“Teaching Quantified Self Methods to Health Care Undergraduates”
Breakout session QS Conference – Sept 2015 - Amsterdam
Dr. Martijn de Groot
Hanze University of Applied Sciences Groningen
188,000 inhabitants
Two large universities (54,000 students)
~50% age under 35
One Hospital UMCG (7000 employees)
One QS meetup group 😊 (230 members)
Quantified Self Institute
To encourage a healthy lifestyle through technology, science and fun

- Founded 2012 by Hanze UAS in collaboration with QS labs
- A network Organisation (6 team members, 20 ambassadors, > 100 students)
- Focus on ‘the big five for healthy life’
- Availability, Creativity, Validity and Efficacy
- Applied research, higher education & new business development

Teaching QS Methods to Health Practitioners

share your talent. move the world.
Research
Our body of knowledge

Collect existing knowledge and learn by doing:

• Deskresearch, following trends
• Writing blogpost and articles for professional journals
• Lectures, workshops and interviews
• Social projects (primary and high school, exhibitions & events)
• Building an open source activity tracker for kids for research purposes in collaboration with industry and public authorities
• Living lab Active Ageing Diabetes
Research

Our body of knowledge

Generate new knowledge through scientific research:


- Reliability and Validity of ten consumer activity trackers BMC Sports Science, Medicine and Rehabilitation *under revision*

- Do activity monitors help overweight adults get active? A systematic review and meta-analysis. *In writing*

Two RCT’s on self tracking daily physical activity during 3 months

- People with diabetes (n=98)
- Employees (n=48)

*research in progress*

*Teaching QS Methods to Health Practitioners*

*share your talent. move the world.*
Teaching QS methods to health care students

- 2012: Honours Specialisation Research Skills
- 2014: Minor Healthy Ageing
- 2015 (sept): International Minor Global Health & Quantified Self
QS Community

- Founded in 2007 by Gary Wolf and Kevin Kelly
- 2010: TED talk by Gary Wolf
- 2011: First international conference in California
- May 2015: 206 groups in 38 countries
- Almost 50,000 people active worldwide
All about data…

Self-tracking; for personal reason

Self-tracking; at request of health care provider

Care/cure

Lifestyle, health/wellness

Bring Data

Adapted from: www.nictiz.nl
The day before tomorrow

- Preventive and predictive
- Personalised
- Participatory

Source: www.p4mi.org
Honours Specialisation Research Skills

2 + 5 ECTS, approximately 15 students per semester

- Assignment is to do a self experiment
- Research strategy
- Single subject design
- N=1
- Any mix of qualitative and qualitative evidence
- Descriptive, exploratory or explanatory analysis (event)
  - Prospective
  - Retrospective
# List of variation in N of 1 trial

<table>
<thead>
<tr>
<th>Design</th>
<th>Causality</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>A-B</td>
<td>Quasi experiment</td>
<td>Often the only possible method</td>
</tr>
<tr>
<td>A-A¹-A</td>
<td>Experiment</td>
<td>Placebo design where A is no drug and A¹ is a placebo</td>
</tr>
<tr>
<td>A-B-A</td>
<td>Experiment</td>
<td>Withdrawal design where effects of B phase can be established</td>
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<td>A-B-A-B-A-B</td>
<td>Experiment</td>
<td>Withdrawal design where effects of B phase can be established</td>
</tr>
<tr>
<td>A-B²-B³-Bⁿ-A</td>
<td>Experiment</td>
<td>Establishing the effect of different versions of B phase</td>
</tr>
</tbody>
</table>
The Single-Subject Design

Method

- Continuous assessment
- Baseline assessment
- Internal control
- “Multiple crossover”
- Blinding and randomization where possible
- Baseline, intervention and reversal
The Single-Subject Design

Advantages (clinical perspective)
• More effective treatments
• Better patient adherence
• Reduced overall cost

Requirements
• Consistent baseline
• Short onset/offset
• Practical measurements
• Ethical

Sources: Guyatt et al, 1990; Scuffham et al, 2010
First, do no harm...

Hippocrates
Data analysis

• Descriptive and narrative
  – Make table or figure
  – Describe patterns
  – Assess normality (skewness and kurtosis)

• Inferential and judging
  – Aggregate data and use simple straightforward statistics (paired t-test, wilcoxon signed rank test)
  – Take all data and do time-series-analysis
Sleep experiments (n=1)

- The effect of a 30 minutes’ walk on the time before falling asleep
- Effects of online gaming on sleep parameters
- The effect of pre-sleep Sudoku making on sleep
- The influence of reading a book on sleep quality
- Difference between sleeping with and without an electric under blanket.
- Impact of one hour playing an exciting video game on sleep
The big five for healthy life

- Physical Activity
- Food
- Sleep
- Stress
- Social interaction
The effect of the blood glucose level on the sleep quality, a n-of-1 study

Angerman, K
Hanz University of Applied Sciences, Groningen, The Netherlands

Introduction
Sleep is a basic necessity of life. A number of factors will help determine the quality of sleep. The level of blood glucose has an important role. A good balance of your blood glucose is important to your sleep pattern. This study will examine whether sleep quality will be better by maintaining blood glucose levels.

Methods
The research has taken 8 days for the baseline and 8 days for the intervention measurements. During the 16 days the participant has eaten regular. On the first 8 days of the research the participant did not eat anything after 20.00 pm. On the last eight days, the participant has eaten just like the previous eight days. After 20.00 pm the participant consumed sugars. The participant consumed two glasses of Dubbel Fris accompanied by four Sadoghe cakes, distributed over the evening. The participant did go to bed at 22.30 pm and the alarm ring at 7.30 am. To avoid possible confounders, the participant did not engage in sports, adhered to the prescribed diet and avoid illness and stress as much as possible. To investigate and monitor the sleep quality of the participant, an Emfit QS sensor was used. The Emfit QS is a non-contact monitor and stored essential sleep statistics. All data were noted in a table and stored in SPSS. Associations between the blood glucose level and the sleep quality were investigated using the Kruskal-Wallis test.

Results
There is no significant difference for the sleep stages awake and REM between the baseline and intervention measurements (p = 0.015 respectively p = 0.654). For the sleep stages light and deep there is a significant difference (p = 0.001) between the baseline and intervention. During the baseline measurement the participant was in the sleep stage light on average 42.8% and during the intervention 57.13%. For the sleep stage sleep the average was 24.75% during the baseline and 7.63% during the intervention.

Conclusion
The study has shown that consuming sugars after 20.00 pm has a significant negative effect on the sleep stages light and deep. The time spent in these stages is significant different. Further research is necessary to investigate whether this effect occurs when tested on a larger population.

Contact
Kim Angerman
Hanz University of Applied Sciences, Groningen, The Netherlands

Poster market (mini symposium)
Minor Healthy Ageing

1 ECTS, approximately 60 students

• One lecture
• One workshops wearables and apps
• One evaluation assignment
• One Debate

The Big Five for Healthy Life Apps

Food & Nutrition
- MyFitnessPal, iOS/Android: Food Diary and Diet app, Lose weight
- DietRite, Windows: Calorie Counter and Information on nutrition values by snapshots
- MyNetDiary, iOS/iPad: Food Diary and Barcode scanner
- Food Diary, iOS/Android: Food and Activity Diary
- Wholesome, iOS/Windows: Provides Information on nutrition values

Physical activity & Sports
- Runkeeper, iOS/Android: Track your runs and other fitness activities
- Cycles, iOS/Windows: A fluid running app for Windows phone
- Runtastic, iOS/Android: Makes sports funtastic
- Google Fit, Android: Tracks walking, cycling & running. Provides information on fitness activity
- 7 Minute Workout, iOS/Android: Don’t have enough time to exercise every day? Try the 7 Minute Workout
- Moves, iOS/Android: Records any walking, cycling and running

Teaching QS Methods to Health Practitioners
Points of interest and debate

- Quality of the data (validity and reliability)
- Data access and control (Privacy and safety)
- Data sharing (usability, interoperability and incentives)
International minor

30 ECTS, sept 2015, 9 students

- Pillar ① Global Health, Globalization, International Organizations & International Cooperation
- Pillar ② Culture and Health
- Pillar ③ Digital Health and Quantified Self (Welfare technology and innovation)
- Europe
Also Summerschool

6 ECTS, starting 2016

• May 26th – June 17th 2016
• USA & Europe
Teaching QS Methods to Health Practitioners

Team:
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