Participant Study

Results and recommendations

Improvement of the Online Data Platform

New Features and possibilities

Edition notice

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I.   Participant study - Results and recommendations

The aim of this research and study was the evaluation of the participation, fitness-status and test items by the end-users. Therefore, a detailed analysis of the EFB database from June 2017 to May 2019 was executed. Full results of this analysis will be published in a scientific journal in 2020 and for the purpose of this report, the main items are evaluated.

<u>Question 1: Who participated at the EFB?</u>

The analysed data set displays all participants, which executed the EFB between 1st of June 2017 and 31st of May 2019. 6019 adults between 18 and 89 years are included with an average age of 52.7 (SD=16.7). The biggest age group (27.4%) is 60 to 69 years old.

68.7% were female and 50.4% executed test profile 2. The BMI mean value is 24.9 (SD=4.1), the waist circumference is 84.3 (SD=11.6) for women and 93.9 (SD=11.8) for men on average. 73.6% of EFB participants are at least one hour physical active per week.

Participants performed the EFB in eight different countries: Denmark (DEN) (41%), Germany (GER) (36.9%), Slovenia (SVN) (11.1%), Spain (ESP) (4.5%), Belgium (BEL) (3.5%), Austria (AUT) (3.1%), Bulgaria (BG) (0.0%) and Czech Republic (CZ) (0.0%).[1] Table 1 presents the detailed description of participants according to the country the EFB was performed in.

Table 1 Country-specific overview about participants (activity ranges according to N-Ex from 1-5)

Country (n)	Sex (% female)	Age ($\overline{x}$, SD)	Test profile (% TP1)	Activity ($\overline{x}$, SD)	BMI ($\overline{x}$, SD)	Posture (% no abnormality)
AUT (186)	59.1	45.2, 14.1	36.0	4.0, 1.0	23.9, 3.2	83.2
BEL (211)	71.1	38.1, 8.3	8.5	3.2, 1.4	24.4, 3.0	43.8
DEN (2465)	73.3	62.5, 12.0	81.1	3.8, 1.1	25.5, 4.3	55.9
ESP (268)	61.9	41.6, 16.1	61.9	4.0, 1.0	26.3, 5.0	38.0
GER (2220)	65.0	46.7, 16.3	26.8	4.1, 1.0	24.4, 3.8	76.1
SVN (666)	68.9	47.3, 16.8	21.0	3.9, 1.1	25.1, 4.2	48.0
Overall (6019)	68.7	52.7, 16.7	49.6	3.9, 1.1	24.9, 4.1	61.8

As consequence for the different target groups of both test profiles (TP), participants are analysed in detail separated after TP in the following section.

Test profile 1

2985 people participated in test profile 1. They are 61.4 years old on average (SD=13.4) with a range from 18 to 89. Most participants are female (74.3%). Main age group (53.8%) is 60 to 69 years, followed by the second oldest age group of ≥70 years. There is no relevant difference in age related to sex. On average, the body composition displays light overweight with a BMI of 25.7 (SD=4.4). The BMI value displays a high range from 15.6 to 51.5. Men display significantly (p=0.000, F=44.706, η^2=0.02) a higher BMI value ($\overline{x}$=26.6, SD=4.0) than women ($\overline{x}$=25.3, SD=4.5) do. The observed posture of 56.8% of participants shows no abnormalities. On average, females display a better posture (58.6% of a good posture) than men (51.6%) do. Participants of test profile 1 mostly do 60 to 180 minutes (35.1%) or

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[1] In *Bulgaria* and the *Czech Republic*, below five people participated at the EFB. Out of data protection issues, we decided not to display the results in this paper.

more than 180 minutes (33.6%) of physical activity during a normal week. 5% are not active at all and 9.5% do low level activities in daily routine like stair climbing. There is no significant difference regarding sex in physical activity.

Test profile 2

3034 people participated in test profile 2. They are 44.2 years old on average (SD=15.1) with a range from 18 to 89. More participants are female (63.2%). Main age group (24%) is 40 to 49 years, followed by the next oldest age group of 50 to 59 years (22%). There is no relevant difference in age related to sex. On average, the body composition displays a normal body composition with a BMI of 24.3 (SD=3.7). The BMI value displays a high range from 15.8 to 45.3. Men display significantly (p=0.000, F=169.141, η^2=0.05) a higher BMI value ($\overline{x}$=25.5, SD=3.6) than women ($\overline{x}$=23.7, SD=3.6) do. The observed posture of 67% of participants is good whereas 19.3% display a forward head position, 11.3% a too hollow lower back and 2.5% both anomalies. On average, females display a better posture (68.4% of a good posture) than men (64.4%) do. Participants of test profile 2 mostly do 60 to 180 minutes (39.4%) or more than 180 minutes (38.9%) of physical activity during a normal week. 4% are not active at all and 5.1% do low level activities in daily routine like stair climbing. There is no significant difference regarding sex in physical activity.

Question 2: Which fitness results achieve EFB participants?

This question aims to display the achieved fitness results and to compare the participants regarding the achieved level according to sex and age group.

Three different levels can be reached at the EFB: Basic, Advanced, Approved. The level "Basic" can be reached when executing test profile 1, the levels "Advanced" and "Approved" via test profile 2. Test profiles include different test items and have different scoring systems. Hence, a differentiation in the calculations between those two is necessary. Mean value comparison regarding the test profile indicate this separation too. Parameters age, sex, BMI, activity and posture differ significantly (p=0.000). A comparison in-between the countries is neglected due to the completely different dissemination strategies and focussed settings. A country-internal distribution of reached certificates in percent provides table 2.

Table 2 Country-internal distribution of reached certificates in percent, structured after test profile

Test profile	Certificate	AUT	BEL	DEN	ESP	GER	SVN
TP1	**Participated**	3.0	94.4	3.9	25.9	6.9	2.1
	Basic	97.0	5.6	96.1	74.1	93.1	97.9
TP2	**Participated**	14.3	28.0	26.6	37.3	12.8	4.2
	Advanced	36.1	36.3	39.1	28.4	29.7	24.9
	Approved	49.6	35.8	34.3	34.4	57.5	70.9

Test profile 1

Fitness results in TP1 differentiated after sex and age group are set out in table 3. As stated before, TP1 is basic oriented and therefore differs not between age and sex in the evaluation. Results in this

table confirm the evaluation of TP1. It reveals low values at the standing up with one leg test and the balancing test in comparison to the other test items.

Results regarding age group show significant but low eta squares throughout almost all test items. Fitness results decline at every test item with older age. This confirms the sum score evaluation of TP1 according to the age.

Table 3 Fitness results of TP1 differentiated after sex and age group

Test item[2]	Sex		p-value	Eta square	Age group						p-value	Eta square
	Female (n=2201)	Male (n=759)			18-29 (n=135)	30-39 (n=158)	40-49 (n=192)	50-59 (n=373)	60-69 (n=1307)	≥70 (n=806)		
	$\overline{x}$, SD	$\overline{x}$, SD			$\overline{x}$, SD	$\overline{x}$, SD	$\overline{x}$, SD	$\overline{x}$, SD	$\overline{x}$, SD	$\overline{x}$, SD		
Step test	2.9, 0.4	2.9, 0.4	0.778	0.000	3.0, 0.2	2.9, 0.4	2.9, 0.3	2.9, 0.3	2.9, 0.4	2.8, 0.5	0.000***	0.021
Plank	2.8, 0.5	2.9, 0.4	0.000***	0.009	2.8, 0.5	2.9, 0.5	2.9, 0.4	2.9, 0.5	2.8, 0.5	2.8, 0.5	0.000***	0.009
Stand up	2.2, 0.9	2.2, 0.9	0.518	0.000	2.6, 0.7	2.7, 0.7	2.7, 0.7	2.4, 0.8	2.2, 0.9	1.8, 0.9	0.000***	0.092
Push up	2.0, 0.8	2.6, 0.6	0.000***	0.098	2.4, 0.7	2.6, 0.6	2.5, 0.7	2.1, 0.8	2.1, 0.8	2.0, 0.8	0.000***	0.042
Jumping Jacks	2.9, 0.4	2.9, 0.5	0.003***	0.003	3.0, 0.1	2.9, 0.3	2.9, 0.3	2.9, 0.3	2.9, 0.4	2.8, 0.5	0.000***	0.023
Balancing	2.1, 0.6	2.1, 0.6	0.133	0.001	2.7, 0.5	2.6, 0.5	2.5, 0.5	2.5, 0.5	2.1, 0.5	1.8, 0.6	0.000***	**0.168**
Sit&reach	2.6, 0.7	2.2, 0.9	0.000***	0.048	2.6, 0.7	2.5, 0.8	2.5, 0.7	2.6, 0.8	2.5, 0.8	2.5, 0.8	0.593	0.001
Sum score	10.5, 1.5	10.2, 1.6	0.000***	0.006	11.0, 1.4	10.7, 1.9	10.7, 1.9	10.7, 1.5	10.5, 1.3	10.0, 1.6	0.000***	0.034

With TP1 people can reach level "Basic". If they do not reach this level, they get a comment of participation including all feedback sheets successful participants get as well. In the following two groups, participated (n=184, 6.2%) and level "Basic" (n=2801, 93.8%), will be compared regarding parameters country, sex, age, activity, BMI and posture.

People reaching the level "Basic" are on average 62.13 years old (SD=12.72) and therewith 12.35 years older than people not reaching the level "Basic" (p=0.000, F=153.444, η^2=0.05). They are more often female (+9.1%) (p=0.006, F=7.577, η^2=0.003), more active (+0.75) (p=0.000, F=74.457, η^2=0.03) and display a better posture (+16.5% with no anomalies) (p=0.000, F=17.434, η^2=0.01). They display a better BMI value ($\overline{x}$=25.53, SD=4.25) than the just participated people ($\overline{x}$=27.93, SD=5.97) do. Furthermore, they are mostly Danish (68.6%) or German (19.8%).

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[2] Test items in TP1 are ranked from 1 to 3 points. No raw values are collected here.

Test profile 2

Fitness results of TP2 differentiated after sex and age group are set out in table 4. These results display mostly significant differences between the sexes. What stands out in the table regarding differences between the sexes are the two strength tests push-up and jump and reach with remarkable effect sizes. The results confirm the differentiation between the sexes in the evaluation of TP2. In addition, the reduction of physical fitness from young to old age is visible. Remarkable effect sizes related to age group can be recognized in test items of endurance, strength and coordination. These results confirm strongly the evaluation after age groups.

Table 4 Fitness results of TP2 differentiated after sex and age group

Test item (value)	Sex		p-value	Eta square	Age group						p-value	Eta square
	Female (n=1903)	Male (n=1109)			18-29 (n=648)	30-39 (n=496)	40-49 (n=721)	50-59 (n=663)	60-69 (n=337)	≥70 (n=148)		
	$\overline{x}$, SD	$\overline{x}$, SD			$\overline{x}$, SD	$\overline{x}$, SD	$\overline{x}$, SD	$\overline{x}$, SD	$\overline{x}$, SD	$\overline{x}$, SD		
Step test (VO2max)	45.5, 12.3	46.8, 12.6	0.008***	0.003	51.8, 10.8	47.8, 11.9	46.5, 12.0	44.1, 11.5	40.1, 11.8	32.0, 10.8	0.000***	**0.138**
Walking (sec)	973.6, 118.6	983.8, 120.8	0.648	0.001	922.3, 85.2	987.9, 94.5	970.9, 116.0	901.8, 88.8	1035.5, 102.5	1073.6, 135.8	0.000***	**0.252**
Plank (sec)	126.4, 60.7	155.0, 62.8	0.000***	0.048	136.9, 59.1	127.6, 62.4	137.4, 63.6	139.7, 63.3	144.8, 65.3	136.1, 69.3	0.006***	0.006
Jump (cm)	28.4. 8.3	40.1, 11.9	0.000***	**0.247**	40.2, 11.5	35.8, 11.5	32.8, 9.3	29.4, 9.0	25.7, 8.2	20.4, 7.9	0.000***	**0.228**
Push up (n°)	10.8, 4.6	14.5, 4.8	0.000***	**0.128**	14.7, 5.0	12.9, 4.9	11.8, 4.7	11.4, 4.7	10.0, 3.9	7.9, 4.2	0.000***	**0.123**
Flamingo (n° of fails)	4.5, 7.3	5.9, 8.9	0.000***	0.007	1.8, 4.1	3.2, 6.0	4.2, 7.0	5.5, 7.9	9.7, 9.7	15.8, 11.4	0.000***	**0.177**
Walkback (sec)	17.6, 9.4	13.8, 5.6	0.000***	0.046	13.0, 5.9	14.9, 6.1	15.6, 7.6	17.4, 8.4	19.7, 8.8	25.4, 16.6	0.000***	**0.112**
Sit&reach (cm)	9.6, 8.5	3.2, 10.5	0.000***	0.098	9.4, 9.8	7.3, 9.5	7.3, 9.5	7.4, 9.0	4.9, 10.5	2.1, 11.2	0.000***	0.030
Sum score (points[3])	14.4, 3.3	13.6, 3.6	0.000***	0.011	13.9, 3.5	13.4, 3.6	13.8, 3.5	15.0, 3.1	14.8, 3.1	13.6, 3.4	0.000***	0.032

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[3] Sum score points range from 1 to 20 in TP2.

With TP2 people can reach level "Advanced" or "Approved". If they do not reach the level "Advanced", they get a comment of participation including the feedback sheets successful participants get as well. In the following the three groups: "Participated" (n=463, 15.3%), "Advanced" (n=937, 30.9%) and "Approved" (n=1634, 53.9%) will be compared regarding the parameters of country, sex, age, activity, BMI and posture.

People reaching the level "Advanced" are on average 43.90 (SD=15.37) years old and therewith on average 1.8 years older than people not reaching the Level "Advanced". They are more often female (+6.1%), more active (+0.3) and display a better posture (+6.1% with no anomalies). They display a better BMI value than the just participated people do (-1.87). Furthermore, they are mostly German (51.4%) or Danish (19.4%).

People reaching Level "Approved" are on average 44.93 (SD=14.9) years old and therewith 1.03 years older than people reaching the Level „Advanced" and 2.83 years older than people who just participated (p=0.001, F=6.565, η^2=0.004). They are more often female (66.3%) than level "Advanced" (62.3%) and "Participated" (54.2%) and more active ($\bar{x}$=4.22, SD=0.91) than level "Advanced" (M=3.93, SD=1.07) and "Participated" ($\bar{x}$=3.62, SD=1.24) (p=0.000, F=70.262, η^2=0.05). Level "Approved" display a better posture (73.6% with no anomalies) than level "Advanced" (60.1%) and "Participated" (56%) (p=0.000, F=37.138, η^2=0.03). They display a better BMI ($\bar{x}$=23.43, SD=2.91) than level "Advanced" ($\bar{x}$=24.87, SD=3.78) and the "Participated" ($\bar{x}$=26.74, SD=4.95) (p=0.000, F=154.871, η^2=0.10). Furthermore, they are mostly German (57.3%) or Slovenian (22.9%).

II.   Improvement of the online data platform - New features and possibilities
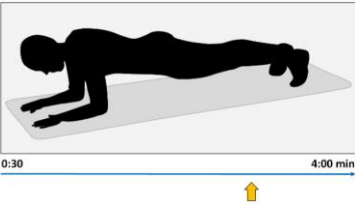
General description of the EFB online data platform

1. New feature 1: Prove of the norms

Aim	Proving of the norms and modification if necessary
Realization	1 ½ years after publication, data of all test items was compared with the existing norms.
Design / Result	No change needed to be done here.

2. New feature 2: Planking norms

Aim	The plank test was a new implemented test. No norms for adults existed for all ages. After a certain time and when enough data was entered, the data should be proven and changed into norms.
Realization	After 1 ½ years of publication, data was exported and proven. It turned out, that the plank test was not comparable with other strength tests as push-ups or jump and reach. In detail, people aged 70 or older had the same results as people aged 20 to 30 years. However, the plank test differs according to sex. Nonetheless, the test is not comparable to the other strength tests and cannot be used for the same evaluation.
Design	The plank test will be further used as test item, but with the aim of testing body stability. Therefore, the test is not part of the evaluation but part of additional measurements. This decision is made considering as well the attraction the test item has to participants. The design of the additional comment is as follows:

|	BODY STABILITY
	The Plank test is a measurement for displaying the core stability. Maximum holding time in test profile 1 is 30 seconds and in test profile 2 four minutes. You reached 02:12 minutes. This is good! Keep going or try to increase the training of your core stability!

3. New feature 3: Available in six different languages

Aim	Aim was to raise the acceptance and therewith the usage of the EFB with translating the ODP up to six different languages.
Realization	With the help of the partners, the ODP could be translated and afterwards programmed by our IT partner "mb mediasports" into five further languages. Additionally, to English, the ODP was translated into German, Danish, Spanish, Bulgarian and Slovenian.
Design / Result	**powered by mb-mediasports ©** Imprint bg da **de** en es sl Through these buttons, the languages can be changed immediately. Altogether, the ODP as well as the forms and certificate documents are available in these six languages now.

4. New feature 4: Scientific interface

Aim	Aim was to have an interface for two reasons: 1) Associations and their instructors should have a usable possibility to see who participated at their events, what their results were and what general results can be extracted 2) Scientific partners should have a usable possibility to export anonymised data from the ODP to study scientific questions 3) Increase the users experience
Realization	An export function was developed for all M-Code owners.

	For further acceptance a dashboard was developed, which displays some overall results understandable for everyone. This is publicly accessible and follows the Data Protection regulations.
Design	The right button allows downloading selected data by M-Code owners. This screenshot displays the first of eight pages of the EFB dashboard. It is accessible via the EFB homepage fitness-badge.eu
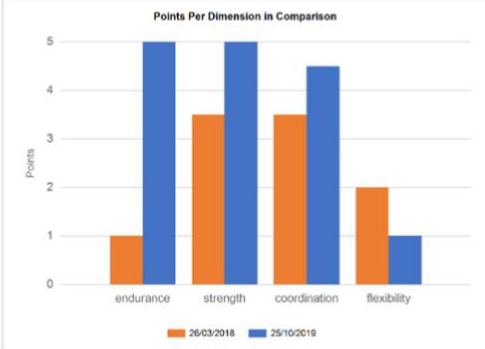
5. New feature 5: FAQ tool

Aim	For improving the usability of all education materials and to answer the most common questions of participants and instructors, a FAQ tool should be implemented.
Realization	Possible questions were collected together with all project partners. Sections of the FAQs are: the project, for participants, for instructors, test items, online data platform, implementation, data protection and further questions.
Design / Result	With altogether 84 questions and corresponding answers, the FAQs are now accessible online at the EFB homepage fitness-badge.eu at the section "Downloads".

6. New feature 6: Further measurement

Aim	For a sustainable usage of the EFB, it is very important for instructors in sport clubs or fitness clubs to have a continuous measurement tool. Until now, it was just possible to test one person once and to test this person twice without knowing the first results.

	Through a new function at the ODP, further measurements of the same person with knowledge of the previous results should be possible.
Realization	In close cooperation with the project partners, two possibilities of further measurements were realized: 1) Copying one event with all participants and test them again. 2) Enter the P-Code of a participant and test this person once again. An additional page was added to the certificate for comparing always the last two tests of a person.
Design	The visible change at the ODP is minimal: The bottom on the right is for copying one event. This is the layout of the additional feedback page: