

Supplementary Materials

An Analysis of Sport-Specific Pain Symptoms through Inter-Individual Training Differences in CrossFit

Maria A. Bernstorff ^{1,*}, Norman Schumann ², Nader Maai ¹, Thomas A. Schildhauer ¹ and Matthias Königshausen ¹

¹ Medical Department of Ruhr University of Bochum, University Hospital Bergmannsheil Bochum, Bürkle de la Camp-Platz 1, 44789 Bochum, Germany; maria.bernstorff@gmail.com (M.A.B.); nader.maai@bergmannsheil.de (N.M.); thomas.schildhauer@bergmannsheil.de (T.A.S.); matthias.königshausen@gmail.com (M.K.)

² Department of Mathematics, Ruhr-University Bochum, Universitätsstraße 150, 44801 Bochum, Germany; norman.schumann@ruhr-universität-bochum.de

* Correspondence: maria.bernstorff@gmail.com; Tel.: (0049-1522-2926-817)

Citation: Bernstorff, M.A.; Schumann, N.; Maai, N.; Schildhauer, T.A.; Königshausen, M. An Analysis of Sport-Specific Pain Symptoms through Inter-Individual Training Differences in CrossFit. *Sports* **2021**, *9*, 68. <https://doi.org/10.3390/sports9050068>

Publisher's Note: MDPI stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.



Copyright: © 2021 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<http://creativecommons.org/licenses/by/4.0/>).

Table S1. Translated questionnaire: list of all questions recorded in the online questionnaire plus graphics to identify the individual pain regions.

Athlete and Training Characteristics
1) How many years have you been doing CrossFit?
2) How many hours a week do you do CrossFit? (Enter your amount of training in hours / week)
3) Do you take part in competitions? Yes/ No
to 3) If yes: RX/advanced/scaled?
4) Do you train according to a training plan designed for you?
To 4) If so, by whom or how was the questionnaire drawn up? Personal Trainer/Online/Self Employed/Employed/Another Source
To 4) If so, do you still take part in the course program of the box? Yes/No
5) Do you warm up regularly before training? Yes/No
6) Are you doing a cool down? Yes/now and then/never
7) Include some of your 1 RM benchmarks: Backsquat/Frontsquat/Deadlift/Power Snatch/Strict Press/Power Clean
8) Do you master: Strict pull-up/Kipping pull-up/Butterfly pull-up/Ring muscle-up/Bar muscle-up/Pistol squats/Handstand walk/Strict handstand push-up
9) Do you do specific exercises for small muscle groups in addition to CrossFit? Yes/No
To 9) If yes, tick for which muscle groups: rotator cuff/scapula retractors/hamstrings/gluteus medius
10) Did you do any other sport regularly before CrossFit? Yes/No
To 10) If so, which one?
To 10) How many years did you do your main sport?
To 10) Do you still do this sport? Yes/No
To 10) Did you practice this sport as a competitive sport? or do you still do it as a competitive sport? Yes/No
Sport-Specific Injuries
11) Have you already had to pause your sport because of an injury you sustained while doing CrossFit? Yes/No
12) Are you currently or have you had pain with individual CrossFit exercises in the past six months? Yes/No
To 12) If so, state in the following question at which point this pain is or was. Please use the illustration below as a guide.
To 12) If yes, tick where this pain is or was:
1—hand, wrist/2—elbow/3—shoulders/4—neck, cervical spine/5—upper back, thoracic spine/6—lower back, lumbar spine/7—hips, hip joint/8—sacrumiliac joint, SIJ/9—knee /10—foot/11—ankle
13) For each number ticked above, give the exercises in which you have or have had the pain / injuries?
14) When you no longer have the pain, how did you get it under control?
Omission of individual exercises/technique training of individual exercises/strength building in order to be able to perform certain exercises better/surgery/physiotherapy
To 14) If an operation was necessary, which one?

Table S2. Categorization of the one-repetition max (female): division of the given weights into five groups for better comparability with regard to the pain locations, N = number of athletes given their RM in this category.

Exercise	Group 1	Group 2	Group 3	Group 4	Group 5
Backsquat	<50kg	50–65 kg	65–80 kg	80–95kg	>95 kg
N	19	29	48	55	39
Frontsquat	<50 kg	50–60 kg	60–70 kg	70–80 kg	>80 kg
N	45	24	40	33	38
Strict Press	<25 kg	25–30 kg	30–35 kg	35–40 kg	>40kg
N	17	21	32	44	62
Power Snatch	<20kg	20–30 kg	30–40 kg	40–50 kg	>50 kg
N	7	18	48	68	36
Power Clean	<35 kg	35–45 kg	45–55 kg	55–65 kg	>65 kg
N	19	22	36	54	53
Deadlift	<60 kg	60–80 kg	80–100 kg	100–120 kg	>120 kg
N	12	29	47	64	41

Table S3. Total number of athletes being capable of mastering certain skills.

Mastered Skill	N (Male)	N (Female)
Strict Pul -up	182	127
Kipping Pull-up	157	126
Butterfly Pull-up	81	36
Ring Muscle-up	75	17
Bar Muscle-up	94	20
Pistol Squat	106	125
Handstand Walk	63	39

Table S4. Number of athletes doing accessory exercises regularly.

Accessory exercise	N (male)	N (female)
Rotator cuff	80	75
Shoulder blade retractors	66	72
Hamstrings	58	52
Gluteus medius	38	43