Background Information on Firstbeat Measurements

At Elonkierto, Firstbeat measurements are used to assess the restorative effects of park visits. Based on current research, recovery can be accurately evaluated through heart rate variability (HRV). In Firstbeat measurements, the HRV curve is also displayed in real time in the application, allowing participants to monitor it themselves if they wish.

The following information is adapted from:

Wellbeing. Heart Rate Variability 2026: A Guide to HRV Measurement and Recovery. By Pinja Heiskanen, 6 May 2026.

What Is Heart Rate Variability and Why Is It Important?

Heart rate variability (HRV) has become one of the most widely followed health metrics among physically active and health-conscious adults. HRV provides insight into the state of the autonomic nervous system, which regulates heart rate, breathing, digestion, and the body's stress response.

HRV measures the variation in time between consecutive heartbeats at the millisecond level. Even if a resting heart rate appears steady at 60 beats per minute, the intervals between heartbeats, known as RR intervals, are not identical. One interval may be 980 milliseconds, the next 1,010 milliseconds, and the following one 995 milliseconds. This natural variation is a sign of a healthy heart and a well-functioning autonomic nervous system.

A higher HRV generally indicates that the parasympathetic nervous system, often referred to as the "rest and digest" system, is active and that the body is recovering well. A lower HRV, on the other hand, may indicate that the sympathetic nervous system, responsible for stress and alertness, is dominant. This can result from intense exercise, the onset of illness, alcohol consumption, poor sleep, or prolonged psychosocial stress.

Scientific Background of HRV

Heart rate variability has been studied clinically since the 1960s. Researchers first observed that fetal HRV strongly correlated with birth outcomes, with low variability predicting complications. Later, HRV became an important indicator in cardiology for assessing risks after myocardial infarction.

During the 2010s, sports scientists recognized that HRV could predict overtraining and inadequate recovery even before individuals noticed symptoms themselves.

HRV and the Autonomic Nervous System

The autonomic nervous system consists of two branches: the sympathetic and the parasympathetic nervous systems. The vagus nerve, the tenth cranial nerve, is the main pathway of the parasympathetic nervous system, and its activity is directly reflected in HRV measurements.

Healthy vagal function is associated with improved stress resilience, stronger immune function, better digestion, and more effective emotional regulation. HRV is considered one of the best practical indicators of vagal tone that can be measured outside a clinical environment.

Heart Rate Variability Reference Values by Age and Sex

One of the most common questions is: *"What is a good HRV value?"* The answer is that HRV values cannot be directly compared between individuals. Heart rate variability is influenced by genetics, age, sex, physical fitness, and the measurement device used.

The table below provides indicative RMSSD ranges for the Finnish adult population based on studies published in 2025–2026 and population data released by Polar and Garmin.

Age Group	Men RMSSD (ms)	Women RMSSD (ms)	Interpretation
20–29 years	50–95	45–88	High baseline level
30–39 years	40–80	38–75	Good
40–49 years	32–70	30–65	Average
50–59 years	25–55	24–52	Typical
60–69 years	20–45	20–42	Good for age
70+ years	15–35	15–32	Maintain through physical activity

Women typically have slightly lower HRV values than men in early adulthood, but this difference tends to diminish after menopause. Different phases of the menstrual cycle can also significantly influence HRV. During the luteal phase, HRV values are often 10–15% lower than during the follicular phase. This is a normal hormonal fluctuation and not a cause for concern.

More important than comparing oneself with others is monitoring personal trends over time. After measuring HRV regularly for two to four weeks, a personal baseline becomes apparent. Once this baseline is established, deviations from it, whether higher or lower, provide more meaningful information than the absolute value itself.

Assessing Fitness Level in the Firstbeat Life App

The fitness assessment available in the Firstbeat Life app provides an estimate of maximal oxygen uptake (VO_2max). Fitness level is expressed in millilitres of oxygen per kilogram of body weight per minute (ml/kg/min).

Performing the Fitness Walk

To determine fitness level during the measurement period, participants should complete a 30-minute brisk walk on relatively flat terrain without carrying any loads. It is also recommended to avoid conversation during the walk, as this may affect the result.

This is considered one of the easiest and most reliable methods for assessing fitness level using the Firstbeat system.

Why Is Aerobic Fitness Important?

Maximal oxygen uptake reflects how effectively the cardiovascular and respiratory systems can deliver oxygen to working muscles. For this reason, VO_2max is widely regarded as the most important measure of cardiovascular fitness.

Good aerobic fitness supports not only physical performance but also recovery capacity and stress management. It is a strong indicator of an individual's ability to tolerate physical and mental demands.

Scientific Publications Related to the Firstbeat System

- Palmer, A.R. et al. (2021). *Reliability of the BodyGuard2 (FirstBeat) in the Detection of Heart Rate Variability*. Applied Psychophysiology and Biofeedback.
- Peabody, J. et al. (2023). *Comparing the Stress Response Using HRV During Real and Simulated Crises*. Advances in Health Science Education.
- Carnevali, L. et al. (2023). *Cardiac Autonomic and Cortisol Stress Responses to Real Operations in Surgeons*. BioPsychoSocial Medicine.
- Tjøsvoll, S.O. et al. (2023). *Physical Work Demands of Maintenance Workers*. Annals of Work Exposures and Health.