Running Training with HRV
‘Listen to your Heart!’

Marcel van der Kuil
Portland, Quantified Self, Sep 22 2018
Medical science has made such tremendous progress that there is hardly a healthy human left.

Aldous Huxley

Medicine, Healthy, Progress
About me

• Married with 3 children.
• Computer/Data Scientist
• Independent Sports& Health Tech entrepreneur
• Background in Telecom and Banking (Risk, Finance and IT), now in Sports & Health Tech
• Marathons, triathlons (quarters) and mountainbiking, with a serious schedule, ever since 1990
QS Checklist: Lessons Learned 1/2

- ‘Citizen’s science’ and ‘Patient Expertise’ support faster diagnosis and better/accelerated treatments
- The responsibility of healthy living primarily lies with you
- Exercise is crucial for mental and physical health, but load and loadability should always be carefully observed.
QS Checklist: Lessons Learned 2/2

- Physical and mental fitness is a big plus, when recovering from operation or injury
- Recovery processes are very similar to training programs
- Be a good patient, but not a ‘victim’
- Put a 100% trust in your caregivers, but make sure to close the gap between them
- Build a support network
Running 20/20

Meetups

Events

Co-creation

1

2

3

Trend: Co-Creation
With runners, coaches and trainers
Personal Digital Running / Coaching
Personal Digital Running / Coaching

Single-Loop Learning
The most common style of learning is just problem solving — improving the system as it exists.

Double-Loop Learning
More than just fixing the problem, this style of learning questions the underlying assumptions, values, and beliefs behind what works.

PILLARS FOR POSITIVE HEALTH

Behaviour Change
- Habits and impulses
- Knowing and believing
- Seeing and realizing
- Wanting and being able to
- Doing and persisting
Personal Digital Running / Coaching
Personal Digital Running / Coaching

PILLARS FOR POSITIVE HEALTH

BODILY FUNCTIONS
- Medical facts
- Medical observations
- Physical functioning
- Complaints and pain
- Energy

MENTAL WELL-BEING
- Cognitive functioning
- Emotional state
- Esteem/self-respect
- Experiencing to be in charge/manageability
- Self-management
- Understanding one's situation/ comprehensibility
- Resilience

MEANINGFULNESS
- Purpose/meaningfulness
- Striving for aims/ideas
- Future prospects
- Acceptance

QUALITY OF LIFE
- Quality of life/well-being
- Experiencing happiness
- Enjoyment
- Perceived health
- Flourishing
- Zeal for life
- Balance

SOCIAL - SOCIETAL PARTICIPATION
- Social and communicative skills
- Social contacts
- Meaningful relationships
- Experiencing to be accepted
- Community involvement
- Meaningful work/occupation

DAILY FUNCTIONING
- Basis ADL (Activities of Daily Living)
- Instrumental ADL
- Ability to work
- Health literacy

iPH
Personal Digital Running / Coaching

[Diagram showing various personal data points such as high alertness, best coordination, fastest reaction times, cortisol release, lowest body temperature, deep sleep, and melatonin secretion at different times of the day.]
Personal Digital Running / Coaching
Personal Digital Running / Coaching
Personal Digital Running / Coaching

Single – Loop Learning
The most common style of learning is just problem solving – improving the system as it exists.

Assumptions
Why We Do What We Do

Strategies and Techniques
What We Do

Results
What We Get

Double – Loop Learning
More than just fixing the problem, this style of learning questions the underlying assumptions, values and beliefs behind what we do.
上医医未病之病
中医医将病之病
下医医已病之病

~ 黄帝内经 ~

Superior doctors prevent the disease.
Mediocre doctors treat the disease before evident.
Inferior doctors treat the full blown disease.

- Huang Dee: Nai-Ching (2600 B.C. 1st Chinese Medical Text.)
Running: Health Risk?

- Injury prone
- Not sustainable for a lot of people
- Lack of ‘real’ support (e.g. science, health, coaching)
- Little ‘learning’, e.g. QS-like
  - What did you do?
  - How did you do it?
  - What did you learn?

> Better not do this alone?!
Running: Health Risk?! (…)

HEALTH BENEFITS VS HEALTH RISK

- Health, fitness benefits
- Benefits: Risks & Harms

Types of activities:
- Active living: Light, moderate, daily, tens of minutes, even hours
- Activity for health: Moderate, about daily, at least 30 min
- Exercise for fitness: Moderate, vigorous, 3 times a week, at least 20 min
- Training for sport: Strenuous, several times a week, variable

Type and amount of activity

Vuori / UKK Institute 1997

QS Quantified Self

Running 2020
Running: Health Risk?! (...)

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Benefits
Risks & Harms

Vuori / UKK Institute 1997

Quantified Self

RUNNING 2020
Marathon: Health Risk?! (...)

**HEALTH BENEFITS VS HEALTH RISK**

- **Novice runners**
  - Male: 2.56 (2.55-2.60)
  - Female: 2.06 (2.02-2.30)

- **Recreational runners**
  - Male: 1.80 (1.70-1.90)
  - Female: 1.55 (1.54-1.56)

- **Competitive runners**
  - Male: 1.10 (1.09-1.20)

- **Marathon runners**

Type and amount of activity

Benefits
Risks & Harms

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Tonoli et al. Geneeskunde & Sport 2010

Quantified Self
Running: Not sustainable?!  

Annual cost of running related injuries

389.500.000 €

(The Netherlands: 2.1 mln runners)
Why have a Coach?

“Good coaching is one of the most important measures to reduce the risk of injury (and overtraining/loading)”

Jan Ekstrand (FIFA): “There is an association between injury rates (...) and the leadership style of the head coach”
Why makes a good Coach?

- Observation and communication skills
- ‘Brutally truthful’, because of trust, authority and ‘shared goal’
- Empathy
- Teacher, to accelerate learning
- Analytical / digital skills, to be the ‘human in the loop’

Question: can you coach yourself?
Digital Coaching

• ‘Greenfield’ > little proof / lineage, ‘belief’ seems to be rising now
• ‘Controversy’ > it could undermine authority and be disruptive
• ‘Emancipation’
• Lack of useful / meaningful ‘performance drivers’, actionable KPI’s
• Real-time data real-time ‘thinking’
Digital Coaching (…)

• What is (not) happening WHEN, WHY is that and what can I do about it?
Why Listen to your Heart?

ATHEROSCLEROSIS
PROGRESSING OF AN ILLNESS

1. Normal functions
2. Endothelial disfunction
3. Plaque formation
4. Thrombosis
Why Listen to your Heart?

“However, a U-shaped curve was apparent for mortality with respect to running dose, with the peak benefit noted with slow-to-moderate running speeds, frequency of about 3 times per week, and 1 to 2 h.wk\(^{-1}\) of running. Very high doses of running, however, were associated with trends of worse survival compared with either non-runners or groups of low- and moderate-dose runners.” (uit ‘Lavie et al. Exercise and the Heart the Harm of Too Little and Too Much’).
Digital Coaching on HR?

- HR/HF values can be easily measured by many mainstream devices, which are affordable
- Meaningful / reliable datapoints (at least, to a data scientist)
- ..but still too abstract for most people

Question: are HR wearables ‘medical devices’?
Digital Coaching on HRV!

- HRV can be easily linked to things most people seem to be (willing) to understand or follow up
- Full scope: sleep, nutrition, exercise, work, etc.
- Great apps, e.g. HRV4Training
- 1 minute ‘camera/finger’ measurement

Question: is HRV a ‘useful’ indicator of stress levels?
Project ‘Digital Coaching on HRV’

- Co-creation with National Athletics League (‘Atletiekunie’)
- 20 runners
- 30 days, daily measurements
- Standardised protocol
- Shared blogging
- Using HRV4training app (user) and dashboard
- HRV-based coaching by HRV expert
Project Findings

- Camera measurements ‘work’ and are ‘fun’
- ‘Good Quality Data’
- 1 minute/ no hassle measurement really lowers the barrier
- Great team dynamics, ‘people helping people’
- Good willingness to reflect and share
- Several similarities with the QS ‘Blood Testers’ project!
Project Findings (...)

• The ‘qualitative’ score works to benchmark you vs you, today vs yesterday
• ‘Good Quality Data’
• 1 minute/ no hassle measurement really lowers the barrier
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Project Findings (…)

• Qualitative feedback with text + score worked and triggered self reflection
• Tags were useful, but still some sensitive issues regarding privacy
• Having data to use to cross check personal perception and feelings was a real eye opener
• Several signals of overtraining were seen and discussed > taboo?!
Project Findings (...)

• Negative correlations between work and exercise were found
• Most participants found it easy to find time and the discipline to do the daily measurements
• HRV4Training is great for basic coaching, but experts should always be consulted when there are real concerns
Running with a Safety Belt ?!

When we run, an enormous amount of data from our ‘on board’ biological sensors is processed by our brain. We could benefit from this data by using wearables.

What if you could be notified when the risk of injury is high?
Running as ‘Life Hacking’.. .. to grow old and (w)healthy?!
Running: the best and cheapest way to self medicate, stay healthy and enjoy life?
Running Training with HRV
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Thank You ! For Q&A, please contact...

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