RISK OF RUNNING INJURIES IN MINIMAL FOOTWEAR/BAREFOOT RUNNERS

new hypothesis generated by crowd sourcing

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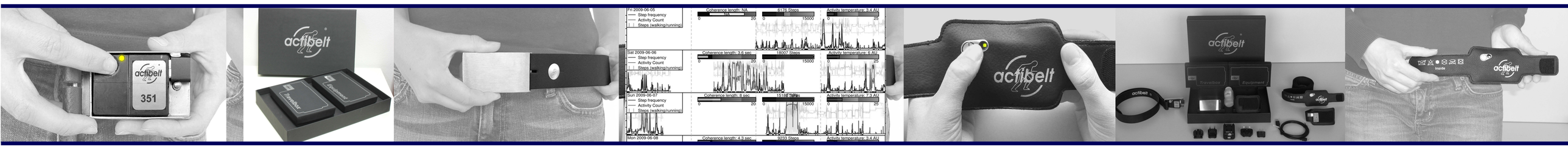


INTRODUCTION AND PURPOSE

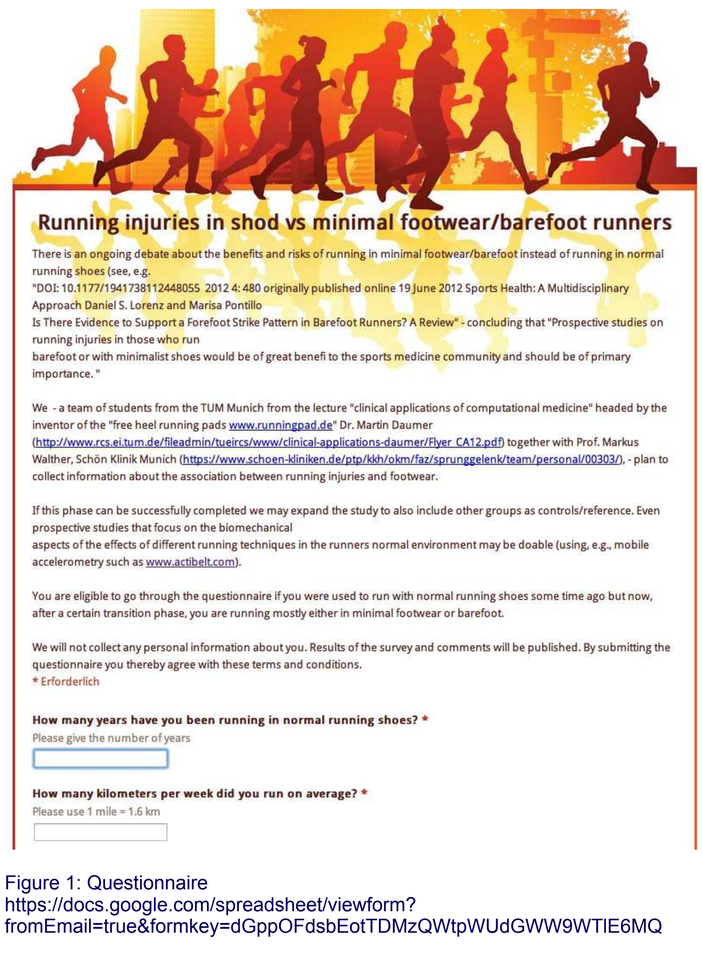
There is an on-going debate about incidence of injuries in minimal footwear/barefoot runners compared to runners using conventional running shoes [1-5]. Here we describe and discuss methods and results of a short online survey assessed in a community of minimal footwear/barefoot (MF/B) runners.

The aim of the survey was to investigate the viability of the method and to archive first insights on running behaviour, kilometric performance and injuries in the past.

METHODS

An online questionnaire was set up using google forms (see fig. 1) that was advertised by “barefoot runners society” website/facebook/twitter account and by the online-newsletter of “free heel running pad”. Runners were eligible to fill out the questionnaire, if they were used to run with normal running shoes some time ago, but then, after a certain transition phase, run mostly either in minimal footwear or barefoot.

The subjects were asked about their sex, age and running habits. These included number of severe injuries (related to running, e.g. Plantar Fasciitis, Achilles Tendinitis, IT Band Syndrome, Runner's Knee, Shin Splints), weekly distance and duration of months or years for each period of shod running, transition phase and MF/B running. Furthermore the subjects were asked on their personal view of benefits and risks of MF/B running and their reason why they've changed their running style.



Running injuries in shod vs minimal footwear/barefoot runners

There is an ongoing debate about the benefits and risks of running in minimal footwear/barefoot instead of running in normal running shoes (see, e.g.
"DOI: 10.1177/1941738112448055 2012 4: 480 originally published online 19 June 2012 Sports Health: A Multidisciplinary Approach Daniel S. Lorenz and Marisa Pontillo
Is There Evidence to Support a Forefoot Strike Pattern in Barefoot Runners? A Review" - concluding that "Prospective studies on running injuries in those who run
barefoot or with minimalist shoes would be of great benefi to the sports medicine community and should be of primary importance. "

We - a team of students from the TUM Munich from the lecture "clinical applications of computational medicine" headed by the inventor of the "free heel running pads www.runningpad.de" Dr. Martin Daumer (http://www.rcs.ei.tum.de/fileadmin/tueircs/www/clinical-applications-daumer/Flyer_CA12.pdf) together with Prof. Markus Walther, Schön Klinik Munich (https://www.schoen-kliniken.de/ptp/kkh/okm/faz/sprunggelenk/team/personal/00303/), - plan to collect information about the association between running injuries and footwear.

If this phase can be successfully completed we may expand the study to also include other groups as controls/reference. Even prospective studies that focus on the biomechanical
aspects of the effects of different running techniques in the runners normal environment may be doable (using, e.g., mobile accelerometry such as www.actibelt.com).

You are eligible to go through the questionnaire if you were used to run with normal running shoes some time ago but now, after a certain transition phase, you are running mostly either in minimal footwear or barefoot.

We will not collect any personal information about you. Results of the survey and comments will be published. By submitting the questionnaire you thereby agree with these terms and conditions.
* Erforderlich

How many years have you been running in normal running shoes? *
Please give the number of years

How many kilometers per week did you run on average? *
Please use 1 mile = 1.6 km

Figure 1: Questionnaire
https://docs.google.com/spreadsheet/viewform?fromEmail=true&formkey=dGppOFdsbEotTDMzQWtpWUdGWW9WTlE6MQ

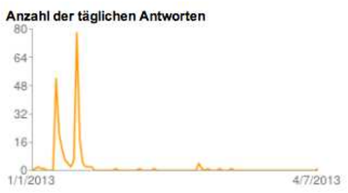


Figure 2: Number of filled in questionnaires per day

Figure 3: Example of an injury related to barefoot running: Haemorrhagic blister of a female barefoot runner (not part of the study)

RESULTS

In total 219 runners (163 male, 56 female) filled out the questionnaire. 200 of them within the first 2 weeks. 21 subjects had to be removed due to not having changed their running style (10 male, 2 female) or due to wrong formatting issues (1 male, 8 female). Therefore 198 (90.4%) subjects (152 male 40.7 ± 10.2 years, 46 female 38.6 ± 8.2 years) were included in the analysis.

	Mean km/week	SD km/week	Mean years	SD years
Shod	27.7 (30.0/ 20.2)	22.5 (24.2 / 13.5)	11.2 (11.8/ 9.4)	10.5 (10.9/ 8.8)
Transition phase	19.4 (20.9/ 14.6)	17.8 (18.8/ 12.7)	0.49 (0.53/ 0.34)	0.41 (0.43/ 0.30)
MF/B	35.8 (38.5/ 26.9)	26.7 (28.5/ 17.1)	2.67 (2.85/ 2.08)	2.75 (3.05/ 1.13)

Table 1: Mean values and SD of km per week of total dataset (male/ female) for each period and mean duration and SD for each period.

To bring the dataset in an homogeneous and analysable format the following rules had to be applied:

1) comments like „too many“ or „many“ were counted as three injuries
2) plural forms of explicitly named injuries were counted as two injuries
3) mean distance was used if weekly distance entries had the format from...to

We found a considerably increased risk of injury (+ 261%) during the time period changing from shod running to MF/B running (see tab. 2). This was also reflected in a number of the free text reports (“too much too fast”). The injury rate per km is smaller in barefoot than in shod running (- 55.9%), after the transition period has been managed (see also [4]).

Calculated injury rates per 10.000km:

Injuries / 10.000km	**Mean**	**Standard deviation**
Shod	12.77	56.82
Transition phase	33.27	95.28
MF/B	5.633	22.42

Table 2: Calculated mean of injuries per 10.000km for shod running, transition phase and minimal footwear/barefoot running and their standard deviations.

Frequency of injuries per 10.000km of 198 subjects:

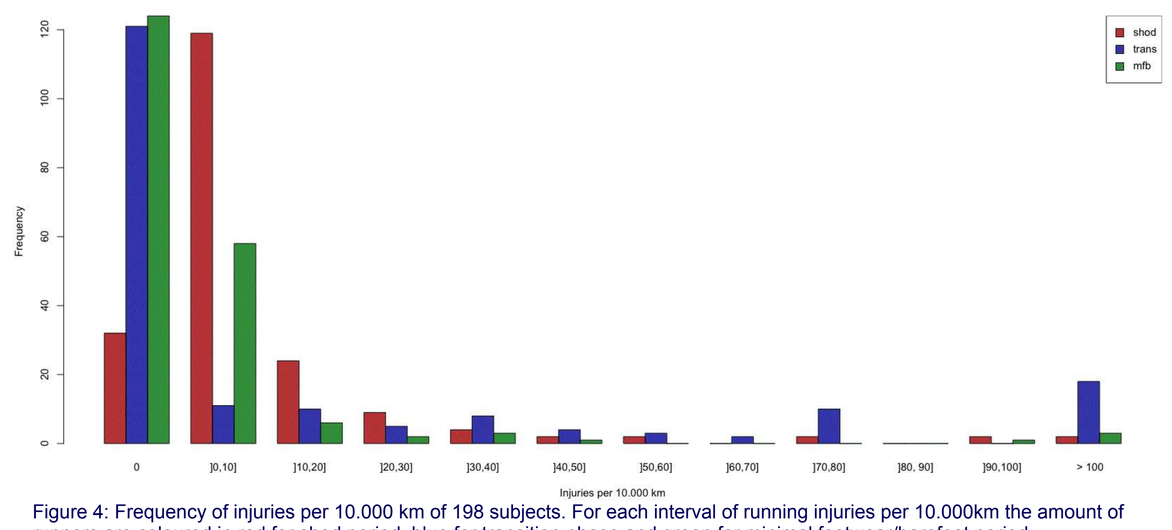


Figure 4: Frequency of injuries per 10.000 km of 198 subjects. For each interval of running injuries per 10.000km the amount of runners are coloured in red for shod period, blue for transition phase and green for minimal footwear/barefoot period.

CONCLUSIONS

The risk of injury during the transition phase in the group of responders (“crowd sourcing“) is considerably higher compared to habitually running either shod or barefoot/minimal footwear even with an optimistic rating of injuries during shod running; however there is a relevant risk of bias. The data seem to confirm the need of special guidance to the runner, especially in the transition phase, to reduce the incidence of injuries. Future research into the right “dosage” of barefoot/minimal footwear running in the transition period is warranted. It is well known that MF/B runners have a higher step frequency. Therefore we have to conclude that there must be a strong beneficial effect on injury rate per step in case of trained BF/M runners.

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