

# The North Point Half Marathon

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Figure 1: Aerial view of North Point (Cambridge Orthophoto 2021).

## Abstract

Negative mental health effects are an occupational hazard of doing research. Exercise is a powerful prophylactic, but finding and sustaining motivation can be challenging, especially for new graduate students who may lack the social and financial resources to pursue athletic activities. To capitalize on researchers' tendency to organize their efforts around arbitrary external deadlines and goals, we propose a lab half marathon, to occur the Saturday after the last day of spring classes. Hosting a conventional half marathon would be infeasible due to the cost of timing and road-closure services, so instead the course will consist of 119 laps of a 177.20 m circle in a nearby park. We discuss the desirable properties of this format and novel technical remedies for some of its deficiencies. For participants short on training time, a 10K option is also available. [Register today](#).

## CCS Concepts

• **Human-centered computing** → **Empirical studies in collaborative and social computing**; • **Applied computing** → **Health informatics**.

## Keywords

running, mental health, research culture, community event

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## 1 Introduction

Mental health indicators among students and graduate trainees have deteriorated measurably over the past decade, with large-scale survey analyses documenting rising distress and psychiatric diagnoses [2, 9, 13].

Physical activity is one of the more plausible low-cost protective interventions: in one large cohort, adults reporting no leisure-time exercise had a 44% higher risk of later depression than those exercising 1–2 hours per week [3]. A 2023 umbrella review found medium effects for physical activity on depression, anxiety, and psychological distress [10]. These effect sizes overlap substantially with the range reported for established psychotherapies, including cognitive behavioral therapy [1].

Unfortunately, we have found that telling graduate students these facts is not an effective way to encourage them to exercise. Excuses vary, but two we are sympathetic to are *motivation* and *cost*. It is difficult to find the motivation to pursue an activity with limited immediate reward and to sustain that motivation in the face of competing pressures.



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Activities require money for things like equipment or transportation. Some of the most engaging activities are social, like fitness classes or competitions, but these too incur additional costs.

Our observation is that graduate students and researchers are preternaturally susceptible to arbitrary goals and deadlines, and are often persuaded by things being free. We are happy to oblige. There will be a lab half marathon in North Point on the Saturday after the end of spring classes—May 16, 2026. Like other half marathons, the North Point Half Marathon (NPHM) is precisely 21097.5m long, a distance that is both challenging and rewarding for novice runners. Unlike other half marathons, the event occurs over 119 laps of a 177.20m circular loop. This course design reduces the task of timing to that of measuring participants' winding number around a central point, which is feasible with fair accuracy using standard geolocation technology. Abandoning typical accoutrements and avoiding logistical costs allows the event to be free.

## 2 Related Work

*Nearby Events* Cambridge is home to two half marathons, and residents have easy access to at least three more hosted regularly in Boston. Registration fees range from \$50 to \$150 depending on time of purchase. Most of these events occur on temporarily closed public streets. Runners interested in using the same course at another time would at best run a longer distance by detouring along pedestrian paths, if the course is navigable at all. Our course, including the precise start and end points, is accessible at all hours, any day of the year.

*Events at MIT* Many group fitness activities were hosted as part of MIT Health's GetFit program. This 12-week program encouraged members of the MIT community to form teams to reach escalating exercise time goals. By all accounts, the program was much beloved, so naturally it ended its 20-year run last year due to budget constraints [5]. While there are no long-standing distance running events organized by the campus community, there have been departmental 5Ks along campus pedestrian paths [4]. Our observation is that people like running along water more than running around campus. Our work leverages this demonstrated preference by locating the course entirely on an island in the Charles.

*Small Field Running Events* Half and full marathons in major cities typically require hundreds to thousands of participants, as organizers must amortize high fixed costs like timing services and permitting. Our event is most similar in spirit to parkruns. These free 5K runs occur weekly on Saturday mornings in parks across the world, and locally in

Danehy Park. Similar to our event, they eschew participant fees with modest volunteer support and the use of cost-effective if less accurate technologies (in their case, manual timing) [7]. The authors have in the past organized similar events at other universities, but would like to remind the reviewers that it's not self-plagiarism if you cite [8].

*Timing Systems* Our course resembles a track, where conventional timing would be performed manually using costly high-speed line scan cameras. Distance running events usually happen on roads, and are timed with Ultra High Frequency (UHF) RFID systems. In addition to the expense of purchase or rental, using these systems requires power or generators. Permits for placing equipment in public spaces are not free, and usually stipulate carrying millions of dollars of insurance. Alternative timing technologies, like tap-and-go low-frequency RFID, are sometimes used in waypoint races, but require the user to stop for nearly a second to be recorded. We use participants' phones or wearable Global Navigation Satellite System (GNSS) data, as our course has both an unobstructed view of the sky and a well-defined shortest path.

## 3 The North Point Half Marathon

The North Point Half Marathon will take place the morning of May 16, 2026 in Richard McKinnon State Park. The course is entirely on an island in the river, and consists of a brief entrance followed by 119 laps of the 177.20m circular path. Nestled against the Charles River Dam, and with excellent views of Bunker Hill Bridge, the course is central yet bucolic; Green Line trains trundle past, boats ferry tourists down the water, and geese gaze and peck at the brilliant green turf covering the encircled hill.

### 3.1 Course Design

*3.1.1 Loop* Accurate measurement of the shortest possible route is a key challenge in designing a conventional 21097.5-meter half marathon course, and one we sidestep by having 99% of the event occur on a short loop. Because the sky is visible throughout the loop, and the course is naturally bounded by a masonry curb, we used a survey-grade GNSS receiver<sup>1</sup> to manually measure 115 points along the

<sup>1</sup>These devices use a larger antenna at higher gain, track more signal frequencies per satellite, incorporate real-time corrections from nearby ground stations, and use carrier-phase positioning rather than the code-phase method used by typical handheld devices. This enables them to obtain measurements accurate to  $\pm 8$ mm horizontally, roughly two orders of magnitude more accurate than a smartphone. Measurements reported were collected under RTK Fix using corrections data from the MassCORS network with a tilt-compensating instrument—a SparkPNT RTK Torch.

inner course boundary. As the curb is convex, the polygon perimeter underapproximates the length, so we estimate a best-fit circle, finding a radius of 27.903 meters. The shortest possible route of a road course is measured at 30 cm away from the curb, so the final loop length is 177.20 m with an estimated 95% confidence interval of  $\pm 25$  mm (140 ppm). The width of the loop is 4 meters. The certainty of these measurements exceeds the typical standards of road course measurement used by USA Track and Field (800 ppm) and rivals the standards set for certifying *tracks* to international standards (100 ppm) [12].

**3.1.2 Start Line(s)** The odd loop length ensures that any distance of interest will leave a residue modulo the length of a lap. Conventional tracks are professionally marked with the start locations for unusual events, like the mile. In the interest of ensuring that the start line is easy to locate, we unfurl the partial lap into a short entrance. As the entrance for any event will always measure less than the length of a lap, it is a simple task to locate it by pulling a steel measuring tape from the lap/finish line. All NPHM participants will begin at the half marathon start line, which is 10.70 m from the edge of the course, on the east bridge. Participants targeting 10 km should run 57 laps.

**3.1.3 Lap/Finish Line** We designate the center line of the east bridge entrance as the angle at which a lap starts and ends. By construction, every event on the course will end at this line. Participants must take care to enter the loop *behind* the lap line, and only change directions after crossing the line.

## 3.2 Timing

The looped course and unobstructed views of the sky enable us to employ smartphone and wearable geolocation services as a primary timing mechanism. Common smartphones now make use of multiple GNSS constellations, and high-end devices use multiple frequencies to offer accuracy at about the 1 m level. With position fixes at 1 Hz and roughly 1 m accuracy typical of high-end consumer GNSS, the uncertainty in detecting when a participant crosses the finish line is roughly one meter divided by their speed at that moment: about 0.3 seconds for a jogger or 0.7 seconds for a walker. Passive RFID chips, like those placed in bibs worn by participants in “chip-timed” events, are typically precise to 0.1 seconds.

We introduce Lappy, a timing service that operationalizes not only consumer-GNSS-based finish timing, but also lap timing. Users install an open-source client application [6] on their smartphone, which streams periodic geolocation fixes to the Lappy server over MQTT, where they are aggre-

gated and analyzed in real time. Lappy calculates the *winding number*, the number of radians around a central point integrated over the complete path to date, and displays the resulting lap number on a public website. The calculation also exploits the course geometry to project users’ positions onto the circular loop, eliminating cross-track uncertainty.

Lappy is most useful as a live-tracking system, but it also allows users to run the analysis later on an uploaded track file or from a link to their publicly viewable Strava activity. Event participants are highly encouraged to use at least one “live” means of lap counting, however. Counting to 119, unassisted, over the span of about 2 hours (for the median participant) is challenging. A small number of mechanical counters, handheld devices that increment a counter based on a button press, will be available for participants to use.

Official results for the NPHM will be posted for half marathon participants who register and make use of Lappy, or who submit a GPX file after the event.

## 4 Frequently Asked Questions

**Who can participate?** MIT community members and their invited guests.

**Won't I get bored?** Perhaps, but you are encouraged to take the opportunity to practice simple mindfulness. Focus on your breathing, or the sound of the water, or the way the light glints off the city skyline. Consider too that, unlike a typical half marathon where a slight difference of pace would separate you, you will always be within 60 m of your friends at the NPHM.

**I've never run a half marathon before. Should I run this?** Think of the event like a conference submission deadline. If you've got an idea hashed out and some solid experiments—or you can conceive of a plan and timeline to accomplish those things—go for it. If you're not prepared and don't see a way you could be prepared, rushing and submitting anyway is going to be stressful and may even hurt you. Fortunately, we offer a workshop deadline too—the 10K. You might also consider alternating running and walking laps, or simply signing up for the 10K and doing as few laps as you please.

**Will I be too slow?** No, you are welcome to run or walk as fast or as slowly as you like.

**Is this a race?** Not especially. There is no prize for going fast, nor any prizes at all for that matter.

**What'll the weather be like?** According to WeatherSpark, “on May 16, the temperature in Boston typically ranges from 52°F to 63°F and is rarely below 45°F or above 77°F.” The event will occur rain or shine, barring National Weather Service alerts.

**Why not run on the MIT Track?** The park is both more scenic and less trafficked. Also, a regulation track is an

oval, whereas researchers are most practiced at running in circles.

**Which direction do we run?** The event will begin counter-clockwise and alternate directions every 30 minutes to help balance the strain across your legs. Change directions only at the end of a lap and only by rounding the finish line marker.

**Will running a continuous curve for dozens of laps injure me?** Unlikely. Many athletes train and race on smaller radius tracks without issue during indoor track season. Alternating directions is probably sufficient to avoid acute issues for most runners.

**Will running a continuous curve slow me down?** Yes, but not substantially. You will need to supply an additional centripetal force due to the curve, but the effect of this is likely less than 1% when running at world record marathon pace on a 30 m radius [11]. Because the force increases with the square of velocity, the effect is negligible for recreational runners. There are individual differences in running technique and physiology that may make the effect more or less pronounced for you. Consider practicing on the course or a track.

**Are there good reasons you can't just do this?** Our use of the space is non-exclusive, and it is unlikely that enough people would participate for our presence to cause concern. We will simply have multiple start times if this looks likely. Running and exercise do carry risk of harm, including death. However, the structure of the event poses no greater danger to participants than a typical weekend long run, as might happen if an event created longer emergency response times or placed participants in dangerous course conditions.

**Why not a marathon?** Preparing to run a marathon is much more than twice the work preparing to run a half marathon. Fortunately, the *distance* of a full marathon is exactly twice the distance of a half marathon, so if you'd like to run a full, simply start from the half marathon line, run 238 laps, and run back across the start.

## 5 Conclusion

We have invited you to run the first North Point Half Marathon. Our course is carefully optimized to maximize participant enjoyment—occurring entirely on the beloved Charles River—and to be exactly 21097.5 meters long. All are welcome to join for the number of laps of their choosing, and official results will be posted for half marathon finishers. [Register today.](#)

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