Supplementary information to:

Original article:

LOW SELF-REPORTED STRESS DESPITE IMMUNE-PHYSIOLOGICAL CHANGES IN PARAMEDICS DURING RESCUE OPERATIONS

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SUPPLEMENTARY INFORMATION

Detailed description of the self-report questionnaires:

- 1. Stress from rescue service specific stressors was measured with the 19-item "Stress during rescue service mission Scale" (SIRE)¹ on a 5-point rating scale (1 = very little to 5 = very high). The scale consists of six subscales named competence (4 items), violence (3 items), not self-inflicted external factors (4 items), emergency operation (3 items), migration (2 items), and unpredictable missions (3 items). Seven items were added to the scale belonging to the subscales interruptions (3 items), colleagues (2 items), alteration (1 item) and material (1 item). The whole scale consists of 26 items. An example item is "My perceived stress during rescue service missions with patients, who penetrate my personal safe area, is ... ". Coefficient alpha for the whole scale was .82 and it ranged between .41 and .81 for the subscales. The SIRE was only filled in by the paramedics.
- 2. Mental Stress was assessed with the 8-item Irritation Scale² on a 7-point rating scale (1 = not at all to 7 = almost totally true). The scale consists of the two dimensions emotional irritation (5 items, e.g., "I get grumpy when others approach me.") and cognitive irritation (3 items, e.g., "Even at home I often think of my problems at work."). Coefficient alpha for the whole scale was .80 and the subscales were .83 (emotional irritation) and .86 (cognitive irritation).
- 3. Subjective strain was assessed with the German version³ of the Perceived Stress Questionnaire (PSQ)⁴ on a 4-point rating scale (1 = hardly never to 4 = mostly). The questionnaire consists of 20 items four subscales with 5 items each. The subscales are named tension (e.g., "You feel tense"), demands (e.g., "You have too many things to do"), joy (e.g., "You are full of energy"), and worries (e.g., "You feel frustrated"). The coefficient alpha were .90 for the whole scale, .81 (tension), .76 (demands), .80 (joy) and .77 (worries).
- 4. Chronic stress was assessed with the Trier Inventory of Chronic Stress (TICS)⁵. The inventory consists of 57 items that are grouped into nine subscales named work overload (8 items), social overload (6 items), pressure to perform (9 items), work discontent (8 items), excessive demands at work (6 items), lack of social recognition (4 items), social tensions (6 items), social isolation (6 items) and chronic worrying (4 items). An example item is "I have too many tasks to perform". The chronic stress was measured on a 5-point rating scale (0 = never to 4 = very often). The coefficient alpha of the whole scale was .93 and it ranged between .77 and .90 for the subscales.
- 5. Detachment was measured with the 16-item Recovery Experience Questionnaire⁶ on a 5-point rating scale (1 = I do not agree at all to 5 = I totally agree). The questionnaire consists of four subscales named psychological detachment (e.g., "During time after work I forget about

¹ Hagemann V, Holtz M. Entwicklung eines web-basierten Fragebogens zur Messung von "Stress im Rettungsdiensteinsatz - SIRE". Wirtschaftspsychologie. 2016;18(1):78-90.

² Mohr G, Rigotti T, Müller A. Instrumente der Arbeits-und Organisationspsychologie. Irritation - ein Instrument zur Erfassung psychischer Beanspruchung im Arbeitskontext. Skalen-und Itemparameter aus 15 Studien. Z Arb & Organisationspsychol A&O. 2005;49:44-8.

³ Fliege H, Rose M, Arck P, Levenstein S, Klapp B. Validation of the" Perceived Stress Questionnaire"(PSQ) in a German sample. Diagnostica. 2001;47:142-52.

⁴ Levenstein S, Prantera C, Varvo V, Scribano ML, Berto E, Luzi C, et al. Development of the Perceived Stress Questionnaire: a new tool for psychosomatic research. J Psychosom Res. 1993;37:19-32.

⁵ Schulz P, Schlotz W, Becker P. Trierer Inventar zum chronischen Stress: TICS. Göttingen: Hogrefe, 2004.

⁶ Sonnentag S, Fritz C. The Recovery Experience Questionnaire: development and validation of a measure for assessing recuperation and unwinding from work. J Occup Health Psychol. 2007;12:204-21.

work"), relaxation (e.g., "During time after work I do relaxing things"), mastery (e.g., "During time after work I do things that challenge me") and control (e.g., "During time after work I decide my own schedule"). Each subscale includes 4 items. Coefficient alpha for the whole scale was .80. For the subscales coefficient alpha were .91 (psychological detachment), .89 (relaxation), .93 (mastery) and .90 (control).

- 6. Coping Strategies were measured with 28 items on a 4-point rating scale (1 = not at all to 4 = to a great extend) based on the German Brief ⁷ COPE (Coping Orientation to Problems Experienced)⁸. There are 13 subscales with 2 items (acceptance, denial, positive reframing, behavioural disengagement, substance use, self-distraction, use of emotional support, humour, active coping, venting, planning, self-blame, religion) and the subscale use of instrumental support that includes 4 items. To specify the subscale use of instrumental support we divided between professional advice, private advice and advices from colleagues, so that we had in total 30 items. An example item is "I've been making jokes about it.". The coefficient alpha for the whole scale was .73 and it ranged between .31 and .92.
- 7. Burnout risk was measured with the German version⁹ of the Maslach Burnout Inventory (MBI)¹⁰. The two subscales emotional exhaustion (EE, e.g., "Working with people all day is really a strain for me") and depersonalisation (DE, e.g., "I don't really care much about what happens to some patients") were used. These subscales consist of 14 items (9 for EE and 5 for DE) and were measured on a 6-point rating scale (1 = not at all to 6 = very often). The coefficient alpha was .81. For the subscale EE the coefficient alpha was .82 and for the subscale DE it was .74. An example item is "I feel used up at the end of the workday".
- 8. Positive and Negative Affect were measured with a German version¹¹ of the Positive and Negative Affect Schedule (PANAS)¹² with 9 items for positive affect and 7 items for negative affect. The 5-point rating scale ranged from 1 (not at all) to 5 (totally true) and examples of the adjectives, which had to be rated, are interested or upset. The coefficient alpha were .76 for positive affect and .79 for negative affect.
- 9. Work-related flow experience was assessed with the 13-item Work-Related Flow Inventory (WOLF)¹³ on a 7-point rating scale (1 = never to 7 = always). The inventory consists of three subscales named absorption (e.g., "I get carried away by my work"), work enjoyment (e.g., "My work gives me a good feeling") and intrinsic work motivation (e.g. "I work because I enjoy it"). The coefficient alpha for the whole scale was .91. For the subscale absorption (4 items) the coefficient alpha was .81, for work enjoyment (4 items) the coefficient alpha was .92 and for intrinsic work motivation (5 items) the coefficient alpha was .85.

⁷ Knoll N, Rieckmann N, Schwarzer R. Coping as a mediator between personality and stress outcomes: A longitudinal study with cataract surgery patients. Eur J Pers. 2005;19:229-47.

⁸ Carver CS, Scheier MF, Weintraub JK. Assessing coping strategies: A theoretically based approach. J Pers Soc Psychol. 1989;56:267-83.

⁹ Büssing A, Perrar K-M. Die Messung von Burnout. Untersuchung einer deutschen Fassung des Maslach Burnout Inventory (MBI-D). Diagnostica. 1992;38: 328-53.

¹⁰ Maslach C, Jackson SE. The measurement of experienced burnout. J Organiz Behav. 1981;2:99-113.

¹¹ Krohne HW, Egloff B, Kohlmann C-W, Tausch A. Untersuchungen mit einer deutschen Version der "Positive and negative Affect Schedule" (PANAS). Diagnostica. 1996;42:139-56.

¹² Watson D, Clark LA, Tellegen A. Development and validation of brief measures of positive and negative affect: the PANAS scales. J Pers Soc Psychol. 1988;54: 1063-70.

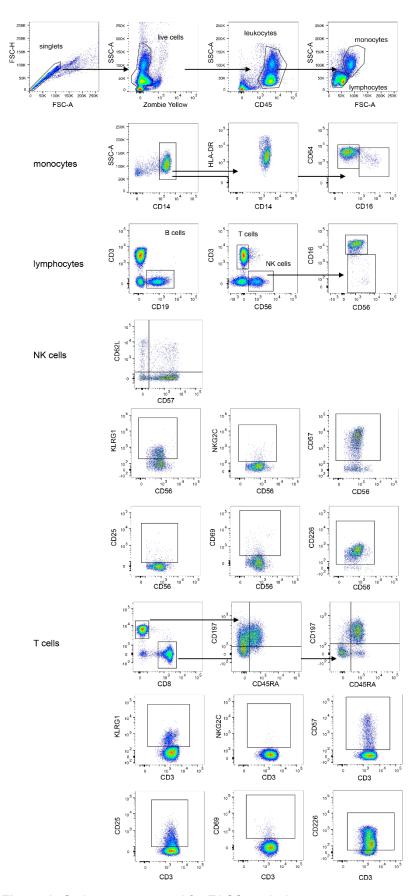
¹³ Bakker AB. The work-related flow inventory: Construction and initial validation of the WOLF. J Vocat Behav. 2008;72:400-14.

Supplementary Table 1: Scales, number of items and coefficient alpha

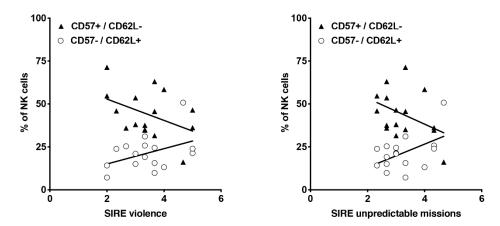
Scale		Items	Coefficient Alpha
SIRE		26	.82
	competence	4	.58
	violence	3	.81
	not self-inflicted external factors	4	.81
	emergency operation	3	.47
	migration	2	.41
	unpredictable missions	3	.68
	interruptions	3	.54
			· • ·
	colleagues	2	.46
	alteration	1	
	material	1	
Irritatio	n Scale	8	.80
	emotional irritation	5	.83
	cognitive irritation	3	.86
PSQ	-	20	.90
	tension	5	.81
	demands	5	.76
	joy	5	.80
			.77
TICC	worries	<u> </u>	
TICS		57	.93
	work overload	8	.90
	social overload	6	.87
	pressure to perform	9	.78
	work discontent	8	.77
	excessive demands at work	6	.79
	lack of social recognition	4	.84
	social tensions	6	.85
		6	
	social isolation		.77
	chronic worrying	4	.87
Recovery Experience Questionnaire		16	.80
	psychological detachment	4	.91
	relaxation	4	.89
	mastery	4	.93
	control	4	.90
COPE		30	.73
00. L	acceptance	2	.88
	use of instrumental support	4	.61
	denial	2	.63
	positive reframing	2	.77
	behavioural disengagement	2	.31
	substance use	2	.92
	self-distraction	2	.38
	use of emotional support	<u>-</u> 2	.62
	humour	2	.60
		2	
	active coping	2 2 2 2 2 2 2	.37
	venting	2	.55
	planning	2	.51
	self-blame	2	.83
	religion	2	.33
MBI (tv	vo subscales)	14	.81
(emotional exhaustion	9	.82
	depersonalisation	5	.74
PANAS		<u> </u>	.1 T
CANAS		0	76
	positive affect	9	.76
	negative affect	7	.79
WOLF		13	.91
	absorption	4	.81
	work enjoyment	4	.92
	WOLK ELIIOVILIETIL		
	intrinsic work motivation	5	.85

Supplementary Table 2: Tables of antibodies used for flow cytometry

panel	antigen	clone	fluorochrome	company	dilution 1/x
absolute cell count	CD19 CD3 CD66b CD56 CD14 CD45	HIB19 UCHT1 G10F5 B159 ΜφΡ9 HI30	BV421 BV510 BB515 PerCP-Cy5.5 PE AF700	BD Horizon™ BD Horizon™ BD Horizon™ BD Pharmingen™ BD Pharmingen™ BD Pharmingen™	100 100 100 100 100 100
(1) general overview of	CD19	HIB19	BV421	BD Horizon™	200
lymphocytes / monocytes	CD3 live / dead CD16 HLA-DR CD14 CD64 CD56 CD45	UCHT1 3G8 G46-6 MφP9 10.1 B159 HI30	BV510 zombie Yellow FITC PerCP-Cy5.5 PE PE-Cy7 APC AF700	BD Horizon™ Biolegend BD Pharmingen™ BD Horizon™ BD Pharmingen™ BD Pharmingen™ BD Pharmingen™ BD Pharmingen™	400 1000 200 100 500 200 50 500
(2) memory and homing markers of NK cells and T cells	KLRG1 CD3 live / dead CD8 CD28 CD57 CD56 CD62L CD197 CD4 CD45RA	2F1 UCHT1 RPA-T8 CD28.2 NK-1 B159 DREG-56 150503 RPA-T4 HI100	BV421 BV510 zombie Yellow FITC PerCP-Cy5.5 PE PE-CF594 PE-Cy7 AF647 APC-H7 AF700	BD Horizon™ BD Horizon™ Biolegend BD Pharmingen™ BD Pharmingen™ BD Pharmingen™ BD Pharmingen™ BD Horizon™ BD Horizon™ BD Pharmingen™ BD Pharmingen™	400 400 1000 200 100 800 100 200 50 100 400
(3) activation and memory markers of NK cells and T cells	KLRG1 CD3 live / dead NKG2C CD56 CD57 CD25 DNAM-1 CD69	2F1 UCHT1 134591 B159 NK-1 M-A251 DX11 FN50	BV421 BV510 zombie Yellow AF488 PerCP-Cy5.5 PE PE-Cy7 AF647 APC-H7	BD Horizon™ BD Horizon™ Biolegend R&D Systems BD Pharmingen™ BD Pharmingen™ BD Pharmingen™ BD Pharmingen™ BD Pharmingen™	400 400 1000 100 50 800 50 100



Supplementary Figure 1: Gating strategy used for FACS analysis



Supplementary Figure 2: Correlation of paramedics NK cell subsets with the SIRE subscales "violence" and "unpredictable missions"