Correlation between measured body temperature, symptoms of sickness and paternal assessment of child well-being in the FeverApp register study.

Larisa Rathjens,[1] Ingo Fingerhut,[4] Sara Hamideh Kerdar,[1] Moritz Gwiasda,[1] Silke Schwarz,[1] Ekkehart Jenetzky, [1,3] David Martin[1,2]

[1]School of Medicine, Faculty of Health, University of Witten/Herdecke; [2]Department of Pediatrics, University of Tübingen; [3]Department of Child and Adolescent Psychiatry and Psychotherapy, Mainz University Medical Center; [4] Pediatric Practice "Kleiner Piks", Bochum

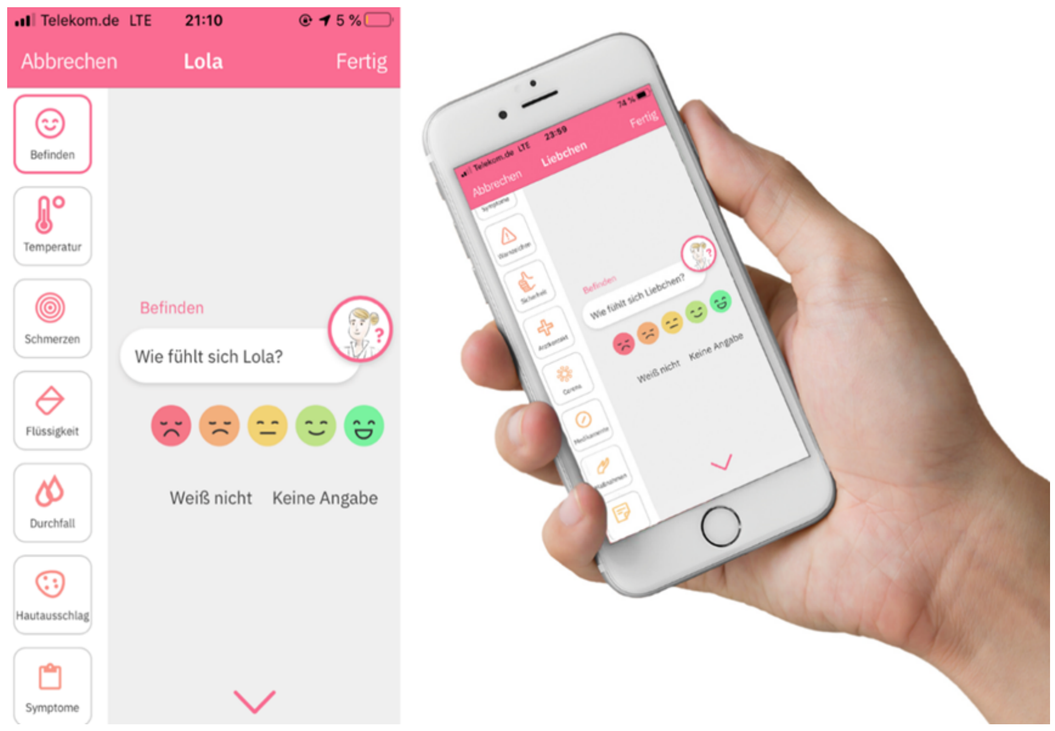
Background:

- Recent guidelines recommend well-being and not temperature be the leading factor in the treatment of children with fever.
- In parents' treatment and perception, temperature is often leading.
- Objective: an investigation of the associations between parental assessment of child's well-being, symptoms of sickness and measured body temperature.

Methods:

- The FeverApp supports families with feverish children by providing comprehensive information on the scientific and guideline-compliant management of fever.
- The users' answers concerning rated well-being, measured on the Likert scale from 1 to 5, body temperature in °C and symptoms of sickness (e. g. complaints such as pains, symptoms of respiratory diseases or diarrhea) are analyzed for pairwise conditional correlations.

Figure 1: Assessment of well-being via FeverApp



Results:

Collected Data:

- Data have been collected from Sept. 01, 2019, to Oct. 14, 2020. The recruitment of participants was done by 43 medical practices in Germany.
- After excluding entries with missing information on assessed well-being and measured temperature, a total of 1555 fever episodes from 842 children in the age between 0 and 16 years remained. The median age of the children was 2 years and 3 months.
- It is possible that several fever episodes belong to one child. To avoid different numbers of entries per fever episode distorting the assessment, only the first entries in each episode are used for analysis (1555 entries).

- In 670 (43%) entries: no answers or answered all questions concerning symptoms in the negative.
- In 885 entries (57%): at least one of the described symptoms is mentioned.
- In entries with documented symptoms, well-being is most often rated as "very bad" or "bad" (60.6% of entries). Only in 37.9% of the entries without documented symptoms is the child well-being rated in this way.

Correlational analysis: (Significant results are marked in bold)

- Mostly moderate correlation between the rated well-being and the measured temperature and the rated well-being and symptoms.
- No correlation between temperature and symptoms.

Table 1: Correlations between body temperature and symptoms (point-biserial correlation coefficient r_{pb}) conditioned on well-being.

Well-being	r_{pb}	Confidence Interval
very bad: 1	0.005	[-0.141; 0.151]
Bad: 2	-0.078	[-0.157; 0.001]
Moderate: 3	**-0.118**	**[-0.206; -0.027]**
Good: 4	-0.041	[-0.166; 0.086]
very good: 5	0.143	[-0.124; 0.391]

Figure 2: Boxplots of Temperature by well-being and symptoms

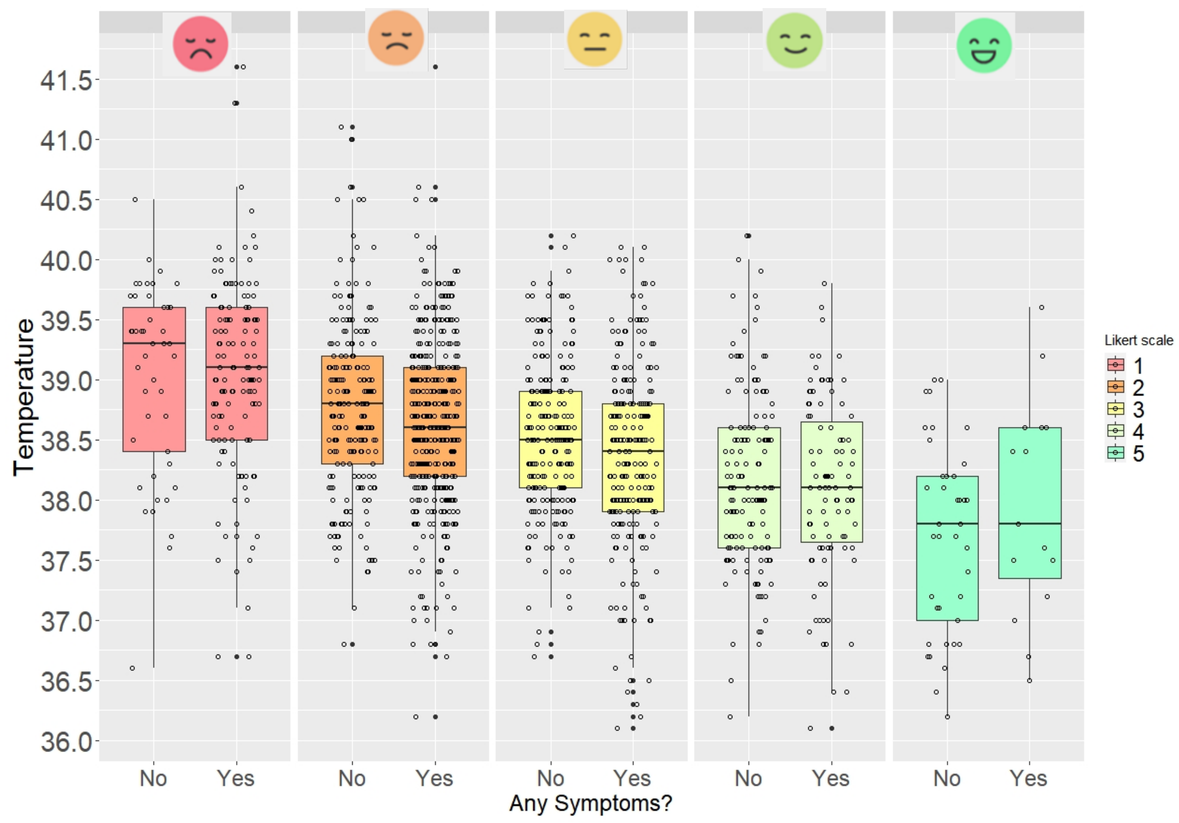


Table 2: Correlations between body temperature and rated well-being (Spearman's ρ) conditioned on symptoms' existence.

Symptoms	ρ	Confidence Interval
No	**-0.39**	**[-0.45; -0.31]**
Yes	**-0.34**	**[-0.40; -0.28]**

Table 3: Correlations between symptoms and rated well-being (rank-biserial correlation coefficient r_{rb}) conditioned on body temperature.

Temperature in °C	r_{rb}	Confidence Interval
Under 37.5	**-0.53**	**[-0.69; -0.34]**
37.5 to 38.5	**-0.26**	**[-0.34; -0.17]**
38.5 to 40	**-0.28**	**[-0.34; -0.21]**
Up 40	**-0.29**	**[-0.60; -0.03]**

Conclusions:

- It must be assumed that malaise, temperature, and symptoms are processes that are not necessarily related.
- Like fever, malaise could also be seen as a faculty that organisms have developed in the course of evolution to better deal with health challenges.
- Parents should therefore be instructed to consider and support well-being as an independent dimension alongside temperature in order to not unnecessarily weaken the resource "fever" by using antipyretics.