those with arthritis are under 65. By 2030, it is projected some form of arthritis will affect 67 million adults. Both osteoarthritis and inflammatory forms of arthritis are more common in women.[19]

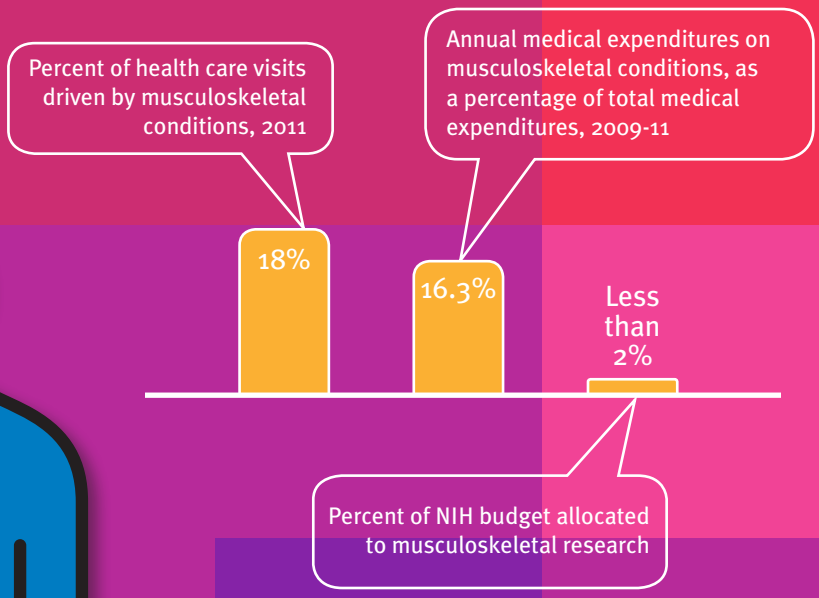
Musculoskeletal disorders can have serious consequences at any age, but become particularly burdensome for older people, often causing a downward health spiral that is difficult to reverse. Two-thirds of those with hip fractures do not return to their pre-fracture levels of functioning. Among Medicare beneficiaries 65 and older, those with hip fractures faced more than double the risk of death and a four-fold increased risk of becoming a nursing home resident (a costly development on its own), along with a more than double risk of enrolling in Medicaid within a year of the fracture.[20] Falls increase a person's risk for fracture. After the age of 75, the rate of falls per 1,000 people rises to 64.9 per 1,000 people, and then nearly doubles after age 85 to 141.6 per 1,000 people.[21]

Opportunities for Action

What We Can Do

As noted earlier, musculoskeletal disorders account for tremendous economic costs in direct treatment expenditures as well as significant indirect costs, mainly in the form of lost productivity. They also affect half the adult population in significant ways. Despite the billions of dollars and millions of lives affected, musculoskeletal disorders accounted for less than 2% of the National Institutes of Health (NIH) budget every year since 2000, declining even more in recent years when NIH's overall budget was either level or cut in constant dollars.





2009 - 2013

Between 2009 and 2013, musculoskeletal conditions that impair and affect 1 of every 2 American adults and drive 18% of all 2011 health care visits and 16.3% of health care costs received less than 2% of the total NIH research budget.[22] The bottom line is that investments in research, prevention, and better access and treatment are not aligned with prevalence, burden, and future projections.

What can be done differently?

The specialists in orthopaedic surgery, rheumatology, physical medicine and rehabilitation, and other musculoskeletal health care specialties who contributed to *The Burden of Musculoskeletal Diseases in the United States* agree that research investments in many different aspects of musculoskeletal disease are both inadequate and long overdue for an increase. Increasing research investments on par with the burden of musculoskeletal disease could answer specific research questions, improve screening and access to care, reduce disparities, promote earlier intervention and primary prevention, and yield new and better treatments. Collectively, these investments would deliver a significant and lasting pay-off in the form of reduced burden of disease as well as reduced healthcare, workplace and daily living costs.

Specifically, federal research funding that more closely mirrors the burden of musculoskeletal disease is needed to improve research on both prevention and treatment, improve aspects of access and coordination, and address key data gaps, as outlined in the following recommendations:

- Accelerate research that compares treatment alternatives, develops new treatments, and evaluates possible prevention approaches. The progress in treating rheumatoid arthritis (RA), in which patients were not long ago routinely confined to wheelchairs (but are now in many cases able to return to work), demonstrates how the promise of greater function and mobility could be achieved across the spectrum of musculoskeletal disorders. Research also could explore unanswered questions about these disorders that could lead to breakthroughs in other areas (e.g., exploring why disk degeneration causes pain in some and not others).

- Understand the role of behavior change in prevention and treatment, including weight loss and self-management of conditions once they arise. The success of lifestyle behavior changes for diabetes and other chronic diseases points the way. A corollary is that we need to better understand and promote the role of clinic-to-community linkages that support behavioral interventions, without leaving their success up to individuals or physicians alone.

- Ensure that a higher percentage of the affected population receives access to evidence-based treatments. As part of this, reduce disparities in the onset of disease, access to care, and outcomes, by race/ethnicity and socioeconomic status.

- Implement proven prevention strategies for sports injuries, workplace injuries, and injuries in the military. In many cases, we have scientifically proven interventions, such as warm-up programs that prevent severe knee injuries, but adoption and implementation of these programs is lacking.

- Ensure that children with chronic medical and musculoskeletal problems have access to care, especially for those insured through Medicaid or other government-funded insurance.

- Promote better coordination between physicians and other care providers (primary care providers, specialists, physical therapists, chiropractors, alternative caregivers).

- Ensure that health care providers (especially primary care physicians) have the appropriate training to diagnose and, if necessary, refer patients for appropriate treatment, so that treatment is not delayed or diagnostic and emergency resources used inappropriately.

- Address data limitations that hinder our understanding of these conditions and how best to screen, diagnose and treat them. For example, data are needed on:
  - The relative impacts of sex and gender on the etiology of musculoskeletal disorders and responses to treatment.
  - Measured outcomes that matter to most people (such as effects on work, activities, health-related quality of life, independence, and the ability to keep partaking of valued life activities).

- Improve data systems and databases that help illuminate the burden of musculoskeletal disorders on children and adolescents, and tracking pediatric patients into adulthood to determine lifelong burden of their pediatric musculoskeletal disease, as well as the effectiveness of treatment, improved care, and support systems.

- Identify ways to obtain data on more specific conditions to drive clinical and public health efforts, including the use of electronic health records (EHRs).

Opportunities for Action

Conclusion: Investing in Prevention, Diagnosis and Treatment to Improve Outcomes and Lower Costs

The wish list of research priorities, improved access and coordination, and better data to drive understanding of musculoskeletal disorders and lower healthcare costs is a realistic one.

If we continue on our current trajectory, we are choosing to accept more prevalence and incidence of these disorders, spiraling costs, restricted access to needed services, and less success in alleviating pain and suffering (or, just as daunting, successes such as total knee replacement surgery that are quickly outpaced by demand and thus do not reach those who could benefit). In this scenario, we as a society accept musculoskeletal disorders and their consequences as inevitable, and try to live with them as best we can.

That passive scenario requires little effort, but exacts high costs—actual costs, as well as missed opportunities to do better by our patients, our society, and our economy. Instead of accepting these trends as inevitable, we could devote funding to filling data and research gaps, and increasing access to care by expanding the supply of providers who know more about these conditions and respond appropriately, coordinating more smoothly and efficiently with their colleagues. We would discover and implement more evidence-based interventions and effective treatments, while simultaneously focusing on prevention.

Collectively, these investments would pay off—not just for one musculoskeletal disease, but for all of them. Inevitably some musculoskeletal conditions will continue to affect people of all ages. But they will cut a far smaller, less painful, and less costly swath through our society.

Within a matter of decades, in our lifetimes, the scenarios that opened this summary could become far less familiar and commonplace.

What if the parent with arthritic joints (or, by then, you yourself) could be far more mobile for far longer, enjoying walking and gardening without medication (or far less of it)? The more active lifestyle and pain-free movement, in turn, would be a huge boon to addressing heart disease, obesity, and/or diabetes, as well.

What if your running buddy hadn't needed a knee replacement—even though it worked out well for him—and never had to risk possible complications from the next one?

What if your colleague's back or neck pain never materialized in the first place, or was resolved so quickly and thoroughly that she didn't miss much work—and was able to make that great contribution which made your whole department shine?

What if your child's bone tumor was treated successfully and became a distant memory?

What if your teenager with a sports injury avoided the ACL tear and skied or played soccer happily ever after?

What if your older neighbor didn't fall at home or at the assisted living residence and, in fact, has become a tai chi enthusiast?

What if your relative or acquaintance with scoliosis avoided years of pain and discomfort from a more effective, earlier treatment?

What if your old roommate with a ruptured disk avoided the surgery that made him miss your college reunion?

And what if each of these individual scenarios were multiplied by millions of people?

Musculoskeletal conditions are woven through our lives, and those of our friends, colleagues, relatives, and neighbors. The statistics pointing to prevalence and costs are compelling, but they don't tell the whole story: a story that could have a very different plot line from its current trajectory.

References

1) National Health Interview Survey (NHIS)_Adult sample. www.cdc.gov/nchs/nhis/nhis_2012_data_release.htm Accessed July 2, 2013.

2) CDC. Prevalence of doctor-diagnosed arthritis and arthritis-attributable activity limitation—United States, 2010–2012. MMWR 2013;62(44).

3) National Health Interview Survey (NHIS)_Adult sample, op cit. www.cdc.gov/nchs/nhis/nhis_2012_data_release.htm Accessed July 2, 2013.

4) Wright NC, Looker AC, Saag KG, et al.: The recent prevalence of osteoporosis and low bone mass in the United States based on bone mineral density at the femoral neck or lumbar spine. JBMR 2014;29(11): 2520-2526. DOI: 10.1002/jbmr.2269.

5) National Health Interview Survey (NHIS), Person Sample. www.cdc.gov/nchs/nhis/nhis_2012_data_release.htm Accessed July 2, 2013.

6) Ibid.

7) Ibid.

8) Medical Expenditures Panel Survey (MEPS), Agency for Healthcare Research and Quality, U.S. Department of Health and Human Services, 1996-2011 www.meps.ahrq.gov/mepsweb/ AND Current GDP multipled by inflation factors calculated per www.meps.ahrq.gov/mepsweb/about_meps/Price_Index.shtml Accessed February 5, 2014.

9) Ibid.

10) Ibid.

11) U.S. Government Printing Office. Budget of the United States Government. www.usgovernmentdebt.us/federal_budget_detail_2016bs22015n Accessed February 5, 2016.

12) Medical Expenditures Panel Survey (MEPS), op cit.

13) Ibid.

14) Ibid.

15) Ibid.

16) HCUP Nationwide Inpatient Sample (NIS). Healthcare Cost and Utilization Project (HCUP). 2011. Agency for Healthcare Research and Quality, Rockville, MD. www.hcup-us.ahrq.gov/nisoverview.jsp

17) Ibid.

18) Ortman JM, Velkoff VA, Hogan H. An aging nation: the older population in the United States. Current Population Reports: Population Estimates and Projections May 2014. www.census.gov/prod/2014pubs/p25-1140.pdf Accessed June 9, 2015.

19) Burden of Musculoskeletal Diseases: Special Populations: Sex and Gender: Arthritis. www.boneandjointburden.org/2014-report/ixado/arthritis Accessed December 31, 2015.

20) Tajeu GS, Delzell E, Smith W, et al.: Death, debility, and destitution following hip fracture. J Gerontol A Biol Sci Med Sci 2014 Mar;69(3):346-353. PMID: 23873945

21) Source: Centers for Disease Control. Web-based Injury Statistics Query and Reporting System (WISQARS) [online]. (2011) National Center for Injury Prevention and Control (producer). www.cdc.gov/injury/wisqars/ Accessed October 21, 2013.

22) National Institutes of Health. Estimates of Funding for Various Research, Condition, and Disease Categories. https://report.nih.gov/categorical_spending.aspx Accessed December 17, 2013.

Opportunities for Action

The Burden of Musculoskeletal Diseases in the United States: Prevalence, Societal and Economic Cost (3rd Edition), published by the United States Bone and Joint Initiative, NFP (USBJI), is a joint project of the organizations listed on this page.

This Executive Summary has been developed from the full publication, which can be viewed at: **www.boneandjointburden.org**

Acknowledgements
USBJI and its partners are grateful to Sylvia Watkins-Castillo, PhD, lead author and project coordinator of the full publication, for her expert compilation, organization and presentation of the voluminous data and research represented in the full publication.

Executive Summary Co-authors:
Nicole Lezin, MPPM and Sylvia Watkins-Castillo, PhD
Project Manager: Toby King, CAE
Design & Layout: Rick Cosaro

Global Alliance for Musculoskeletal Health/Bone and Joint Decade
The Global Alliance is an international collaborative movement sanctioned by the United Nations/World Health Organization working to improve the quality of life for people with musculoskeletal conditions and to advance the understanding, prevention and treatment of these conditions.

United States Bone and Joint Initiative, NFP
The United States Bone and Joint Initiative (USBJI), publisher of *The Burden of Musculoskeletal Diseases in the United States: Prevalence, Societal and Economic Cost*, is the U.S. National Alliance of the Global Alliance. The USBJI advocates and promotes multidisciplinary, coordinated, and patient-centered care to improve the prevention, diagnosis, and treatment of musculoskeletal conditions.

The material presented in *The Burden of Musculoskeletal Diseases in the United States: Prevalence, Societal and Economic Cost* is made available for informational purposes only. This material is not intended to suggest procedures or course of treatment, only to provide an interpretation of available data on the incidence and prevalence of most major musculoskeletal conditions.

ISBN Number 978-0-9963091-1-0

The Burden of Musculoskeletal Diseases in the United States: Prevalence, Societal and Economic Cost
9400 W. Higgins Road, Suite 500
Rosemont, IL 60018
United States of America

Phone: 847.430.5053/5054
Email: usbji@usbji.org

Supporting Organizations
American Academy of Orthopaedic Surgeons
American Academy of Physical Medicine and Rehabilitation
AO North America
American Orthopaedic Society for Sports Medicine
American Society for Bone and Mineral Research
Genentech
Medtronic
National University of Health Sciences
Orthopaedic Trauma Association
Pediatric Orthopaedic Society of North America
Sanofi Biosurgery
Scoliosis Research Society
Zimmer Biomet

BMUS Chapter Authors
Gunnar B. J. Andersson, MD, PhD
Sigurd H. Berven, MD
Kenneth L. Cameron, PhD, MPH, ATC
Michelle Canham-Chervak, PhD, MPH
Miriam Cisternas, MA
Robert M. Corey, MD
Adolfo Correa, MD, PhD
Esther O. Dada, MPH
Beatrice J. Edwards, MD
Charles G. (Chad) Helmick, MD
Matthew D. Hepler, MD
Aimee O. Hersh, MD
Bruce H. Jones, MD, MPH
Meredith Kilgore, RN, PhD
Stephen Marshall, PhD
Brett D. Owens, MD
Andrew N. Pollak, MD
Ellen M. Raney, MD
Scott B. Rosenfeld, MD
Kenneth S. Saag, MD, MSc
Kimberly J. Templeton, MD
William G. Ward Sr., MD
Sylvia Watkins-Castillo, PhD
Stuart L. Weinstein, MD
Nicole C. Wright, PhD, MPH
Edward H. Yelin, PhD, MCP

BMUS Steering Committee
Stuart L. Weinstein, MD, Co-Chair
American Academy of Orthopaedic Surgeons

Edward H. Yelin, PhD, MCP, Co-Chair

Gunnar B.J. Andersson, MD, PhD
American Academy of Orthopaedic Surgeons

Sigurd Berven, MD
Scoliosis Research Society

Leigh Callahan, PhD

Paul Dougherty, DC
American Chiropractic Association

Paul W. Esposito, MD
American Academy of Pediatrics

Julie M. Fritz, PhD, ATC
American Physical Therapy Association

Marian T. Hannan, DSc, MPH

Michael Henrickson, MD, MPH
American Academy of Pediatrics

Matthew Hepler, MD
Scoliosis Research Society

Marc C. Hochberg, MD, MPH
American Society for Bone and Mineral Research

Jonathan Kirschner, MD, RMSK
American Academy of Physical Medicine and Rehabilitation

Anne C. Looker, PhD
Centers for Disease Control and Prevention

Joseph P. O'Brien, MBA
National Scoliosis Foundation

Erica L. Odom, DrPH, MPH
Centers for Disease Control and Prevention

Alexis Ogdie, MD

Brett D. Owens, MD
American Orthopaedic Society for Sports Medicine

Andrew N. Pollak, MD
Orthopaedic Trauma Association

J. Edward Puzas, PhD
University of Rochester

Patricia Quinlan, DNSc, MPA, CPHQ
National Association of Orthopaedic Nurses

Scott B. Rosenfeld, MD
Pediatric Orthopaedic Society of North America

Kimberly J. Templeton, MD

Paul A. Ullucci, Jr., PT, PhD, DPT, ATC, SCS, CSCS
National Athletic Trainers' Association

John Ventura, DC
American Chiropractic Association

BMUS Special Consultants
Deborah S. Cummins, PhD
Joan McGowan, PhD
Jayson Murray, MA
Ryan Pezold, MA