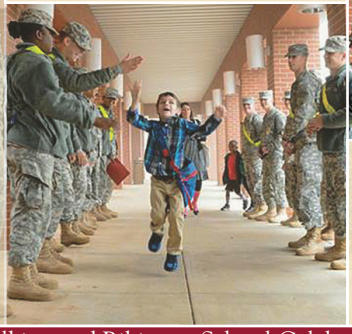
MISSION: READINESS

Illinois: Unfit to Fight

Illinois children need regular PE, real walking and biking options, and nutritious meals to maintain healthy weights and build strong bones and lungs.



A Walking-and-Biking-to-School Celebration

Sprains and broken bones outpaced combat injuries in Iraq and Afghanistan

WHO WE ARE

Shown in the photo are (left to right): Major General David M. Edgington, US Air Force (Ret.), Admiral James M. Loy, US Coast Guard (Ret.) and General Richard E. Hawley, US Air Force (Ret.) on the deck of the *Battleship Wisconsin*, in Norfolk, VA. at a Mission: Readiness news conference.

Mission: Readiness is the nonprofit, nonpartisan national security organization of more than 550 retired generals, admirals and other senior retired military leaders who work to ensure continued American security and prosperity into the 21st century by calling for smart investments in the upcoming generation of American children. It operates under the umbrella of the nonprofit Council for a Strong America.

For a full listing of our membership, please see our website at **www.missionreadiness.org**

ACKNOWLEDGMENTS

"A Walking and Biking to School Celebration" cover photo credit: U.S. Army photo by Bill Bengtson

Mission: Readiness Minnesota *Illinois* is supported by tax-deductible contributions from foundations, individuals, and corporations.

Major funding for Mission: Readiness is provided by: Alliance for Early Success • Betterment Fund • The Bingham Program • Boone Family Foundation • Frances Hollis Brain Foundation • The California Education Policy Fund • The California Endowment • The Annie E. Casey Foundation • Robert Sterling Clark Foundation • Sam L. Cohen Foundation • The Colorado Health Foundation • Max M. and Marjorie S. Fisher Foundation • Bill & Melinda Gates Foundation • John T. Gorman Foundation • The Grable Foundation • George Gund Foundation • The William and Flora Hewlett Foundation • Robert Wood Johnson Foundation • Kansas Health Foundation • W.K. Kellogg Foundation • The Kresge Foundation • Meadows Foundation • The David & Lucile Packard Foundation • William Penn Foundation • The J.B. and M.K. Pritzker Family Foundation • Texas Education Grantmakers Advocacy Consortium Fund.

Report authored by Bill Christeson, Kara Billings, and Sara Hutton.

Amy Dawson Taggart, Chris Beakey, and Sally Puleo also contributed to this report.

Report design by Mariana Galloway.

Summary

Our nation's military has often played a role in solving problems affecting our greater society. When malnutrition kept many young men from serving during WWII, General Lewis Hershey pushed successfully for the creation of the national school lunch program as a major force for children's health. When the Soviet Union sparked national security concerns by succesfully launching Sputnik as the first satellite to circle the earth, military leaders helped inspire improvements in the teaching of mathematics in U.S. schools. Responding to military leaders' concerns about the need to move troops and supplies during an emergency, President Eisenhower—a former Army general—championed the development of the Interstate Highway System. And today, in response to an obesity crisis that disqualifies millions of young adults for military service, retired military leaders once again are leading the charge to ensure that schools are able to serve more nutritious meals to our nation's students.

Today there are new challenges that affect the health of our nation's children and the success of our military:

- Nearly one in three young Americans is too overweight to serve, one of the leading reasons why **71 percent of Illinois' young adults cannot serve in the military;**
- **Just over nine percent of young Illinoisans currently have asthma**, which disqualifies them from serving in the military without a waiver. Obesity and lack of exercise can contribute to asthma and other respiratory problems;
- More than 60 percent of non-deployed active duty service members experience a sprain, stress fracture, or other musculoskeletal injury each year due in part to years of low calcium intake, lack of long-term exercise habits and/or excess weight. The military is spending billions treating these injuries among active duty personnel and veterans

Photo: U.S. Army

While these challenges have been driven by a variety of factors, there are two key ways to improve both health and military readiness for generations to come.

First, community planners and builders can prioritize the creation of new transportation systems that prioritize sidewalks, trails, separate bike lanes and other longer-term built environment changes to substantially increase walking or biking to and from school and work. Currently, only 13 percent of students nationwide walk or bike to school. These efforts will reinforce regular physical activity as a simple and rewarding way to lead a healthy life, while improving air quality and lung functioning in the process.

Second, schools can help ensure that children get at least one hour of physical activity every day—the amount recommended by experts—which will help young people maintain a healthy weight while building strong muscles, lungs and bones. Unfortunately, **in an average week, 36 percent of Illinois teens receive no physical education (PE) and only 25 percent get the recommended hour of daily physical activity.**

Finally, we must stay the course on serving healthier school meals. Children consume up to half of their daily calories at school, and healthier meals will not

only help prevent weight gain, but also provide the right nutrients that can enhance physical activity and contribute to bone and muscle growth. According to the U.S. Department of Agriculture, **98 percent of Illinois' schools are serving meals that meet updated nutrition standards**.

The good news is that **Illinois has started making important changes to encourage physical activity.** Chicago is ranked among the top 50 cities for biking nationwide, and Springfield holds an annual "curb your car" challenge for business and other organizations to promote alternative transportation methods. Recent evidence from elsewhere shows success is possible. Childhood obesity rates have declined by more than 30 percent among students in Wisconsin's Chetek-Weyerhaeuser school district following a number of changes to help students become healthier, including expanding opportunities for physical activity throughout the school day. In the most polluted parts of Los Angeles, the number of teens with under-developed lungs has been cut in half following efforts to reduce air pollution. In Portland, Oregon and across Northern Europe, ongoing commitments to "active transportation" efforts have led to many thousands more children and adults walking or biking to and from school and work each day.

With all of this in mind, the retired admirals and generals of Mission: Readiness are leading the way to making PE a key part of every student's school day and supporting Safe Routes to School projects in Illinois and across the country. Collectively, these efforts will put more students on track for a healthy future and help those who choose that path the opportunity to serve their country in the military. When military leaders have called for important changes that impact our nation's security, America has listened and acted. It is time for Illinois to answer the call.

"A few Illinois cities are at the forefront of active transportation efforts nationwide. For example, Chicago ranked among the top 50 cities for biking in the country."

Illinois, We Have a Problem

Impacts on the Military

A growing number of military recruits and service members are not only too overweight, but also too frail to fight. Many others have respiratory problems that prevent them from serving. While some physical deficiencies can be addressed once individuals enter the military, long-term military readiness is at risk unless a large-scale change in physical activity and nutrition takes place in America.

Unhealthy weights

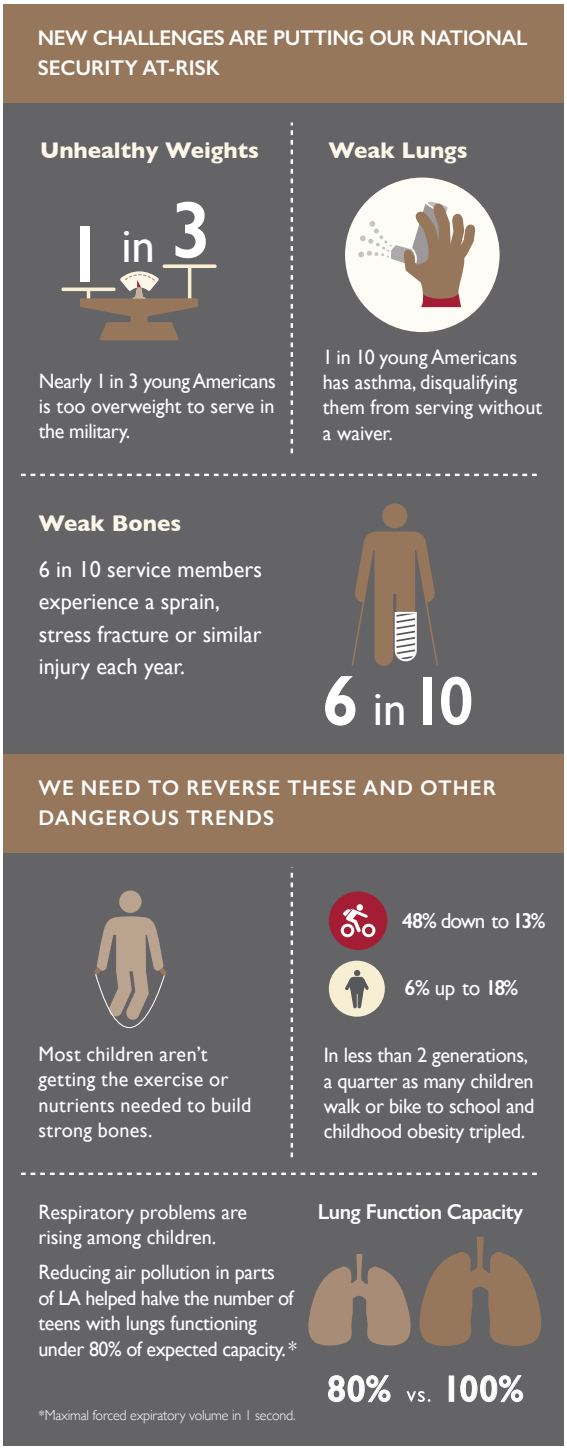
Nearly one in three young Americans is now too heavy to serve in the armed forces, a main reason why 71 percent of Illinois young adults cannot serve.[1] At the same time, physical inactivity is a problem even among those whose weight does not disqualify them from serving; according to one study, one out of every seven male Army recruits reported that they had not exercised or played any sports in a typical week prior to joining.[2]

Among active duty forces, obesity has risen by 61 percent since 2002. The military pays more than $1.5 billion in annual obesity-related health care spending and costs to replace unfit personnel.

Respiratory problems

Asthma is a smaller but growing problem for recruiters, rendering just over nine percent of young Illinoisans ineligible for military service.[3] In addition, approximately 600 newly enlisted recruits are discharged each year because of asthma and approximately four percent of soldiers currently have asthma.[4]

While allergens, air pollution and smoking are known to increase the risk of asthma and other respiratory problems, research shows that obesity and a lack of



physical fitness are also risk factors.[5] For example, one *Journal of the American Medical Association* study examining a military population found that being overweight or obese was a major risk factor for asthma.[6]

Broken bones and sprains

The military is also facing an unprecedented problem with sprains, stress fractures and other orthopedic problems (also known as musculoskeletal injuries). Those injuries are now recognized as "the biggest medical threat to readiness" among service members.[7] Musculoskeletal injuries increase during wartime as a result of heavier packs and greater stressors, but research shows that poor nutrition, lack of exercise and obesity are contributing factors as well.[8]

More than 60 percent of non-deployed active duty service members experience a musculoskeletal injury each year for an annual total of more than 740,000 musculoskeletal injuries. These injuries are the leading reason why 30 percent of the Army's reserve population is non-deployable.[9] They are also the leading health-related reason for discharge from service. Discharges for these injuries have increased five-fold among males and nine-fold among females over the last three decades.[10]

There are more than two million medical encounters among service members for musculoskeletal injuries every year—greater than for any other condition.[11] There were 72 percent more medical evacuations from Afghanistan and Iraq to Germany for stress fractures, serious sprains and other musculoskeletal injuries among those deployed than for combat wounds.[12]

The military pays at least $5 billion a year in medical care costs and for the salaries of service members who are on limited duty or non-deployable because of injuries—the majority of which are musculoskeletal.[13] U.S. Department of Veterans Affairs (VA) payments to individuals partially or fully disabled by musculoskeletal injuries also topped $5 billion per year even before the Afghanistan and Iraq wars.[14] Since 2000, the average disability payment to veterans has increased by 60 percent.[15]

Declining activity and weaker bones among children

It is well-known that America is facing an obesity epidemic. A growing body of research is shedding light on one of the primary contributors to the epidemic: physical inactivity.

In less than two generations, physical activity time among adults in the U.S. has declined 32 percent and is on track to drop 46 percent by 2030.[16] Three-quarters of children receive less than an hour of physical activity daily.[17] The proportion of children who walk or bike to school dropped dramatically over the past four decades: from 48 percent in 1969 to 13 percent in 2009.[18] Meanwhile, children's diets are increasingly made up of more empty calories and fewer nutrients. For instance, in 1977, children received 13 percent of their total daily calories from milk and eight percent from sugary drinks. In 2001, by contrast, children received 17 percent of their daily calories from sugary drinks and only eight percent from milk.[19]

As a result of these trends, compared to recent generations, **children at age 10 are not only 12 pounds heavier, but many also have weaker bones.**[20]

More than one-quarter of adult bone mass is formed between the ages of nine and 15, and research on child development shows that if children miss this key window for bone growth, they can have problems the rest of their lives.[21] Yet an increasing number of children are not getting the adequate physical activity, calcium and vitamin D that healthy musculoskeletal development requires:

- Between the ages of nine and 15, the time that children spend engaged in moderate and vigorous physical activity drops by 75 percent. By tenth grade, 70 percent of American students are not getting the recommended hour of moderate to vigorous exercise daily.[22]
- Eighty-five percent of adolescent girls and 77 percent of adolescent boys ages nine to 13 are not getting an adequate amount of calcium, and nearly half of girls and boys ages nine to 13 are not getting the vitamin D needed to build strong bones.[23]

As a result of these deficiencies, there is evidence that many children have weaker bones than previous generations. A long-term study in Rochester, Minnesota, published in the *Journal of the American Medical Association*, found that forearm fractures increased by 32 percent among boys and 56 percent among girls from 1970 to 2000, likely in part because of rising obesity rates and less-developed skeletal systems.[24] It is also possible that many children are suffering from weaker muscles and tendons due to lack of exercise; the CDC began collecting data on children's muscle strength in 2012, and research examining longitudinal trends should become available in future years.[25]

Respiratory problems often develop in childhood

In just over three decades, the proportion of the U.S. population with asthma has tripled—from around three percent in 1980 to nine percent in 2013.[26] Just over nine percent of 18- to 24-year-olds in Illinois and 10 percent nationwide have asthma. Asthma prevalence is slightly higher among young adults ages 18 to 24.[27] Meanwhile, CDC data show that the proportion of Americans ages 12 to 15 with adequate levels of cardiorespiratory fitness dropped by 20 percent between 2000 and 2012.[28]

Particulate Air Pollution in Major Cities

The average daily density of fine particulate matter in micrograms per cubic meter (PM2.5). Less than 12.4 PM2.5 is considered good by U.S. standards.

Fulton County (Atlanta)	13.2
Cook County (Chicago)	**13.1**
Washington, DC	12.7
Winnebago County (Rockford)	**12.3**
Dallas County (Dallas)	9.9
Los Angeles County	8.1

Source: Robert Wood Johnson Foundation 2015 County Health Rankings, 2011 data.

There is no single cause of asthma or other respiratory problems, but physical inactivity and pollution contribute to these issues.[29] Lung development is nearly complete by the age of 18 and, therefore, "children with lung deficits are likely to have diminished lung function for the rest of their lives."[30] Research shows that children exposed to nitrogen dioxide and fine particulate matter—both prevalent in traffic pollution—experience an increase in daily symptoms of troubled breathing as well as a substantial decrease in lung function and growth.[31] Another study found that children with elongated exposure to these pollutants throughout the first eight years of life have an increased risk of developing asthma.[32] Compared to other major cities around the country, Chicago and Rockford have higher than average particulate air pollution.

Increasing walking and biking can reduce air pollution near schools.

There is promising evidence that reducing air pollution can strengthen children's lungs. According to a recent study, neighborhoods in Los Angeles that experienced meaningful decreases in air pollution over 17 years also saw the percent of children with smaller lungs and lower lung functioning cut in half over the same time period. Specifically, teens with lung function below 80 percent of average—a criterion used to indicate concern—fell from eight percent to four percent.[33]

Other research shows that children in schools in high air pollution areas have more respiratory problems.[34] A return to substantial numbers of children walking and biking to and from school will not only help them get more exercise, but it will also help reduce the number of cars and buses idling outside their schools.[35]

Three Solutions to Strengthen the Next Generation

Photo: "Divvy Bicycles - Michigan Avenue - Chicago IL", Creative Commons from Meridith112

One of downtown Chicago's 476 bicycle sharing stations.

Photo: Minnesota Department of Health and the Minneapolis Health

A Walking School Bus, where a group of children walks to school with one or more adults.

1 Build physical activity back into communities

Since 2005, more than 500 Safe Routes to School projects have been funded in Illinois, and the state has received more than $47 million in federal Safe Routes to School funding, helping to increase the number of children who walk and bike to and from school by improving sidewalks, bicycle paths, intersections, traffic signals and other infrastructure, as well as by enlisting parents to participate.[38]

One such project is in Chicago, where four schools participate in a walking school bus program, in which parents volunteer to accompany a group of children to and from school.[39] In Maryville, new sidewalks are being constructed in the area surrounding Maryville Elementary School with the hopes that they will encourage more students to walk and bike to school.[40]

Some Illinois cities are making other important progress. In Chicago, the city implemented "Divvy," a bike sharing system that now has 4,760 bikes and 476 stations throughout the city, providing riders with an alternative and more active method of transportation around the city.[41] This has contributed to Chicago being ranked among the top 50 cities for biking in the county.[42] However, there is still work to be done; only 8.1 percent of adults in Chicago, 3.5 percent in Springfield, and 1.9 percent in Rockford actively commute to work.[43]

2 Keep and improve physical activity in the school day

Physical education (PE) is a critical source of physical activity for children. The good news is that Illinois is doing well at ensuring most students have PE when compared with the rest of the country. Illinois requires daily physical education for all students in grades K-12.[44] As a result, while 70 percent of high school students nationwide report attending no PE in an average week, only 36 percent of students in Illinois do.[45] Even with the requirement in place, there is still progress to be made. Only 25 percent of high school students in Illinois get the recommended hour of daily physical activity.[46] The Illinois State Board of Education (ISBE) has acknowledged the need to improve the quality of PE in schools by boosting the amount of class time spent engaged in physical activity, among other things. ISBE's Enhance PE Task Force developed a plan to improve PE classes in these and other areas.

Increasing physical activity during the school day can improve students' health, fitness and even their academic performance. Studies have found that PE curricula that emphasize total participation and health and nutrition education, such as the *SPARK* and *CATCH* programs, can substantially increase children's physical fitness and endurance.[47] Other rigorous studies have found that increasing physical activity during the school day can improve bone growth in prepubescent children.[48] Meanwhile, a randomized trial of another program, *Physical Activity Across the Curriculum*, found that incorporating more physical activity into the school day improved test scores among students at participating schools compared to those in the control group.[49]

The connection between physical activity and brain functioning helps to explain this boost in test scores. Research shows that physical activity increases neural activity and affects areas of the brain that are associated with learning in children.[50] For example, one randomized study of an afterschool program that provided children with 70 minutes of physical activity per day for nine months found significant improvements in working memory (important for learning, reasoning and comprehension) among participants compared to children in the control group.[51]

Walking and Biking Can Be Serious Transportation

Portland's Safe Routes to School program reports that approximately 42 percent of its students now walk or bike to school, and in Malmo, Sweden—as in much of bike-friendly Northern Europe—half of students bike or walk to school.

Photo: Creative Commons from La Citta Vita

A barge for parking bikes in Malmo, the third-largest city in Sweden.

3 Do not retreat on healthier school meals

As a result of updated national nutrition standards for school meals that went into effect in 2012, 98 percent of schools in Illinois are now serving healthier meals that have more fruits, vegetables, whole grains and lean proteins.[53] Schools struggling to meet the updated standards have received support from the U.S. Department of Agriculture (USDA), which has awarded more than $185 million in grants to fund new school kitchen equipment nationwide since 2009, including $1.4 million in Illinois, and continues to provide training to school nutrition professionals to help schools serve healthy meals for students. The Department also announced the nationwide expansion of its *Team Up for School Nutrition Success* program, which allows the schools still working to meet the standards to pair up and learn best practices from schools that are already successfully serving healthier meals. USDA has also provided appropriate flexibility on issues such as transitioning to whole grain products.[54]

It is important to keep making progress on healthier meals because children consume up to half of their

Active Physical Education can reduce weight gain while building strong bones and lungs.

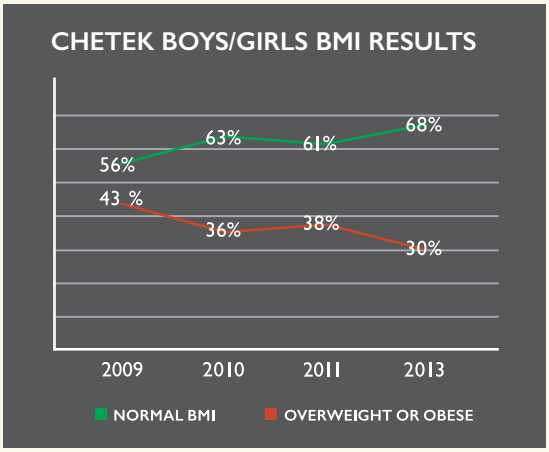
daily calories at school, and healthier meals will not only help prevent weight gain, but also provide the right nutrients that can enhance physical activity and healthier bone and muscle growth.[55]

Conclusion

Throughout America's history, when military leaders have said it is time for a major change, the country has stepped forward to take action. Too many children are currently overweight and have weak bones or under-developed lungs. Prioritizing changes in schools and communities that promote physical education and activity are the right steps for Illinois' future. National security is at stake. It is time to act.

Accomplishing Real Change

Student obesity rates in the Chetek-Weyerhaeuser School District in Wisconsin are declining faster than almost any other location nationwide. In just four years, from 2009 to 2013, the percent of students who were overweight or obese dropped from 43 percent to 30 percent. The lower obesity rates have coincided with dramatic improvements in physical activity and meals served in district schools. For example, the district purchased exercise equipment such as a climbing wall, skates, snowshoes, kayaks, cross-country skis, mountain bikes, treadmills and elliptical and weight lifting machines. They also updated school meals standards to include more fruits and vegetables, whole grains and low-fat milk and enhanced health and nutrition education during classes.[51]



Appendix

Illinois Data by County on Physical Activity and Obesity

	Adult obesity rate (%)	Adults who report getting no physical activity (%)	Population without adequate access to locations for physical activity (%)		Adult obesity rate (%)	Adults who report getting no physical activity (%)	Population without adequate access to locations for physical activity (%)
Statewide	27	23	11	Lee	29	25	38
Adams	35	25	17	Livingston	32	32	32
Alexander	33	29	38	Logan	32	26	32
Bond	28	27	42	McDonough	29	23	31
Boone	31	25	24	McHenry	28	22	6
Brown	31	27	86	McLean	31	24	22
Bureau	31	31	29	Macon	33	25	21
Calhoun	30	32	70	Macoupin	33	31	43
Carroll	31	26	28	Madison	32	28	13
Cass	29	26	32	Marion	36	33	34
Campaign	27	21	19	Marshall	31	27	36
Christian	33	31	32	Mason	32	28	46
Clark	32	27	37	Massac	35	31	38
Clay	31	34	48	Menard	31	29	32
Clinton	28	30	50	Mercer	30	30	44
Coles	28	23	22	Monroe	32	27	29
Cook	25	21	1	Montgomery	27	24	49
Cumberland	30	29	99	Morgan	31	29	30
DeKalb	29	20	25	Moultrie	31	28	38
De Witt	33	29	25	Ogle	29	25	32
Douglas	30	28	28	Peoria	28	23	25
DuPage	24	19	1	Perry	29	26	63
Edgar	33	24	51	Piatt	32	26	38
Edwards	30	27	68	Pike	31	30	40
Effingham	29	27	45	Pope	30	29	2
Fayette	27	24	52	Pulaski	33	28	32
Ford	31	29	40	Putnam	30	28	52
Franklin	31	29	31	Randolph	32	25	33
Fulton	33	27	35	Richland	30	29	32
Gallatin	31	29	63	Rock Island	27	27	19
Greene	28	28	42	St. Clair	31	28	18
Grundy	32	27	16	Saline	32	31	27
Hamilton	29	27	65	Sangamon	30	27	20
Hancock	30	30	40	Shuyler	30	28	50
Hardin	34	29	0	Scott	30	26	93
Henderson	33	28	75	Shelby	32	33	46
Henry	30	26	30	Stark	32	28	37
Iroquois	32	30	49	Stephenson	27	27	22
Jackson	32	23	25	Tazewell	28	29	15
Jasper	31	27	58	Union	33	28	42
Jefferson	35	28	42	Vermilion	34	27	35
Jersey	32	32	43	Wabash	31	30	30
Jo Daviess	29	29	39	Warren	32	28	31
Johnson	29	27	30	Washington	32	28	42
Kane	27	21	6	Wayne	29	29	59
Kankakee	31	27	19	White	32	28	47
Kendall	31	19	8	Whiteside	27	28	21
Knox	29	29	32	Will	29	23	4
Lake	26	19	4	Williamson	35	31	25
LaSalle	30	23	22	Winnebago	30	27	18
Lawrence	32	29	53	Woodford	30	24	29

Source: County Health Rankings & Roadmaps, Robert Wood Johnson Foundation

Endnotes

1 2013 Qualified Military Available (QMA), based on personal communication between Mission: Readiness and the Accession Policy and Joint Advertising, Market Research and Studies teams at the Department of Defense in July 2014.

2 Swedler, D.I., Knapik, J.J., Williams, K.W., Grier, T.L., & Jones, B.H. (n.d.). Risk factors for medical discharge from United States Army basic combat training. Aberdeen Proving Ground, MD: US Army Center for Health Promotion and Preventive Medicine.

3 The military does not accept individuals who currently have asthma and 10% of Americans ages 18-24 currently have asthma, according to: Centers for Disease Control and Prevention (n.d.) "Table C3: Adult Self-Reported Current Asthma Prevalence Rate (Percent) and Prevalence (Number) by Age and State or Territory, BRFSS 2013." Behavioral Risk Factor Surveillance System. National Center for Environmental Health. Retrieved from http://www.cdc.gov/asthma/brfss/2013/tableC3.htm; the National Health Interview Survey finds slightly lower prevalence among young adults. See: Centers for Disease Control and Prevention (n.d.) "Table 4-1: Current Asthma Prevalence Percents by Age, United States: National Health Interview Survey, 2013." National Health Interview Survey (NHIS). National Center for Health Statistics. Retrieved from http://www.cdc.gov/asthma/nhis/2013/table2-1.htm

4 The annual number newly enlisted recruits who are discharged for asthma is based on the average yearly rate from 2007-2011; see page 70 of Accession Medical Standards Analysis & Research Activity (AMSARA). "2013 Annual Report." Silver Spring, MD. Retrieved from http://www.amsara.amedd.army.mil/Documents/AMSARA_AR/AMSARA%20AR%202013_final.pdf; Szema, A. M., Peters, M. C., Weissinger, K. M., Gagliano, C. A., & Chen, J. J. (2010). New-onset asthma among soldiers serving in Iraq and Afghanistan. Allergy and Asthma Proceedings.

5 World Health Organization (2011). Global status report on noncommunicable diseases 2010. Global status report on noncommunicable diseases 2010. Retrieved from http://www.who.int/gard/publications/Risk%20factors.pdf; Marshall, H. (2013). Jobs, junk food, and geography—asthma risks mount up. Lancet Respir Med. Mar1(1):14; Siersted, H., Hansen, H., & Hansen, N. (2000). Low physical fitness in childhood is associated with the development of asthma in young adulthood: the Odense schoolchild study. European Respiratory Journal, 16(5), 866-870.

6 Young, S.Y., Gunzenhauser, J. D., Malone, K. E., & McTiernan, A. (2001). Body mass index and asthma in the military population of the northwestern United States. JAMA – the Journal of the American Medical Association, formerly Archives of Internal Medicine, 161(13), 1605-1611.

7 Nindl, B. C., Williams, T. J., Deuster, P. A., Butler, N. L., & Jones, B. H. (2013). Strategies for optimizing military physical readiness and preventing musculoskeletal injuries in the 21st century. US Army Medical Department journal, (4-13), 5-23. Retrieved from http://www.cs.amedd.army.mil/FileDownload-public.aspx?docid=565febfe-b26e-4922-8f82-0e9373b5f01a; Hauret, K. G., Jones, B. H., Bullock, S. H., Canham-Chervak, M., & Canada, S. (2010). Musculoskeletal injuries: description of an under-recognized injury problem among military personnel. American journal of preventive medicine, 38(1), S61-S70.

8 Lardner, R. (2009, March 11). "Stress injuries rising due to combat loads." Military Times. Retrieved from http://archive.armytimes.com/article/20090311/NEWS/903110313/Stress-injuries-rising-due-combat-loads; Centers for Disease Control and Prevention (2011). "Nutrition for everyone: Calcium and bone health." Retrieved May 22, 2012, from http://www.cdc.gov/nutrition/everyone/basics/vitamins/calcium.html; Centers for Disease Control and Prevention (n.d.) "Childhood Obesity Facts." Retrieved from http://www.cdc.gov/healthyyouth/obesity/facts.htm; Anderson, MK, Grier, T, Canham Chervak, M, Bushman, TT & Jones, BH, Army Institute of Public Health. Association of health behaviors and risk factors for injury: A study of military personnel. Poster session presented at: 141st American Public Health Association Annual Meeting and Expo; 2013 Nov 2-6. Boston, MA.

9 Nindl, B. C., Williams, T. J., Deuster, P. A., Butler, N. L., & Jones, B. H. (2013). Strategies for optimizing military physical readiness and preventing musculoskeletal injuries in the 21st century. US Army Medical Department journal, (4-13), 5-23. Retrieved from http://www.cs.amedd.army.mil/FileDownload-public.aspx?docid=565febfe-b26e-4922-8f82-0e9373b5f01a; The musculoskeletal injury rate is 628 injuries per 1000 person-years—see: Hauret, K. G., Jones, B. H., Bullock, S. H., Canham-Chervak, M., & Canada, S. (2010). Musculoskeletal injuries: description of an under-recognized injury problem among military personnel. American journal of preventive medicine, 38(1), S61-S70.

10 Nindl, B. C., Williams, T. J., Deuster, P. A., Butler, N. L., & Jones, B. H. (2013). Strategies for optimizing military physical readiness and preventing musculoskeletal injuries in the 21st century. US Army Medical Department journal, (4-13), 5-23. Retrieved from http://www.cs.amedd.army.mil/FileDownload-public.aspx?docid=565febfe-b26e-4922-8f82-0e9373b5f01a; Hauret, K. G., Jones, B. H., Bullock, S. H., Canham-Chervak, M., & Canada, S. (2010). Musculoskeletal injuries: description of an under-recognized injury problem among military personnel. American journal of preventive medicine, 38(1), S61-S70.

11 Nindl, B. C., Williams, T. J., Deuster, P. A., Butler, N. L., & Jones, B. H. (2013). Strategies for optimizing military physical readiness and preventing musculoskeletal injuries in the 21st century. US Army Medical Department journal, (4-13), 5-23. Retrieved from http://www.cs.amedd.army.mil/FileDownload-public.aspx?docid=565febfe-b26e-4922-8f82-0e9373b5f01a; The musculoskeletal injury rate is 628 injuries per 1000 person-years—see: Hauret, K. G., Jones, B. H., Bullock, S. H., Canham-Chervak, M., & Canada, S. (2010). Musculoskeletal injuries: description of an under-recognized injury problem among military personnel. American journal of preventive medicine, 38(1), S61-S70.

12 Cohen, S.P., Brown, C., Kurihara, C., Plunkett, A., Nguyen, C., & Strassels, S.A. (2010). Diagnoses and factors associated with medical evacuation and return to duty for service members participating in Operation Iraqi Freedom or Operation Enduring Freedom: a prospective cohort study. The Lancet, 375, 301-09.

13 According to a 2013 military study, "The healthcare costs alone ascribed to those 68,000 DoD service members [on limited duty because of injury] are over $700 million a year. The cost of salaries of Soldiers who cannot deploy [due to injuries] is just over $3 billion annually. The costs to the Army for medical care and salaries of Soldiers on limited duty can be conservatively estimated to be about $1.5 billion per year." See: Nindl, B. C., Williams, T. J., Deuster, P. A., Butler, N. L., & Jones, B. H. (2013). Strategies for optimizing military physical readiness and preventing musculoskeletal injuries in the 21st century. US Army Medical Department journal, (4-13), 5-23. Retrieved from http://www.cs.amedd.army.mil/FileDownloadpublic.aspx?docid=565febfe-b26e-4922-8f82-0e9373b-5f01a

14 Department of the Army (2011, May). TECHNICAL BULLETIN MEDICAL 592: PREVENTION AND CONTROL OF MUSCULOSKELETALINJURIES ASSOCIATED WITH PHYSICAL TRAINING. Washington, DC. Retrieved from http://www.usariem.army.mil/assets/docs/publications/guidance/tbmed592_musculoskeletal_injuries.pdf

15 Bass, E., & Golding, H. (2014). Veterans' Disability Compensation: Trends and Policy Options. CONGRESSIONAL BUDGET OFFICE (US CONGRESS) WASHINGTON DC.

16 Ng, S.W., & Popkin, B.M. (2012). Time use and physical activity: A shift away from movement across the globe. Obesity Review, 13(8), 659-80.

17 National Physical Activity Plan (n.d.) "The 2014 United States Report Card on Physical Activity for children and Youth." Retrieved from https://www.informz.net/acsm/data/images/NationalReportCard_longform_final%20for%20web%282%29.pdf

18 McDonald, N.C., Brown, A.L., Marchetti, L.M., & Pedroso, M.S. (2011). US school travel, 2009: An assessment of trends. American Journal of Preventive Medicine, 41(2), 146-151.

19 Nielsen, S. J., & Popkin, B. M. (2004). Changes in beverage intake between 1977 and 2001. American journal of preventive medicine, 27(3), 205-210.

20 The average weight of a 10-year-old boy increased by 10 pounds between 1970 and 2002 and rose 14 pounds among girls. Among older children, the average weight of a 15-year-old boy increased by 17 pounds between 1970 and 2002, 9 pounds among girls the same age. Ogden, C. L., et al. (2004, October). Mean body weight, height, and body mass index: United States 1960-2002 (pp. 1-17). Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Health Statistics. Retrieved from http://www.cdc.gov/nchs/data/ad/ad347.pdf

21 Bailey DA, Martin AD, McKay HA, Whiting S, Mirwald R. Calcium

accretion in girls and boys during puberty: a longitudinal analysis. J Bone Miner Res. 2000; 15:2245-2250. Retrieved from http://onlinelibrary.wiley.com/doi/10.1359/jbmr.2000.15.11.2245/full

22 Nader, P.R., Bradley, R.H., Houts, R.M., McRitchie, S.L., & O'Brien, M. (2008). Moderate-to-vigorous physical activity from ages 9 to 15 years. Journal of the American Medical Association, 300(3), 295-305. Telama, R., & Yang, X. (2000). Decline of physical activity from youth to young adulthood in Finland. Medicine and Science in Sports and Exercise, 32(9), 1617-1622; Centers for Disease Control and Prevention (2011). "Youth Online."Youth Behavioral Risk Factor Surveillance System. Retrieved on February 3, 2014 from www.cdc.gov/yrbs

23 Bailey, R. L., Dodd, K. W., Goldman, J. A., Gahche, J. J., Dwyer, J. T., Moshfegh, A. J., et al. (2010). Estimation of total usual calcium and vitamin D intakes in the United States. The Journal of nutrition, 140(4), 817-822.

24 Khosla, S., Melton III, L. J., Dekutoski, M. B., Achenbach, S. J., Oberg, A. L., & Riggs, B. L. (2003). Incidence of childhood distal forearm fractures over 30 years: a population-based study. JAMA -- the Journal of the American Medical Association, 290(11), 1479-1485; NIH/National Institute on Aging (2003, Sept. 16). "PUBLIC RELEASE: Study shows dramatic increase in wrist fractures over 30-year span." Retrieved from http://www.eurekalert.org/pub_releases/2003-09/nioa-ssd091503.php

25 Ervin, R. B., Wang, C., Fryar, C. D., Miller, I. M., & Ogden, C. L. (2013). Measures of muscular strength in US children and adolescents, 2012. NCHS data brief, 139, 1-8. Retrieved from http://www.cdc.gov/nchs/data/databriefs/db139.pdf

26 Mannino, D. M., Homa, D. M., Pertowski, C. A., Ashizawa, A., Nixon, L. L., Johnson, C. A., et al. (1998). Surveillance for asthma—United States, 1960–1995. MMWR CDC Surveill Summ, 47(1), 1-27; Centers for Disease Control and Prevention (n.d.) "Table C1: Adult Self-Reported Current Asthma Prevalence Rate (Percent) and Prevalence (Number) by State or Territory, BRFSS 2013." Behavioral Risk Factor Surveillance System. National Center for Environmental Health. Retrieved from http://www.cdc.gov/asthma/brfss/2013/tableC3.htm

27 10% of Americans ages 18-24 currently have asthma, according to: Centers for Disease Control and Prevention (n.d.) "Table C3: Adult Self-Reported Current Asthma Prevalence Rate (Percent) and Prevalence (Number) by Age and State or Territory, BRFSS 2013." Behavioral Risk Factor Surveillance System. National Center for Environmental Health. Retrieved from http://www.cdc.gov/asthma/brfss/2013/tableC3.htm; the National Health Interview Survey finds slightly lower prevalence among young adults. See: Centers for Disease Control and Prevention (n.d.) "2013 National Health Interview Survey (NHIS) Data: Table 4-1: Current Asthma Prevalence Percents by Age, United States: National Health Interview Survey, 2013." National Health Interview Survey (NHIS). National Center for Health Statistics. Retrieved from http://www.cdc.gov/asthma/nhis/2013/table2-1.htm

28 Gahche, J., Fakhouri, T., Carroll, D. D., Burt, V. L., Wang, C., & Fulton, J. E. (2014). Cardiorespiratory fitness levels among us Youth aged 12-15 years: United States, 1999-2004 and 2012. NCHS data brief, (153), 1-8.

29 World Health Organization (2011). Global status report on noncommunicable diseases 2010. Global status report on noncommunicable diseases 2010. Retrieved from http://www.who.int/gard/publications/Risk%20factors.pdf; Marshall, H. (2013). Jobs, junk food, and geography—asthma risks mount up. Lancet Respir Med. Mar;1(1):14; Siersted, H., Hansen, H., & Hansen, N. (2000). Low physical fitness in childhood is associated with the development of asthma in young adulthood: the Odense schoolchild study. European Respiratory Journal, 16(5), 866-870.

30 Gauderman, W J, E Avol, F Gilliland, H Vora, D Thomas, K Berhane, R McConnell, N Kuenzli, F Lurmann, E Rappaport, H Margolis, D Bates and J Peters. "The effect of air pollution on lungd evelopment from 10 to 18 years of age."The New England Journal of Medicine 351,11 (2004): 1057–1067.

31 Gauderman, W J, E Avol, F Gilliland, H Vora, D Thomas, K Berhane, R McConnell, N Kuenzli, F Lurmann, E Rappaport, H Margolis, D Bates and J Peters. "The effect of air pollution on lungd evelopment from 10 to 18 years of age."The New England Journal of Medicine 351,11 (2004): 1057–1067.

32 Gehring, Ulrike, Alet H. Wijga, Michael Brauer, Paul Fischer, Johan C. de Jongste, Marjan Kerkhof, Marieke Oldenwening, Henriette A. Smit and Bert Brunekreef. "Traffic-related Air Pollution and the Development of Asthma and Allergies during the First 8 Years of Life." American Journal of Respiratory and Critical Care Medicine 181(2010):596–603, as reported in Safe Routes to School National Partnership (2012, June). "Safe Routes to School and Traffic Pollution." Retrieved from http://www.saferoutespartnership.org/sites/default/files/pdf/Air_Source_Guide_web.pdf

33 Gauderman, W. J., Urman, R., Avol, E., Berhane, K., McConnell, R., Rappaport, E., et al. (2015). Association of improved air quality with lung development in children. New England Journal of Medicine, 372(10), 905-913.

34 Patel, M. M., Chillrud, S. N., Correa, J. C., Feinberg, M., Hazi, Y., Deepti, K., et al. (2009). Spatial and temporal variations in traffic-related particulate matter at New York City high schools. Atmospheric environment, 43(32), 4975-4981; Korenstein, S., & Piazza, B. (2002). An exposure assessment of PM10 from a major highway interchange: are children in nearby schools at risk?. Journal of environmental health, 65(2), 9-17, 37.

35 U.S. Environmental Protection Agency (n.d.) "Idle Free Schools." Retrieved from http://www2.epa.gov/region8/idle-free-schools

36 Active Living Research (2013, February). Article Summary: Reaching the Goal of 60 Minutes of Physical Activity for Children. Robert Wood Johnson Foundation. Retrieved from: http://activelivingresearch.org/; Basset, D.R. et al. (2013). Estimated Energy Expenditures for School-Based Policies and Active Living. American Journal of Preventive Medicine, 44(2), 108-113.

37 Center for Disease Control and Prevention. (n.d.). "Illinois, High School Youth Risk Behavior Survey, 2013." Retrieved on December 15, 2015 from https://nccd.cdc.gov/youthonline/App/Results.aspx?LID=IL

38 Active Transportation Alliance. (n.d.). Active Kids = Healthy Communities: Support Safe Routes to School. Retrieved from: https://www.activetrans.org/sites/files/SRTS.pdf; Safe Routes, National Center for Safe Routes to School. (n.d.). Illinois. Retrieved on December 16, 2015 from http://www.saferoutesinfo.org/program-tools/find-state-contacts/illinois

39 Safe Routes, National Center for Safe Routes to School. (n.d.). Chicago, Illinois: Community Makes it Safer for Children to Walk to School. Retrieved on December 16, 2015 from http://www.saferoutesinfo.org/program-tools/success-stories/chicago-illinois-community-makes-it-safe-children-walk-school

40 Safe Routes, National Center for Safe Routes to School. (n.d.). Maryville, Illinois: Building Sidewalks in Maryville. Retrieved on December 16, 2015 from http://www.saferoutesinfo.org/program-tools/success-stories/maryville-illinois-building-sidewalks-maryville

41 City of Chicago. (2013, July 1). Chicago Welcomes Divvy Bike Sharing System. Retrieved on December 16, 2015 from http://www.cityofchicago.org/city/en/depts/cdot/provdrs/bike/news/2013/jul/chicago_welcomesdivvybikesharingsystem.html; Divvy. (n.d.). About Divvy. Retrieved on December 16, 2016 from https://www.divvybikes.com/about

42 Dille, Ian. (2014, August 29). "2014 Top 50 Bike-Friendly Cities." Retrieved from: http://www.bicycling.com/culture/advocacy/2014-top-50-bike-friendly-cities/

43 Census Bureau. (2013). "Table S0801 Commuting Characteristics by Sex." 2009-2013 American Community Survey 5-Year Estimates, American FactFinder. Retrieved on January 26, 2016 from http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_14_5YR_S0801&prodType=table

44 Illinois General Assembly (n.d.) "Illinois Compiled Statutes: Illinois School Code, Sec. 27-6." Retrieved from http://www.ilga.gov/legislation/ilcs/fulltext.asp?DocName=010500050K27-6

45 Center for Disease Control and Prevention. (n.d.). "Did Not Attend Physical Education Classes On all 5 Days, 2013." Retrieved on January 26, 2016 from https://nccd.cdc.gov/youthonline/App/Results.aspx?TT=&OUT=&SID=HS&QID=QNDLYPE&LID=&YID=&LID2=&YID2=&COL=&ROW1=&ROW2=&HT=&LCT=&FS=&FR=&FG=&FSL=&FRL=&FGL=&PV=&TST=&C1=&C2=&QP=G&DP=&VA=CI&CS=Y&SYID=&EYID=&SC=&SO=

46 Center for Disease Control and Prevention. (n.d.). "Did Not Attend Physical Education Classes On all 5 Days, 2013." Retrieved on January 26, 2016 from https://nccd.cdc.gov/youthonline/App/Results.aspx-

?TT=&OUT=&SID=HS&QID=QNDLYPE&LID=&YID=&LID2=&YID2=&COL=&ROW1=&ROW2=&HT=&LCT=&FS=&FR=&FG=&FSL=&FRL=&FGL=&PV=&TST=&C1=&C2=&QP=G&DP=&VA=CI&CS=Y&SYID=&EYID=&SC=&SO=

47 Sallis, J. F., McKenzie, T. L., Alcaraz, J. E., Kolody, B., Faucette, N., & Hovell, M. F. (1997). The effects of a 2-year physical education program (SPARK) on physical activity and fitness in elementary school students. Sports, Play and Active Recreation for Kids. American Journal of Public Health, 87(8), 1328-1334; Nader, P. R., Stone, E. J., Lytle, L. A., Perry, C. L., Osganian, S. K., Kelder, S., et al. (1999). Three-year maintenance of improved diet and physical activity: the CATCH cohort. Archives of pediatrics & adolescent medicine, 153(7), 695.

48 Is a School-Based Physical Activity Intervention Effective for Increasing Tibial Bone Strength in Boys and Girls? This 16-month randomized, controlled school-based study compared change in tibial bone strength between 281 boys and girls participating in a daily program of physical activity (Action Schools! BC) and 129 same-sex controls. The simple, pragmatic intervention increased distal tibia bone strength in prepubertal boys; it had no effect in early pubertal boys or pre or early pubertal girls; A School-Based Exercise Intervention Elicits Substantial Bone Health Benefits: A 2-Year Randomized Controlled Trial in Girls (Pediatrics) Three brief sessions of high-impact exercise per week implemented over 2 consecutive years within the elementary school curriculum elicited a substantial bone mineral accrual advantage in pubertal girls**.**

49 Donnelly, J. E., Greene, J. L., Gibson, C. A., Smith, B. K., Washburn, R. A., Sullivan, D. K., et al. (2009). Physical Activity Across the Curriculum (PAAC): a randomized controlled trial to promote physical activity and diminish overweight and obesity in elementary school children. Preventive medicine, 49(4), 336-341.

50 Active Living Research (2015, January). "Active Education: Growing Evidence on Physical Activity and Academic Performance." Research Brief. Retrieved from http://activelivingresearch.org/sites/default/files/ALR_Brief_ActiveEducation_Jan2015.pdf

51 Hillman, C. H., Pontifex, M. B., Castelli, D. M., Khan, N. A., Raine, L. B., Scudder, M. R., Kamijo, K. (2014). Effects of the FITKids randomized controlled trial on executive control and brain function. Pediatrics, 134(4), 1062–1071.

52 Robert Wood Johnson Foundation (2015, February 5). "Signs of Progress: Chetek-Weyerhaeuser School District, Wisconsin." Retrieved from http://www.rwjf.org/en/about-rwjf/newsroom/newsroom-content/2013/07/chetekweyerhaeuser-schooldistrict-wi-signs-of-progress.html

53 U.S. Department of Agriculture (2014). "School Meals, School Mean Certification Data." Retrieved on December 15, 2015 from http://www.fns.usda.gov/school-meals/school-meal-certification-data

54 U.S. Department of Agriculture (2015, March). "USDA Awards Grants to Support Schools Serving Healthier Meals and Snacks." Food and Nutrition Service. Retrieved from http://www.fns.usda.gov/pressrelease/2015/005815; U.S. Department of Agriculture (2015, March). "USDA Announces Nationwide Expansion of Team Up for School Nutrition Success Initiative." Food and Nutrition Service. Retrieved from http://www.fns.usda.gov/pressrelease/2015/005915

55 Briefel RR, Wilson A, Gleason PM. Consumption of low-nutrient, energy-dense foods and beverages at school, home, and other locations among school lunch participants and nonparticipants. J Am Diet Assoc, 109: Suppl-90, 2009; Stallings, V. A., Suitor, C. W., & Taylor, C. L. (2009, October). School meals: building blocks for healthy children. "Chapter 3: Schoolchildren's Food and Nutrient Intakes and Related Health Concerns." Institute of Medicine. National Academies Press.

FIND US ONLINE AT:

WWW.MISSIONREADINESS.ORG