

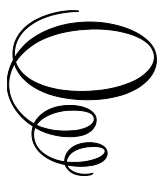
The Infinite Runner

The Infinite Runner

By

Ray M. Merrill and Bill Rodgers

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To my son Dallin, who reminds me that limitations are not binding and that seeking “closeness to the infinite” should be a lifelong pursuit.

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FOREWORD

I can't imagine a better way to begin a running and fitness book than with a mix of tales from hunter-gatherer tribes, Aristotelian philosophy, and the annual marathon race over sacred ground from Marathon, Greece, to the original Olympic Stadium in Athens. That's exactly what you'll find in *The Infinite Runner*, where public health professor Ray M. Merrill and marathoner extraordinaire Bill Rodgers combine their life experiences and lessons learned on the roads.

Once the story gets rolling, you'll find plenty to keep you turning the pages: training and diet advice, dealing with age-related issues, how running improves brain health, and much more.

I was drawn to the book's emphasis on holistic health. This includes eight dimensions of "the good life": the physical, spiritual, intellectual, emotional, social, financial, occupational, and environmental realms. No other running book covers such important, wide-ranging turf.

The Infinite Runner might not lead you to a Boston Marathon win (like Bill's four), but it will certainly help you live a healthier, more satisfying, and more rewarding life. If that's not quite "infinite," it's close enough for me. I think you'll agree.

Amby Burfoot,
1968 Boston Marathon winner
Former Executive Editor of Runner's World Magazine

PREFACE

In our modern world, which lends itself to a sedentary lifestyle, having a plan for being physically active to improve health and fitness is important. Approaches for achieving health and fitness are vast, yet perhaps the most natural approach, one that has evolved over the centuries, is running. Short and long-distance running was essential to the survival of our ancestors and is part of our heritage. Humans are the best distance runners on the planet. Genetic evolution has retained our natural ability to run. Consistent running is a type of physical activity that can positively impact our mental and physical health and can extend life.

This book talks about the benefits of running for our physical and mental health. Chapter 1 covers ways in which running contributes to a “good life.” Chapter 2 associates running with eight important dimensions of wellbeing that contribute to a good life. Chapter 3 provides specific nutrition and sleep guidelines for runners. Chapter 4 talks about changes in our running ability with age, but that running can help us stay a step ahead of father time. Chapter 5 talks about running and brain health. Chapter 6 talks about life skills developed through running that, when applied to other aspects of our life, promote virtues (e.g., strong, and meaningful relationships) consistent with a good life.

William Henry (“Bill”) Rodgers, an Olympian who competed in the 1976 Olympic marathon in Montreal, Canada, four-time winner of the Boston marathon, four-time winner of the New York marathon, winner of the 1977 Fukuoka Marathon, and winner of many other notable road races during the 1970s, contributed to the running boom in the United States in the 1970s and 1980s. Many of his experiences will be woven into the book such that his journey will be combined with the scientific based health benefits of running.

The book is intended for a broad audience of people interested in developing important life skills and promoting a level of wellbeing through running that contributes to a good life. The book will show how many dimensions of our lives can benefit from regular, consistent running. The book also teaches how running, nutrition, and sleep interact to promote good health and

disease prevention; what to expect in our running ability as we age; and how running is good for our brains. Finally, there are certain important life skills that can be learned and developed through running. These will be discussed in part from the perspective of running legends like Bill Rodgers and others. Many of those in the running world will know of Bill and will appreciate learning about his real-life experiences and lessons learned in the sport.

BIOGRAPHIES

Ray M. Merrill, PhD, MPH, received his education in public health and statistics. In 1995, he was named a Cancer Prevention Fellow at the National Cancer Institute, where he worked in the Surveillance Modeling and Methods Section of the Applied Research Branch. In 1998, he joined the faculty of the Department of Health Science at Brigham Young University in Provo, Utah. In 2001, he spent a sabbatical working in the Unit of Epidemiology for Cancer Prevention at the International Agency for Research on Cancer in Lyon, France. He has won various awards for his research and is a Fellow of the American College of Epidemiology and of the American Academy of Health Behavior. He is the author of more than 300 peer-reviewed research papers and textbooks (*Environmental Epidemiology*; *Reproductive Epidemiology*; *Principles of Epidemiology Workbook*; *Introduction to Epidemiology* (Editions 4-9); *Fundamentals of Epidemiology and Biostatistics*; *Behavioral Epidemiology*; *Statistical Methods in Epidemiologic Research*; *Fundamental Mathematics for Epidemiology Study*; and *Principles and Applications of Biostatistics*). He teaches classes in epidemiology, biostatistics, health, and the aging process, is a full professor in the Department of Public Health, College of Life Sciences, at Brigham Young University, and the Director of the Gerontology Program at Brigham Young University. He has run the Boston Marathon twice and completed 14 other marathons.

Bill Rodgers, BA, MA, received a bachelor's degree in Sociology in 1970 from Wesleyan University and a master's degree in special education in 1977 from Boston College. He was an indomitable force as a runner in road-racing in the U.S. and internationally during the 1970s and 1980s. He is best known for as a four-time winner of both the Boston Marathon and the New York Marathon. He set several American records (some of which still stand) and ranked as the top marathoner in the world three times. He is an Olympian and remains an active runner at the age of 76. He is the author of *Marathon Man: My 26.2 Mile Journey from Unknown Grad Student to the Top of the Running World*; *Marathoning*; *Running and Racing*; *Lifetime Running Plan*; and *The Complete Idiot's Guide to Running*.

CHAPTER 1

MAKING A GOOD LIFE

Summary. This chapter focuses on what makes for a “good life.” A “good life” has various interpretations and meanings, but according to Aristotle, achieving it is a long-term endeavor. This endeavor consists of directing our activities toward happiness, where happiness involves acquiring certain virtues. Health is a fundamental virtue. A prescription for optimal health may include consideration of the way of life lived by the hunter-gatherers. Short and long-distance running was essential to their survival and is part of our heritage. Humans are the best distance runners on the planet. Genetic evolution has retained our natural ability to run. Consistent running is a type of physical activity that can positively influence our mental and physical health, extend life and the quality of it, and contribute to a “good life.”

Made to Run

Throughout history, modern humans have sought a “good life,” which has personal meaning for each of us—with many interpretations. To prehistoric nomadic groups (hunter-gatherers) a good life involved mastering a successful subsistence strategy, which consisted of controlling the use of fire, acquiring knowledge of plant life, and refining skills for hunting and domestic living. The lifestyle of hunter-gatherers comprised of considerable amounts of low intensity physical activity along with moderate amounts of medium to high intensity physical activity, in an outdoor environment, with their peers, combined with regular intervals of physically interactive play or dancing.¹

There is evidence that hunter-gatherers had excellent metabolic and cardiovascular health and were happy people. In a study on health, activity, energetics, and diet of hunter-gatherers and other small-scale societies, along with recent fossil and archaeological discoveries and a hunter-gatherer population in northern Tanzania, researchers found they had very low obesity, mean body fat percentage, and high physical activity (exceeding 100 minutes per day of moderate and vigorous physical activity). Their diets were generally less energy dense and richer in fiber

and micronutrients than modern diets.² We know from previous studies that physical activity contributes to greater life satisfaction and happiness,^{3,4} which suggests that the hunter-gatherers were not only fit but happy people.

The Greek philosopher Aristotle believed that a good life is a state in which a person is most happy. He devoted more written thought to the topic of happiness than any thinker prior to the modern era, enshrining happiness as a central purpose of human life. Aristotle believed that to achieve happiness one must develop good moral character, which consists of pursuing, over the course of a whole lifetime, traits (virtues) that reliably dispose a person to act well, such as health, friendship, courage, wisdom, etc.⁵ Aristotle believed that pursuit of good moral character would lead to the perfection of human nature and the enrichment of human life.

In our life's pursuit of a good life, health and fitness play an important role. For hunter-gatherers, their survival required being physically active, even into the later years, and relying on each other. However, being physically active is less essential today for our basic survival, as evidenced by 1 in 4 adults failing to meet recommended levels of physical activity and over 80% of adolescents not sufficiently physically active.⁶ Nevertheless, epidemiologic studies confirm that being physically active has noticeable benefits for our heart, body, and mind. It reduces the risk of disease and symptoms of depression and anxiety. Physical activity enhances thinking, learning, and judgment skills; healthy growth and development in young people; healthy aging; and improves overall wellbeing.

As I thought about whether my lifetime of running made me happier, the plane started its descent into the Athens airport in Greece. I thought about the decisive battle fought on the Marathon plain between the Greek and the Persian armies. The Battle of Marathon (September 490 BCE) occurred in a single afternoon when the Persians were defeated. The legend has it that the Greek messenger Philippides ran from Marathon to Athens to deliver the news of victory but then dropped dead. Whether he really died after delivering his message or not has been questioned, but the Greeks were able to tell a story that has immortalized the marathon.⁷

As we arrived in Athens, the city was preparing for the 40th Athens Marathon. Over 20,000 runners participated in the race. Runners finished in the Panathenaic Stadium in the central Athens district of Pangrati, built for the 1896 Olympic games. The marathon distance then was 40 kilometers (km) (24.85-miles). The marathon distance today is 42.195 km (26.2 miles). This longer distance was adopted in the 1908 Olympic marathon in London

when Queen Alexandra requested that the race go from the Lawn of Windsor Castle to the royal box at the Olympic stadium.

My love for running was inspired by the marathon. As a boy, I learned about the great Ethiopian runner Abebe Bikila who won the 1960 Olympic marathon in Rome, while running barefoot. He won his second gold medal in the 1964 Olympic marathon in Tokyo. Frank Shorter won the 1972 Olympic marathon in Munich. Until Shorter's historic victory, an American had not won the gold medal in the Olympic marathon since Johnny Hayes did so in 1908.

In the 1976 Montréal Olympics, Frank Shorter, Bill Rodgers, and Don Kardong made up the United States marathon team. This race inspired me to join the West High School cross-country team in my freshman year. Our coach had a love for the sport and wanted us to succeed. The first competitive test for me was a mile time trial with my teammates. With no experience, I ran to the front, staying in the lead through three laps, only to find my body fail me the final lap. I lost my place in the lead, completely exhausted, trying hard to not collapse. As I walked off the track, I thought I was a failure. Competitive running was hard, it hurt. I did not want to feel that kind of pain again. Yet, it wasn't long before I was back running with the team. Through the following summer I ran six days a week, about 10 miles a day. Unfortunately, when I returned to school for my sophomore year, hoping my coach would appreciate my progress, he was gone. I never found out where he went or why he left the school, but it was a great disappointment.

Our new coach was also an athlete, but his specialty was the triple jump. He was very successful in college and seemed to appreciate running. I assumed this because he was often seen reading a running magazine. One day, I saw him carrying the 1978 issue of *Track & Field News*, which had on its cover a picture of the Olympic runner Bill Rodgers. Under his picture and name were the words "King of the Road." I was intrigued. As I learned about Rodgers, I was impressed that he won 27 of 30 races he entered that year, and that he set a new world-best time in the 10-kilometer (km) race on the roads. The year before he set American records in the 15 km, 20 km, and one-hour run. The year after he set an American record for 30 km.

When I started running in the mid-1970s, running was becoming very popular in the United States. The running boom during this time was strongly influenced by the successes of certain American runners like Frank Shorter, Bill Rodgers, and Steve Prefontaine. While not a marathoner,

Prefontaine claimed seven NCAA titles, American records from 2 km to 10 km, and took fourth in the 1972 Olympic 5 km.

The running movement really began in the 1960s in New Zealand by the nations runner and athletics coach Arthur Lydiard and spread to the United States by the University of Oregon coach and Nike co-founder Bill Bowerman. In 1966 Bowerman and cardiologist W.E. Harris wrote a book on jogging that sold over a million copies. This was a time of recession, race riots, assassinations, and the war in Vietnam. Running was a way to temporarily escape these challenges.

It was years after my high school running days when I met Bill Rodgers at the 1998 Cherry Blossom Road Race in Washington, D.C. I averaged a 7-minute mile for the 10-mile race but he, albeit 15 years older, ran much faster. In 2022 we met again, when he presented at a conference I organized in Provo. His message at the Conference was inspiring, as was also his subsequent radio interview on the health benefits of staying physically active into the later years. As I joined him and others for a four-mile run, his pace had slowed from his younger days, but his continued passion for running persisted.

Although running times slow with age, there remains an intrinsic desire to continue reaching toward something that defies the frailties associated with older age. In addition to the health benefits of running, it teaches that we can do more than we think we can, overcome and find successes despite life's obstacles. Consider the Boston Marathon. It is run on Patriots Day every spring and is considered a harder marathon in that the course records are slower than the world's best marathon times for men and women. The training and time involved for this, or any marathon, is intense and requires considerable commitment. Most marathoners will likely agree that the competition is less between each other than within oneself. It is a personal journey in which there is great satisfaction that comes from knowing that you can run the full marathon distance. And if you are one of those 4-9% in each age group of the marathon who qualifies to run the Boston Marathon, you become part of the oldest annually run marathon in the world. While only about 0.17% of people worldwide have run a marathon, those few who have can feel a sense of distinction and accomplishment.⁸

Boston Athletic Association member and U.S. Olympic team manager John Graham was inspired by the marathon run at the first Olympic Games in Athens, 1896, to inaugurate the Boston Marathon in 1897. On April 19, an Irish American athlete named John J. McDermott (124 pounds [56 kg] and

5'6" inches [168 cm]) of New York won the first Boston Marathon.⁹ His time of 2:55:10 was the best of 15 runners who started the race that day.

The grandmaster of the Boston Marathon is Clarence H. DeMar of Melrose, Massachusetts. In 1910, Clarence DeMar ran his first Boston Marathon, finishing the race in second place. The next year he won the Boston Marathon, and then he did it again six times. He also won the bronze medal at the 1924 Paris Olympics.¹⁰ This phenomenal athlete associated his running with wellbeing. In 1958, he told the Boston Herald that training for and running in marathons “is no cheap and passing emotion.... It’s a supreme feeling of perfection and closeness to the Infinite I can’t express very well ... To me it’s more than a race. It’s a very personal thing—a sense of supreme wellbeing.”¹¹ An interesting fact came after his death from the New England Journal of Medicine in 1958, which reported that his autopsy showed that his arteries were two or three times the diameter of normal arteries.¹²

Briefly, **arteries** deliver blood to the body (versus veins that return blood to the heart). They increase in size when you run because your muscles demand a greater supply of oxygen and, thus, more blood flows through the arteries. Arteries are made to handle a lot of pressure. On the other hand, **veins** are a low-pressure system with thinner walls and use valves to keep your blood flowing. Veins return blood to the heart. **Capillaries** are tiny blood vessels that transport blood, nutrients, and oxygen to cells. They are the smallest blood vessels in the body system.

Perhaps it is appropriate to say that the marathon is a test of our physical and spiritual endurance. It is a prototype of life’s journey in which our hopes and dreams, our perspectives, can change in a moment. The question is how we will respond. When we begin the race, the hope is to finish, preferably with a personal best time. We are optimistic and excited but know that drama awaits us. Our emotions are heightened, yet at some point in the race we learn of our capacity to endure—we discover pain and our ability to survive. No matter the level of runner, there is a time of reckoning in the marathon, when we feel our bodies failing and must decide whether to go on.

Health

According to Aristotle, making decisions related to possessing the virtues that bring happiness, such as good health, is fundamental to creating a good life. Since the earliest of times, people have sought to understand what it

means to be healthy. In ancient times, health fell under the auspices of religion, obtained by finding favor with deity. Good health was associated with individual sacrifice, pilgrimage to the temple, and prayer to the gods. On the other hand, poor health was attributed to demons.

During the fifth century BCE, Hippocrates took the first step away from the notion that health is supernaturally determined when he identified it as a product of behavior and environmental factors. In 100 BCE, the Roman Galen contributed to the definition of health by considering the whole patient, which included physical, mental, and emotional states.¹³ This holistic conception of health was adopted by the World Health Organization (WHO) in their 1948 definition of health, which is “a state of complete physical, mental and social wellbeing, not merely the absence of infirmity or disease.”¹⁴ Factors that contribute to the broader dimensions of health range from medical interventions to social determinants of health (SDOH). The CDC defines SDOH as “conditions in the places where people live, learn, work, and play that affect a wide range of quality-of-life-risks and outcomes.”¹⁵ Examples include food insecurity, unsafe neighborhoods, and polluted water and air.

Run for Health

In our modern times, which lends itself to a sedentary lifestyle, having a planned approach to being physically active to improve health and fitness is important. Approaches for achieving health and fitness are vast, yet the most natural approach, one that has evolved over the centuries, is perhaps running. A consensus appears to be growing in the scientific community that our bodies evolved to run distances of at least 5 km (3.1 miles), which rely on aerobic metabolism.^{16,17} Aerobic means “with oxygen” and refers to the body’s production of energy with the use of oxygen. On the other hand, anerobic means “without oxygen” and refers to the body’s production of energy stored in your muscles.

It has been suggested that the best model of physical activity is one closely aligned with that of hunter-gatherers.¹ Our genetic makeup has been evolutionarily adapted to moderate amounts of high-intensity interval training, along with high amounts of low-intensity physical activity, averaging up to eight miles of walking or running per day. Cross training aimed at developing flexibility, balance, and strength is consistent with the lifestyle of the hunter-gatherers. In addition, running with others, outdoors, is consistent with the way hunter-gatherers survived.

Although humans are not as fast as many animals, they are the best endurance runners.¹⁸ Yet, inherent factors play a big role in running ability. Genetics is important in determining **VO2 Max** (rate the body can transport oxygen to the muscles for fuel), muscle fiber type, flexibility, metabolism, endurance, and motivation to continue running.¹⁸⁻²³ Elite distance runners are distinguished from other runners by certain physiological traits: higher VO2 Max capacity, running economy, and ability to run long distances at their anaerobic threshold (point when lactic acid, a byproduct of energy made from glucose, substantially builds up in the blood).²⁴⁻²⁶

A study of reviewed data found that running, even at low levels, can lower risk of stroke, osteoarthritis, high blood pressure, high cholesterol, certain cancers, disability, cardiovascular disease, and all-cause mortality.²⁷ Yet research has found that high doses of running (e.g., marathons) can cause cardiotoxicity, although this risk is low.^{27,28}

There are also mental health benefits to running. For example, in a 2018 online survey of 8,157 runners from across the United Kingdom found that running makes people happier and more confident with everyday life.²⁹ About 90% said that running regularly boosted their happiness and positively impacted their mental health and body image. The runners scored 4.4 on the Oxford Happiness Scale compared with an average score of 4.0 in the general population.

Consistency is Key

Top distance runners will say that you optimize form, economy, and aerobic capacity by consistently running. In my conversation with Bill Rodgers about training, he said that during his competitive running years he ran twice a day, with light speed work a couple times per week. He frequently raced, training through most races in preparation for his marathons. He consistently trained around 130 miles per week, with a light week of about 90 miles and the most miles he ran in a week was 202 miles. In that high mileage week leading up to the 1975 Boston Marathon, this is what he did:

Day of the Week	AM	PM
Saturday	14 miles (of which 3 miles were run on the track with times of 4:48, 4:54, and 4:48, with half mile jogs between the runs).	16 miles
Sunday	20 miles on hills	10 miles, easy
Monday	17 miles	13 miles
Tuesday	16 miles	13 miles
Wednesday	16 miles	13 miles
Thursday	16 miles	15 miles
Friday	23 miles on the Boston Marathon Course	

Consistency was no doubt the key to Bill's indomitable force on the road-racing scene throughout the world. In addition to his accomplishments already mentioned, he won both the New York City Marathon and Boston Marathon four times and was the top-ranked marathoner in the world three times. In 1977, he became the first person in history to win the New York Marathon, the Boston Marathon, and the Fukuoka Marathon in a single year. No one has since accomplished this feat. In 1999, he was inducted into the National Track and Field Hall of Fame.³⁰

"I've always had a simple view of training for distance running: two hard interval sessions a week and one long run – 20 miles or two hours, whichever comes first. Every other run is aerobic, and you do as much of that for volume as you can handle. Do this for two or three years, and you'll get good."³¹ – Frank Shorter

In an interview conducted in 2019, Don Kardong indicated that he had been running consistently for 55 years, having run an estimated 100,000 miles during this time.³² Note that this distance is roughly four times around the earth.

"To be a consistent winner means preparing not just one day, one month or even one year – but for a lifetime."³³ – Bill Rodgers

Today, the Kenyan runner Eliud Kipchoge is considered the greatest marathon runner of all time. He is the gold medalist in the 2016 and 2020 Olympic marathons and held the world best time in the marathon in 2022

with a time of 2:01:09, until that record was broken by Kelvin Kiptum in the 2023 Chicago marathon with a time of 2:00:35. Kipchoge claims four of the five fastest marathon times in history. A typical week of training for Kipchoge is 124-136 miles (16-17 hours) per week. His daily training logs are available online.³⁴ As Eliud Kipchoge and Kelvin Kiptum reach the best marathon times in the history of the world, through years of dedicated, consistent effort, watching them run resembles an excellence that borders human limitation, a perfection that approaches the infinite.

Consistency helps the body adapt to the stress of running on the cardiovascular and musculoskeletal systems. Stress on the body is required to create adaptation. Higher mileage equates to greater stamina and overall speed. It is also helpful to increase the intensity of one or more workouts per week by adding an interval session.

With consistent running, muscle strength and function increases, such that less oxygen is required to move, and less carbon dioxide is produced.³⁵ Note that oxygen is used in the body to break down glucose to fuel the muscles in our body. A byproduct produced in response to this reaction is carbon dioxide. With exercise, like running, the muscles work harder, which requires the body to use more oxygen and produce more carbon dioxide. As we exhale, carbon dioxide is expelled from the body. The body copes with higher levels of carbon dioxide by breathing harder.

As mentioned, although the elite distance runner is unique, runners on all levels can improve their quality of life through running. Consistency will help you move beyond the point where every run feels hard. As health is a virtue of the body according to Aristotle, consistency is key to achieving this state. Here are some reasons why: consistent running can positively influence mental health, can improve, and help maintain physical health, and provide time and opportunity for meditation and strengthening social bonds.³⁶⁻⁴⁷ With these benefits, it is not surprising that studies have linked running with longer life. For example, one study found that runners have a 25%-40% lower risk of premature death and live about 3 years longer than their non-runner counterparts.⁴⁸

Conclusion

Perhaps Aristotle was right in thinking that a “good life” is a state in which a person is most happy, acquired from a lifetime of pursuing ennobling virtues, including good health. He referred to health as a virtue of the body. A simple and natural prescription for good health may be seen by hunter-

gatherers. Short and long-distance running was essential to their survival and part of our heritage. Humans are the best distance runners on the planet. Genetic evolution has retained our natural ability to run.

References

1. O'Keefe EL, Lavie CJ. A hunter-gatherer exercise prescription to optimize health and wellbeing in the modern world. *J Sci Sport Exer.* 2021;3:147-157. <https://doi.org/10.1007/s42978-020-00091-0>
2. Pontzer H, Wood BM, Raichlen DA. Hunter-gatherers as models in public health. *Obes Rev.* 2018;19(1):24-35. <https://onlinelibrary.wiley.com/doi/10.1111/obr.12785>
3. Li C, Ning G, Xia Y. Does exercise participation promote happiness?: Mediations and heterogeneities. *Front Public Health.* 2023;10;11:1033157. <https://doi.org/10.3389/fpubh.2023.1033157>
4. An HY, Chen W, Wang CW, Yang HF, Huang WT, Fan SY. The relationships between physical activity and life satisfaction and happiness among young, middle-aged, and older adults. *Int J Environ Res Public Health.* 2020;17(13):4817. <https://www.mdpi.com/1660-4601/17/13/4817>
5. Pursuit of Happiness. Aristotle & Happiness. Accessed March 8, 2024. <https://www.pursuit-of-happiness.org/history-of-happiness/aristotle/>
6. World Health Organization. Physical activity. Accessed March 8, 2024. <https://www.who.int/news-room/fact-sheets/detail/physical-activity>.
7. Lucas JA. A history of the marathon race—490 BC to 1975. *J Sport Hist.* 1976;3(2):120-138.
8. Sayer A. How many people have run a marathon? World Statistics. Marathon Handbook. Accessed March 8, 2024. <https://marathonhandbook.com/how-many-people-have-run-a-marathon/>.
9. Falls J. *The Boston Marathon*. New York: Macmillan; 1977: 163. ISBN 0-02-028520-5.
10. Olympia. Clarence DeMar Biographical Information. Accessed March 8, 2024. <https://www.olympedia.org/athletes/78317>
11. Clarence DeMar in Bill Cunningham, "Marathon more than race to DeMar," *Boston Herald*, June 7, 1958.

12. New England Historical Society. Accessed March 8, 2024. <https://newenglandhistoricalsociety.com/clarence-demar-upends-medical-science-proves-running-good-heart/>
13. Badash I, Kleinman NP, Barr S, Jang J, Rahman S, Wu BW. Redefining health: The evolution of health ideas from antiquity to the era of value-based care. *Cureus*. 2017;9(2):e1018.
14. World Health Organization. Official records of the World Health Organization. No. 234-235. United Nations, World Health Organization, Interim Commission, 1976.
15. Centers for Disease Control and Prevention. Social determinants of health at CDC. Accessed March 8, 2024. <https://www.cdc.gov/about/sdoh/index.html>.
16. Carroll J. How we evolved to run, and why we probably didn't. *Runner's World*. Accessed March 8, 2024. <https://www.runnersworld.com/uk/training/motivation/a34522419/did-we-evolve-to-run/>
17. Bramble DM, Lieberman DE. Endurance running and the evolution of Homo. *Nature*. 2004;432(7015):345-52. <https://doi.org/10.1038/nature03052>
18. Big Think. Why endurance running is humanity's surprising hidden talent. 2018. Accessed March 8, 2024. <https://bigthink.com/life/humans-best-endurance-runners/>.
19. Boucharde C, Rankinen T, Chagnon YC, et al. Genomic scan for maximal oxygen uptake and its response to training in the HERITAGE Family Study. *J Appl Physiol* (1985). 2000;88(2):551-9.
20. Cupeiro R, Pérez-Prieto R, Amigo T, Gortázar P, Redondo C, González-Lamuño D. Role of the monocarboxylate transporter MCT1 in the uptake of lactate during active recovery. *Eur J Appl Physiol*. 2016;116(5):1005-10.
21. Wang C, Li H, Chen K, Wu B, Liu H. Association of polymorphisms rs1800012 in COL1A1 with sports-related tendon and ligament injuries: a meta-analysis. *Oncotarget*. 2017;8(16):27627-27634.
22. September AV, Cook J, Handley CJ, van der Merwe L, Schwellnus MP, Collins M. Variants within the COL5A1 gene are associated with Achilles tendinopathy in two populations. *Br J Sports Med*. 2009;43(5):357-65.
23. Caldwell Hooper AE, Bryan AD, Hagger MS. What keeps a body moving? The brain-derived neurotrophic factor val66met polymorphism and intrinsic motivation to exercise in humans. *J Behav Med*. 2014;37(6):1180-92.

24. Martin DE, Vroon DH, May DF, Pilbeam SP. Physiological changes in elite male distance runners training for Olympic competition. *Phys Sportsmed.* 1986;14(1):152-206.
25. Saunders PU, Pyne DB, Telford RD, Hawley JA. Factors affecting running economy in trained distance runners. *Sports Med.* 2004;34(7):465-85.
26. Jacobs RA, Rasmussen P, Siebenmann C, et al. Determinants of time trial performance and maximal incremental exercise in highly trained endurance athletes. *J Appl Physiol* (1985). 2011;111(5):1422-30.
27. Lavie CJ, Lee D chul, Sui X, et al. Effects of running on chronic diseases and cardiovascular and all-cause mortality. *Mayo Clinic Proceedings.* 2015;90(11):1541-1552.
28. McCullough PA, Lavie CJ. Coronary artery plaque and cardiotoxicity as a result of extreme endurance exercise. *Mo Med.* 2014;111(2):95-98.
29. Tulle E, Bowness J, McKendrick JH. Strava-using parkrunners: a community study Glasgow: Glasgow Caledonian University Research Briefing, 2018.
30. New York Road Runners. Bill Rodgers: Boston and beyond. Accessed March 8, 2024. <https://www.nyrr.org/about/hall-of-fame/bill-rodgers>
31. The inventor of running – The training of Frank Shorter. 2017. Accessed March 8, 2024. <https://www.runnerstribe.com/expert-advice/inventor-running-training-frank-shorter/>.
32. Profile—Don Kardong has been running for 55 years. 2019. Accessed March 8, 2024. <https://www.lifetimerunning.net/2019/11/profile-don-kardong-has-been-running.html>.
33. Bill Rodgers Quotes. Accessed March 8, 2024. <https://quotefancy.com/quote/1388648/Bill-Rodgers-To-be-a-consistent-winner-means-preparing-not-just-one-day-one-month-or-even>.
34. Ramsay G. Eliud Kipchoge is the ‘greatest of all time ... in any sport,’ says leading performance coach. Accessed March 8, 2024. <https://www.cnn.com/2021/08/08/sport/eliud-kipchoge-olympic-marathon-spt-intl/index.html>.
35. Your lungs and exercise. *Breathe* (Sheff). 2016;12(1):97-100.
36. Janal MN, Colt EWD, Clark CW, Glusman M. Pain sensitivity, mood and plasma endocrine levels in man following long-distance running: effects of naloxone. *Pain.* 1984;19(1):13-25.

37. Harte JL, Eifert GH, Smith R. The effects of running and meditation on beta-endorphin, corticotropin-releasing hormone and cortisol in plasma, and on mood. *Biol Psychol.* 1995;40(3):251-265.
38. Solberg EE, Halvorsen R, Sundgot-Borgen J, Ingjer F, Holen A. Meditation: a modulator of the immune response to physical stress? A brief report. *Br J Sports Med.* 1995;29(4):255-257.
39. Lewicka-Potocka Z, Dąbrowska-Kugacka A, Lewicka E, et al. The "athlete's heart" features in amateur male marathon runners. *Cardiol J.* 2021;28(5):707-715.
40. Hu M, Lin W. Effects of exercise training on red blood cell production: implications for anemia. *Acta Haematol.* 2012; 127(3): 156-164.
41. Mairbäurl H. Red blood cells in sports: effects of exercise and training on oxygen supply by red blood cells. *Front Physiol.* 2013; 4:332.
42. Bizjak DA, Tomschi F, Bales G, et al. Does endurance training improve red blood cell aging and hemorheology in moderate-trained healthy individuals? *J Sport Health Sci.* 2020;9(6):595-603.
43. Hespanhol Junior LC, Pillay JD, van Mechelen W, Verhagen E. Meta-Analyses of the effects of habitual running on indices of health in physically inactive adults. *Sports Med.* 2015;45(10):1455-68.
44. Williams PT. Greater weight loss from running than walking during a 6.2-yr prospective follow-up. *Med Sci Sports Exerc.* 2013; 45(4): 706-713.
45. Igarashi Y, Nogami Y. Running to lower resting blood pressure: a systematic review and meta-analysis. *Sports Med.* 2020; 50(3): 531-541.
46. Lee DC, Brellenthin AG, Thompson PD, Sui X, Lee IM, Lavie CJ. Running as a key lifestyle medicine for longevity. *Prog Cardiovasc Dis.* 2017;60(1):45-55.
47. Omura JD, Brown DR, McGuire LC, Taylor CA, Fulton JE, Carlson SA. Cross-sectional association between physical activity level and subjective cognitive decline among US adults aged ≥ 45 years, 2015. *Prev Med.* 2020;141:106279.
48. Lee DC, Brellenthin AG, Thompson PD, Sui X, Lee IM, Lavie CJ. Running as a key lifestyle medicine for longevity. *Prog Cardiovasc Dis.* 2017;60(1):45-55.

CHAPTER 2

DIMENSIONS OF WELLBEING THAT CONTRIBUTE TO A GOOD LIFE

Summary. This chapter focuses on eight dimensions that support a good life. These dimensions include physical, environmental, occupational, financial, social, emotional, intellectual, and spiritual aspects of our lives. Aristotle's virtues are developed over the life course within the framework of these dimensions. An activity as simple as regular running plays a role in developing the virtues. Other forms of exercise, consistent with our natural gifts and developed over a lifetime can also promote a good life through better health, meaningful social connections, and greater purpose.

A Gifted Runner

All of us have unique, natural gifts. Some of us successfully identify these gifts and develop them in ways that promote purpose, social connections, and happiness. Developing these gifts, even for those who are exceptionally blessed, may require patience, hard work, consistency, and perseverance. This is the story of Bill Rodgers.

Bill was born in Hartford, Connecticut. At about age five he moved with his family to Newington, Connecticut. He played Hockey, baseball, and ran cross country with his older brother, Charlie. In an interview with the Los Angeles Times, Charlie said that "When the coach would send us out on the road for a two-mile run, three quarters of the team would drop off at my girlfriend's house for a Pepsi but Bill would keep running. We all thought he was a little strange."

As a sophomore in high school, Bill decided to join the newly formed cross-country team. He found success in this sport, running a 4:28:8 mile and in his senior year, won the Connecticut state cross country title, and took sixth place in the New England Cross Country Championships. His first road race was the Manchester Thanksgiving Day 4.8 mile run in 1965.

In 1966, he entered Wesleyan University on an athletic scholarship, where he ran cross country and track. He completed a B.A. degree in Sociology in 1970. He then pursued and eventually received an M.S. in special education from Boston College. During his college days, he smoked cigarettes and drank alcohol, sometimes excessively. His diet was poor, and in his words, his activities accelerated his aging and hurt his running.

At the time he completed his undergraduate degree, there was no running team for him to join, the Vietnam War was raging, and his future was uncertain. He had friends fighting in the war, one a top miler from Newington, Connecticut, who sadly never returned home. Sorrow was everywhere. Bill's parents, both World War II veterans, had spoken of the destruction, poverty, ruin, and death associated with war. As a catholic he felt a moral obligation to work toward avoiding war.

When his application as a conscientious objector was approved, Bill was assigned alternative war service as an aide at Peter Bent Brigham Hospital in Boston. His salary was only \$71 per week. He was responsible for wheeling bodies to the morgue. The job was monotonous and lonely. Referring to this time, he said that he had little purpose and felt dead himself. He was smoking a pack of cigarettes a day and ate poorly. On top of that, he lived in a dump in a rough part of Boston, just trying to survive on his meager income and food stamps.

As a new resident of Boston, Bill found his Newington High School teammate Jason Kehoe. On Patriots Day of that year, he and Jason walked to see the Boston Marathon. Some of his teammates at Wesleyan were in the race (Amby Burfoot, 1968 winner of the Boston Marathon and Jeff Galloway, 1972 Olympian in the 10,000-meter run). As a spectator, he did not think that he would someday win the Boston Marathon, not once but four times. He missed the connection he had with his running teammates from college. His impressions of the Boston Marathon could not go away. He wanted to get back into running. When his beloved motorcycle was stolen, this gave him the push to start running, not competitively but rather to get to and from work every day. And then, when he was fired from his job for trying to organize a union for the hospital workers, all he had left was running.

He started back by joining the Boston YMCA. He ran indoors on their tiny ancient track. "It felt good to move," he said. In the spring he ran outside, which "felt even better." He continued to struggle financially, working at Arby's for a time, and later at an ice cream shop. Training on his own he

decided to enter some local road races. However, he was financially destitute and could not afford good running shoes and clothes. Yet, despite running in blue jeans, he placed third at the Silver Lake Dodge 30 km (Amby Burfoot won). This caught the eye of Jock Semple, an official with the Boston Athletic Club, who invited him to run for the Boston Athletic Association (BAA).

Bill said, “all of us runners were financially poor.” There was no prize money allowed in the races, according to the Rules of the International Amateur Athletics Association and the International Olympic Committee. The winner of the 30 km race won a set of 4 tires. Unfortunately, none of the top three runners owned a car.

As a naturally gifted runner, Bill started to find purpose again through his running. He began feeling healthier, with renewed confidence in himself. As running gained renewed importance in his life, he saw the need to quit smoking cigarettes and drinking excessive amounts of alcohol. His love for being with people led him to join the newly formed Greater Boston track Club at Boston College in 1973. The club was led by track coach Bill Squires. With a group of friends supporting each other in the sport, the pieces fell into place for his successful running career.

For Aristotle, friendship is possibly the most important virtue in the quest toward happiness. In thinking about the film “It’s A Wonderful Life,” we are reminded that no man is a failure who has friends. It teaches us that life is truly wonderful when everyone works together and looks out for one another. It was a few close friends who helped Bill along the road to running success.

On his way back to competitive running he attempted the Boston Marathon in April 1973, but dropped out at 20 miles because of dehydration. At that point, he was literally unable to continue running. His options were to walk to the finish line or walk home. Because the latter distance was shorter, he chose to walk home. Despite not finishing the race, his friends and new coach encouraged him to keep running. He went back to training and six months later won the Bay State Marathon in 2:28. In 1974, he took fourteenth place in the Boston Marathon and fifth place in the New York City Marathon. The month following the New York City Marathon, he won the Philadelphia Marathon in 2:21. With the pieces falling into place, it was in 1975 when Bill gained national prominence by winning the Boston Marathon, with an American record time in the marathon of 2:09:55. Bill would then dominate road racing through the rest of the 1970s.