fizjoterapia polska

POLISH JOURNAL OF PHYSIOTHERAPY

OFICJALNE PISMO POLSKIEGO TOWARZYSTWA FIZJOTERAPII

THE OFFICIAL JOURNAL OF THE POLISH SOCIETY OF PHYSIOTHERAPY

NR 4/2018 (18) KWARTALNIK ISSN 1642-0136

Porównanie efektywności wybranych zabiegów fizykoterapeutycznych w dolegliwościach barku u chorych ze zmianami zwyrodnieniowymi

Comparison of the effectiveness of certain physical therapy treatments in shoulder pain in patients with degenerative lesions

Ocena wpływu metody integracji sensorycznej na rozwój lateralizacji

Assessment of the impact of sensory integration method on the development of laterality

ZAMÓW PRENUMERATĘ!

SUBSCRIBE!

www.fizjoterapiapolska.pl

prenumerata@fizjoterapiapolska.pl

Dr. Comfort®

Nowy wymiar wygody dla stóp z problemami

Obuwie profilaktyczno-zdrowotne o atrakcyjnym wzornictwie i modnym wyglądzie

NAGRODA POLSKIEGO TOWARZYSTWA REHABILITACJI

ACCEPTED
AMERICAN PODIATRIC MEDICAL ASSOCIATION

APROBATA AMERYKAŃSKIEGO MEDYCZNEGO STOWARZYSZENIA PODIATRYCZNEGO

CE **WYRÓB MEDYCZNY**

Miękki, wyścielany kołnierz cholewki
Minimalizuje podrażnienia

Wyścielany język
Zmniejsza tarcie i ulepsza dopasowanie

Stabilny, wzmocniony i wyścielany zapiętek
Zapewnia silniejsze wsparcie łuku podłużnego stopy

Lekka konstrukcja
Zmniejsza codzienne zmęczenie

Zwiększona szerokość i głębokość w obrębie palców i przodostopia
Minimalizuje ucisk i zapobiega urazom

Antypoślizgowa, wytrzymała podeszwa o lekkiej konstrukcji
Zwiększa przyczepność, amortyzuje i odciąża stopy

Ochronna przestrzeń na palce - brak szwów w rejonie przodostopia
Minimalizuje możliwość zranień

Wysoka jakość materiałów - naturalne skóry, oddychające siatki i Lycra
Dostosowują się do stopy, utrzymują je w suchości i zapobiegają przegrzewaniu

Trzy rozmiary szerokości

Podwyższona tęgość

Zwiększona przestrzeń na palce

WSKAZANIA

• haluksy • wkładki specjalistyczne • palce młotkowate, szponiaste • cukrzyca (stopa cukrzycowa) • reumatoidalne zapalenie stawów • bóle pięty i podeszwy stopy (zapalenie rozcięgna podeszwowego - ostroga piętowa) • płaskostopie (stopa poprzecznie płaska) • bóle pleców • wysokie podbicie • praca stojąca • nerwiak Mortona • obrzęk limfatyczny • opatrunki • ortezy i bandaże • obrzęki • modzele • protezy • odciski • urazy wpływające na ścięgna, mięśnie i kości (np. ścięgno Achillesa) • wrastające paznokcie

Wyłączny dystrybutor w Polsce:

KALMED
Iwona Renz, Poznań

ul. Wilczak 3
61-623 Poznań
tel. 61 828 06 86
fax. 61 828 06 87
kom. 601 640 223, 601 647 877
e-mail: kalmed@kalmed.com.pl
www.kalmed.com.pl

www.butydlazdrowia.pl **www.dr-comfort.pl**

Creator®
kriotechnika

Kriokomory
stacjonarne

Kriokomory
kontenerowe

Kriokomory
mobilne

CREATOR Sp. z o.o.
54-154 Wrocław, ul. Lotnicza 37
tel. kom 605 900 177; 503 103 227
kontakt@kriokomory.pl
www.kriokomory.pl

KRIOTERAPIA

GŁÓWNE OBSZARY ZASTOSOWAŃ

Rehabilitacja ⇨ Medycyna sportowa ⇨ Medycyna estetyczna

ZASTOSOWANIE KRIOTERAPII

- ⇨ Choroba zwyrodnieniowa stawów
- ⇨ DNA
- ⇨ Dyskopatia
- ⇨ Fibromialgia
- ⇨ Modelowanie sylwetki
- ⇨ Neuralgia nerwu trójdzielnego
- ⇨ Niedowłady spastyczne
- ⇨ Osteoporoza
- ⇨ Ostre urazy stawów i tkanek miękkich: stłuczenia, krwiaki i skręcenia stawów
- ⇨ Profilaktyka zmian przeciążeniowych układu ruchu
- ⇨ Przewlekłe zmiany pourazowe i przeciążeniowe mięśni i stawów
- ⇨ Przyspieszenie restytucji powysiłkowej
- ⇨ Reumatoidalne zapalenie stawów (RZS)
- ⇨ Stwardnienie rozsiane
- ⇨ Wspomaganie odnowy biologicznej
- ⇨ Wspomaganie rehabilitacji po rekonstrukcji wewnątrzstawowych oraz po operacji więzadeł, ścięgien, mięśni i kości
- ⇨ Wspomaganie treningu wytrzymałościowego i siłowego
- ⇨ Zesztywniające zapalenie stawów kręgosłupa (ZZSK)

Bryza 2

kriomedpol

Kriomedpol Sp.z o.o., ul. Warszawska 272 , 05-082 Stare
tel.+48 22 752 93 21, + 48 22 733 19 05, + 48 502 502 444
www.kromedpol.pl, kriomedpol@kriomedpol.pl

KREATYWNY RUCH

łagodzi bóle kręgosłupa

Creator®

wyłączny przedstawiciel
DBC w Polsce

DBC - Documentation Based Care unikalna metoda terapii schorzeń układu ruchu

Programy terapeutyczne DBC wykorzystywane są w następujących schorzeniach:

- niespecyficzne zespoły bólowe kręgosłupa,
- dyskopatie,
- kręgozmyki,
- stany po urazach i operacjach kręgosłupa,
- schorzenia reumatyczne,
- schorzenia i urazy stawu barkowego,
- schorzenia i urazy stawu kolanowego.

Koncepcja DBC opiera się na dowodach naukowych – EBM (Evidence Based Medicine), a jej wysoka skuteczność, w postaci zmniejszenia dolegliwości bólowych i poprawy funkcji, potwierdzona została u 88% osób korzystających z terapii (www.dbc.fi, 2013).

Ośrodki Profilaktyki i Rehabilitacji CREATOR:

- ul. Lotnicza 37; 54-154 WROCŁAW, tel. 713 620 222; fax 713 620 242; e-mail: dbc@creator.wroc.pl
- ul. M. Kopernika 55a; 90-553 ŁÓDŹ, tel. 422 301 000; fax 422 30 001; e-mail: lodz@creator.wroc.pl

www.creator.wroc.pl

bardomed
PHYSIO REHAB SPORT

REHABILITACJA I TRENING EKSCENTRYCZNY Z EPTE INERTIAL SYSTEM

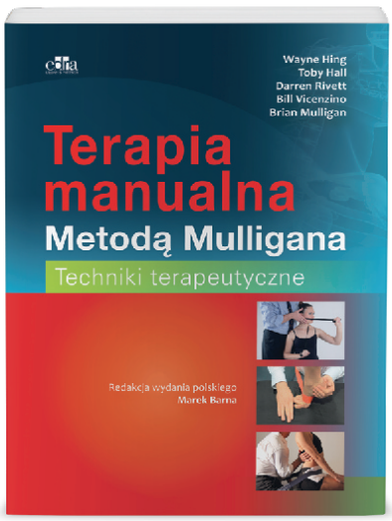
CO ZYSKASZ

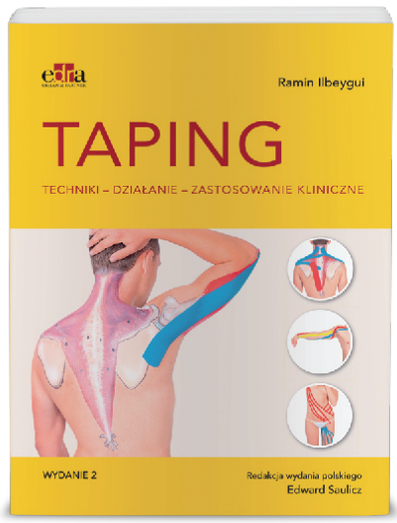
- Profesjonalne narzędzie do rehabilitacji, prewencji urazów i treningu
- Zwiększysz siłę i masę mięśniową ćwiczącego w szybszym tempie dzięki dużemu naciskowi na ekscentrykę
- Trening Twojego podopiecznego będzie bardziej zróżnicowany i przyjemniejszy
- Dopasujesz odpowiednie ćwiczenia do dyscypliny sportowej, którą uprawia osoba, z którą pracujesz
- Uzyskasz możliwość bieżącego monitorowania postępów swojego pacjenta dzięki systemowi Encoder. Zarówno Ty, jak i pacjent będziecie wiedzieli co należy poprawić i wzmocnić
- Twój pacjent wykona ćwiczenia na różne partie mięśniowe dzięki zastosowaniu dodatkowych komponentów: wioślarza i przyrządu do przysiadów

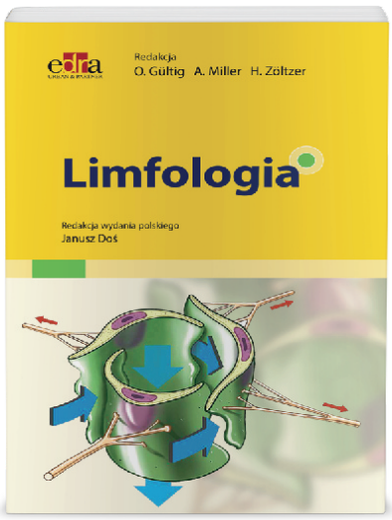
MASZ PYTANIA? SKONTAKTUJ SIĘ:

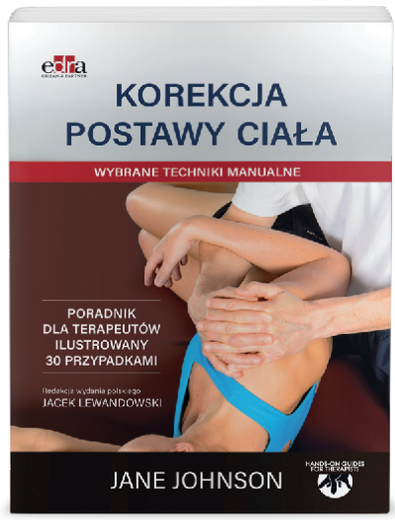
721 12 13 14 | 12 444 12 97 | BIURO@BARDOMED.PL | WWW.BARDOMED.PL

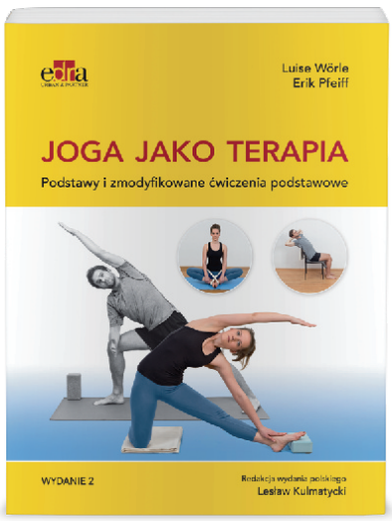
edra
URBAN & PARTNER

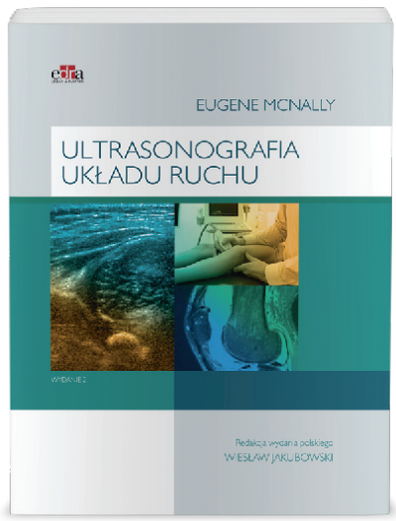












TROMED TRAINING
program szkoleniowy

Diagnostyka i leczenie manualne w dysfunkcjach stawu kolanowego

Mobilność i stabilność – profilaktyka urazów w treningu sportowym i fizjoterapii

Współczesne metody leczenia wybranych dysfunkcji stawu skokowego i stopy

Schorzenia narządów ruchu u dzieci i młodzieży

Mózgowe Porażenie Dziecięce - algorytm postępowania diagnostyczno-terapeutycznego

Rehabilitacja Kardiologiczna w praktyce

Podstawy neurorehabilitacji - udar mózgu

Dysfagia - zaburzenia połykania w pracy z pacjentem neurologicznym

Podstawy neuromobilizacji nerwów obwodowych - diagnostyka i praktyczne zastosowanie w fizjoterapii

Terapia pacjentów z obrzękiem limfatycznym

Fizjoterapia w onkologii

Zaopatrzenie dla osób po urazie rdzenia kręgowego

Zaopatrzenie dla osób po udarze mózgu

Wybrane elementy zaopatrzenia ortopedycznego w praktyce

Narzędzia coachigowe w pracy z pacjentem

Trening diagnostyczno-rozwojowy personelu medycznego

Skuteczna komunikacja z pacjentem i jego otoczeniem

Informacje i zapisy

TROMED Zaopatrzenie Medyczne
93-309 Łódź, ul. Grażyny 2/4 (wejście Rzgowska 169/171)
tel. 42 684 32 02, 501 893 590
e-mail: szkolenia@tromed.pl
www.szkolenia.tromed.pl

ULTRASONOGRAFY
DLA FIZJOTERAPEUTÓW

CHCESZ MIEĆ W GABINECIE?
- najlepszy, przenośny ultrasonograf b/w na świecie
- nowoczesne 128-elem. głowice
- 3 lata gwarancji
- niską cenę

CHCESZ MIEĆ?
- szybką i trafną diagnozę narządu ruchu i skutecznie dobraną terapię
- sonofeedback w leczeniu schorzeń i rehabilitcji pod kontrolą USG
- wyselekcjonowanie pacjentów już na pierwszej wizycie
(rehabilitacja czy skierowanie do szpitala)

CHCESZ IŚĆ na profesjonalne szkolenie dla fizjoterapeutów kupując USG?

CHCESZ MIEĆ super warunki leasingu i uproszczoną procedurę przy zakupie USG?

NIE CZEKAJ, AŻ INNI CIĘ WYPRZEDZĄ!
JUŻ PONAD 300 FIZJOTERAPEUTÓW NAM ZAUFAŁO

HONDA 2200

Made in Japan

Przy zakupie USG profesjonalne kilkudniowe szkolenie GRATIS!

Atrakcyjne warunki leasingu!

03-287 Warszawa, ul. Skarbka z Gór 67/16
tel. 22 / 855 52 60, fax 22 / 855 52 61
Małgorzata Rapacz **kom. 695 980 190**

polrentgen®

www.polrentgen.pl

fizjoterapia polska
nr 4/2018 (18)

Ocena funkcjonalna tancerek odmiennych stylów tańca: jazzowego oraz hip hop w oparciu o test Functional Movement Screen

Functional assessment of female dancers representing different dance styles, such as jazz and hip-hop, based on the Functional Movement Screen Test

不同舞蹈风格的舞者机能性评估，包括：爵士舞及嘻哈舞的功能性运动检测

Tomasz Ridan[1(A,D,E,F)], Barbara Tomas[1,2(A,B,F)], Olga Nowotny-Czupryna[3(A,F)], Beata Kita[3(A,F)]

[1]Zakład Kinezyterapii, Katedra Fizjoterapii, Akademia Wychowania Fizycznego, Kraków /
Institute of Kinesiotherapy, Department of Physiotherapy, University of Physical Education, Cracow, Poland
[2]Egurrola Dance Studio, Kraków / Egurrola Dance Studio, Cracow, Poland
[3]Katedra Fizjoterapii, Wydział Nauk Stosowanych, Akademia WSB, Dąbrowa Górnicza /
Department of Physiotherapy, Faculty of Applied Sciences, WSB University, Dąbrowa Górnicza, Poland

Streszczenie

Celem pracy była ocena poziomu sprawności funkcjonalnej 30 tancerek (16 tancerek jazzowych i 14 tancerek hiphopowych) w wieku od 16 do 21 lat. Istotną kwestią dotyczącą wyników było sprawdzenie czy istnieją różnice w poziomie sprawności funkcjonalnej pomiędzy dwoma grupami, w zależności od stylu tańca. Ostatnim aspektem oceny było zbadanie istniejących zależności pomiędzy stylem tańca, a wynikami w poszczególnych składowych badania FMS. Badania przeprowadzono w Egurrola Dance Studio w Krakowie, w kwietniu 2018 r. Wynik końcowy przeprowadzonych badań dał obraz ogólnej sprawności fizycznej badanej grupy tancerek i został określony, jako odpowiedni, gdyż średnia wartość oceny całościowej, była powyżej wartości granicznej zwiększonego ryzyka urazu. Nie stwierdzono różnic w wynikach ogólnej sprawności fizycznej, pomiędzy tancerkami jazzowymi i hiphopowymi, natomiast wykazano zróżnicowanie w ocenie szczegółowej poszczególnych składowych FMS. Uzyskane wyniki badań określiły poziom sprawności funkcjonalnej wśród tancerzy i potwierdziły, jego zróżnicowanie w odniesieniu do rodzaju aktywności w ocenie szczegółowej.

Słowa kluczowe:

Functional Movement Screen, ocena funkcjonalna, taniec

Abstract

The objective of this study was to assess the level of functional fitness of 30 female dancers (16 jazz dancers and 14 hip-hop dancers), aged between 16 and 21 years. An important research goal was to determine whether there are any differences in the level of functional fitness between the two groups, depending on the dance style. Moreover, the study also aimed to assess the correlation between the style of dance and the results obtained for the particular components of the FMS test. The study was carried out in the Egurrola Dance Studio in Krakow in April 2018. The final result of the tests provided a picture of the overall physical fitness of the examined group of dancers, and was found to be appropriate, since the total mean score was above the limit value of an increased injury risk. No differences were found between jazz and hip-hop dancers with regard to the overall physical fitness score. At the same time, however, differences were detected in the detailed scores for the particular FMS components. The test results reflected the level of functional fitness among the dancers, and the detailed scores confirmed the differences in that level depending on the type of activity.

Key words:

Functional Movement Screen, functional evaluation, dance

摘要

研究目的在评估 30 名舞者（包括 16 名爵士舞者及 14 名嘻哈舞者）的体适能水平，他们的年纪在 16 至 21 岁之间。有关结果的重要问题在于检查不同舞蹈风格的两组间体适能水平是否存在差异，评估的最后一个方面为研究舞蹈风格与 FMS 研究各组成部分间的现有关系。该研究于 2018 年 4 月在位于克拉科夫的 Egurrola Dance Studio 舞蹈工作室进行，研究的最后结果显示受试组舞者的整体体适能状况，经确认为适当，因为整体评估的平均值超过伤害风险增加的阈值。爵士舞及嘻哈舞者间的体适能一般结果无差异，然而 FMS 测试的各组成部分间的详细评估却有所不同，所得到的研究结果说明舞者间的体适能水平并确认其在活动类型特定评估上的多样化。

关键词：

功能性运动检测、机能评估、舞蹈

Introduction

Dance, like any other sport discipline, requires specific movement skills, coordination abilities and endurance. Dancers perfect their suppleness, strength, jumping ability, speed, and, what is of crucial importance, the correct dance technique. A dancer puts a lot of work and effort in both physical and mental preparation, just like an athlete who prepares for a competition [1].

Contemporary dance forms are practised as a recreational, stage or sports activity. The third type of dance requires special preparation from the dancers, which involves many hours of strenuous training. Dance is not officially recognized as a sport discipline. However, the physical requirements placed on competitive dancers are very high and it is therefore fair to compare dancers to athletes [2].

Due to regular and frequent training, a dancer's musculoskeletal system is subject to enormous loads, as a result of which the dancer is exposed to numerous injuries. During jazz dance training a lot of attention is paid to boosting the dancers' suppleness in order to increase the range of motion of the extremities and the spine. Hip-hop dancers, on the other hand, focus on increasing the strength of the entire body and attach great importance to the speed and precision of the movements performed to music. At the competition level, both styles involve the performance of acrobatic elements. The practice of dynamic elements, such as aerial cartwheels or backflips, are more advanced elements which require an appropriate level of physical preparation from the dancers [3].

Fig. 1. Jazz dance move: Tilt

Fig.2 Calypso leap in jazz dance

According to the literature [4], the most common injuries in classic and jazz dancers involve the injuries to lower extremities and overloading of the spine, especially in the lumbar section. The studies conducted by the Leanderson et al. [5] show that the ankle sprain is the most common acute injury in young dancers, whereas chronic tendinitis in the feet and lower extremities is the most common injury resulting from overloading. Stracciolini et al. [4] have demonstrated in their studies that the most common lower extremity injuries in young female dancers involve the knee (26.9%), followed by the ankle (19.9%) and the foot (17.9%). Similarly to the Landerson et al. [5], Lee et al. [6] have also shown through their research that the greatest number of injuries in dancers involve the ankle, followed by the knee and the hip. The studies carried out by Hincapié et al. [7] reveal that the most frequent musculoskeletal injuries in dancers affect the soft tissue and involve strains, muscle tears or ruptures, as well as tendinopathy.

Spinal overload in dancers is probably caused by, among other things, the frequently repeated hyperextensions performed during workout, or placing the pelvis in an anterior tilt position in order to achieve the maximum external rotation in the hips. Frequent overloading caused by the regular deepening of lumbar lordosis may lead to health problems in dancers, including spondylolysis, spondylolisthesis, or disc problems. Pain in the spinal area may also be caused by the overloading of paravertebral muscles, as well as by the piriformis syndrome which is a common condition among dancers [8].

Due to a high risk of injury in dance it is important to prepare dancers for competitions in the most functional manner possible in order to avoid injuries and contusions. A functional preparation should aim at improving the mobility of the entire kinematic chain as well as concentrating on the involvement of the entire musculoskeletal system, rather than on individual segments of the body. In order to assess functional fitness, the FMS concept, i.e. the Functional Movement Screen or Functional Movement System, has been developed by Cook and Burton. The FMS concept evaluates the level of functional ability in an individual, the quality of his or her movement patterns, the type and degree of limitations of the musculoskeletal system and the presence of compensation, i.e. an asymmetry during movement [9].

In addition to identifying the limitations and specific abnormalities in movement patterns, the FMS tool enables establishing the criteria and directions of the action aimed at correcting those deficiencies and improving the quality of movement patterns [9].

When describing the FMS concept, Cook et al. [9,10] presented the idea of the Optimum Performance Pyramid which consisted of three levels. The base of the pyramid represents movement and movement patterns, i.e. Functional Movement. The next layer of the pyramid is Functional Performance, i.e. motor abilities and traits such as strength, speed, power or endurance. The top level of the Pyramid represents the Technique and the specific skills typical of particular sport disciplines (Functional Skill). Each of the levels is the basis for the development of the next level, bearing in mind that the improvement and development should not disturb the balance between those levels.

Aim

The objective of the study was to assess the functional fitness of female dancers representing different dance styles, such as jazz and hip-hop dance, using the FMS test.

Material and research method

The study initially covered a group of 39 girls representing two different dance styles. After applying the exclusion criteria, thirty girls aged between 16 and 21 years, with a mean age of 17.7 years (SD = 1.49), were eventually qualified for the study. The girls were divided into two study groups: group I included 16 jazz dancers, whereas group II consisted of 14 hip-hop dancers (Table 1).
The girls under study participated in training at least 3-4 times a week and took part in competitions at least 3-4 times a year, which was a prerequisite for participation in the study. The dancers in group I had 8.4 years of dance experience, as compared with 5.8 years of experience in group II.

Table 1. Descriptive characteristics of the examined groups of female dancers

Parameters	Mean ($\bar{x}$)	SD	Minimum value	Maximum value
Jazz group				
Age [years]	17.7	1.49	16	20
Weight [kg]	56.7	4.33	51	66
Height [m]	1.66	0.05	1.57	1.75
BMI [kg/m^2]	20.3	1.36	18.1	23.1
Hip-hop group				
Age [years]	17.6	1.55	16	20
Weight [kg]	58.5	3.18	52	63
Height [m]	1.66	0.05	1.58	1.75
BMI [kg/m^2]	21.1	1.46	18	22.8

The subject matter and methodology of this study was based on the review of international databases, such as PubMed and Google Scholar. During the search for suitable materials, the papers written between 2003 and the present were analysed. Eventually, twenty-two papers in English were selected in order to analyse and compare the results for the purposes of this work.

The study was based on a self-designed questionnaire, as well as on the set of 7 main tests and 3 clearing tests in accordance with the FMS concept. The results were gathered using the official FMS questionnaire. The Functional Movement Screen involved the following tests: 1. Deep Squat Movement Pattern; 2. Hurdle Step Movement Pattern;
3. In-Line Lunge Movement Pattern; 4. Shoulder Mobility Movement Pattern and Shoulder Clearing Test; 5. Active Straight Leg Raise Movement Pattern; 6. Trunk Stability Push-Up Movement Pattern and Spinal Extension Clearing Test including a modification of the initial position in women by changing the position of the hands and placing the thumbs at the chin level; 7. Rotary Stability Movement Pattern and Spinal Flexion Clearing Test [9].
The tests were conducted in the Egurrola Dance Studio in Krakow in April 2018, using the equipment consisting of a measuring board with a scale, a 1.5 metre long stick, an elastic band and two short rods [9]. The tests were not preceded by a warm-up or exercise. Each stage of the examination was accompanied by detailed verbal instructions.
Each dancer could take the test 3 times, by doing the 7 consecutive tests along with the 3 clearing tests in order to assess the occurrence of pain in particular segments of the body. The highest score achieved by a dancer constituted her final score. The test was graded on a 0-3 scale. The final score was obtained by adding up all the scores. A positive result of the clearing test attached to a specific stage of the examination resulted in a score = 0 for a particular test [9]. The maximum possible score was 21, in accordance with the assumptions adopted by Cook et al. [10]. For the purposes of interpretation of the final FMS score, a limit value ≤ 14 points was adopted, which indicated a considerably increased risk of injury [11].
Clearing tests were not graded according to the above procedure and their result was evaluated as either positive or negative, depending on the occurrence of pain during the test. A positive result of a clearing test resulted in a score = 0 for a particular test [9].
Exclusion criteria for participation in the study: health contraindications, no injuries to upper or lower extremities in the past, no surgical procedures in the past which might affect the reliability of the tests.
The test results were subject to statistical analysis using the Statistica software 10.0. The significance level of 0.05 was adopted for all tests. Student's t-test for independent samples as well as chi-square independence test were applied.

Results

The assessment of physical fitness in the examined group of dancers revealed 25 persons, 83% of the sample were characterized by an appropriate level of functional fitness (> 14 points). At the same time, 5 persons (17% of the dancers) showed a reduced level of functional fitness (≤ 14 points).
The Student t-test for independent samples did not reveal a significant difference in the functional fitness scores depending on the practised style of dance (Table 2).

Table 2. Comparison of the functional fitness level depending on the practised style of dance

Parameters	Mean		SD		t	P
	Jazz	Hip hop	Jazz	Hip hop		
FMS Score	15.6	15.8	1.5	1.6	-0.2816	0.7803

Comparison of the level of functional fitness for the particular FMS components depending on the practised style of dance

After applying the Student t-test for independent samples, as well as the chi-square independence test, a significant difference was found in the Active Straight Leg Raise score depending on the style of dance. Jazz dancers achieved a significantly higher score during that test than hip-hop dancers. No significant differences were found for the remaining components of the FMS (Table 3).

Table 3. Comparison of functional fitness scores for the seven main FMS tests

Parameters	Mean		SD		t	P
	Jazz	Hip hop	Jazz	Hip hop		
Deep squat	2.2	2.1	0.4	0.4	0.3168	0.7537
Hurdle step	2.6	2.2	0.5	0.4	2.0068	0.0545
Inline lunge	2.9	3.0	0.3	0.0	-0.9333	0.3586
Shoulder mobility	2.7	2.9	0.8	0.4	-0.7345	0.4687
Active straight-leg raise	3.0	2.6	0.0	0.5	2.8803	0.0075
Trunk stability push up	0.6	1.3	0.9	1.1	-1.9487	0.0614
Rotary stability	1.7	1.6	0.5	0.6	0.2195	0.8279

Comparing the results of clearing tests Test 1 – Impingement Clearing Test

Based on the test (p = 0.5333), no significant difference was found in the results of the Impingement Clearing Test depending on the practised style of dance (Fig. 3).

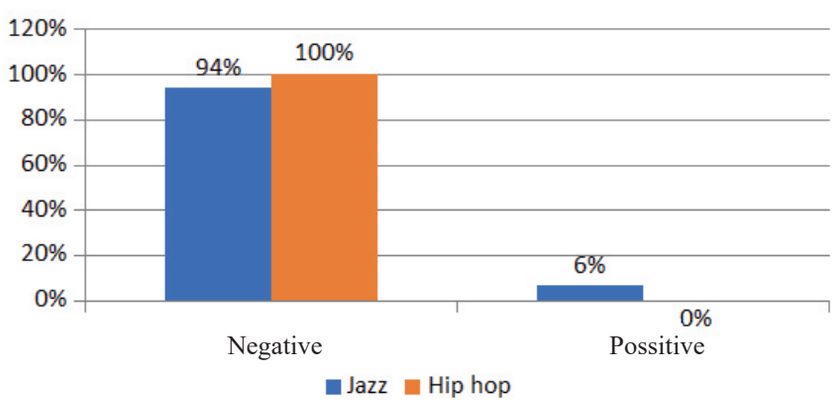


Fig. 3. Comparing the results of the Impingement Clearing Test

Comparing the results of clearing tests Test 2 – Press-up Clearing Test

Based on the test (p = 0.1432), no significant difference was found in the results of the Press-up Clearing Test depending on the practised style of dance (Fig. 4).

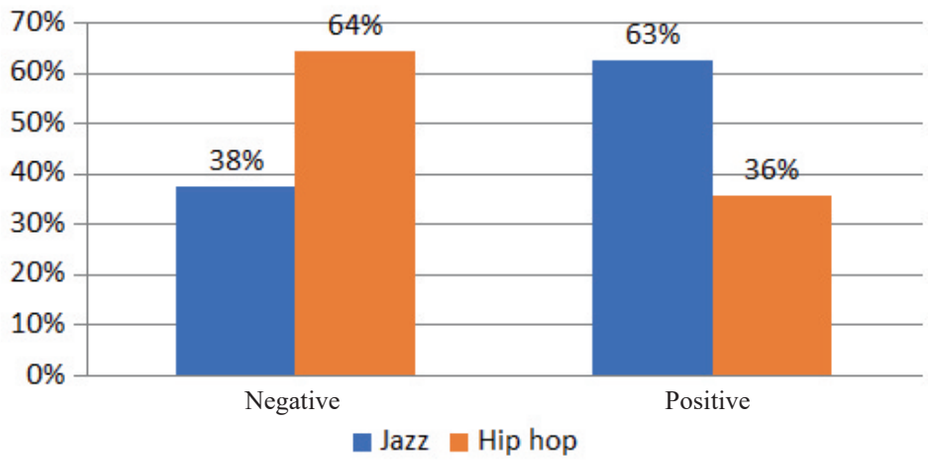


Fig. 4. Comparing the results of the Press-up Clearing Test

Comparing the results of clearing tests Test 3 – Posterior rocking clearing test

Based on the test (p = 0.4667), no significant difference was found in the results of the Posterior Rocking Clearing Test depending on the practised style of dance (Fig. 5).

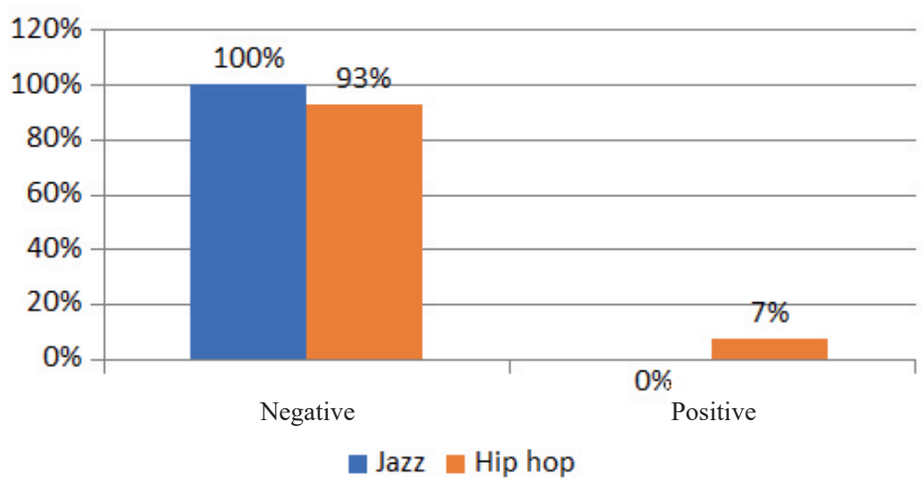


Fig. 5. Comparing the results of the Posterior Rocking Clearing Test

Detailed analysis of the FMS components in study groups

The lowest scores among jazz dancers were achieved in the Trunk Stability Push-up Test, whereas the highest scores were obtained in the Active Straight Leg Raise Test (Table 4). Hip-hop dancers earned the lowest scores in the Trunk Stability Push-up Test, and the highest scores in the In-Line Lunge Test (Table 5).

Table 4. Scores achieved by jazz dancers for particular FMS components

Parameters	Mean	Minimum	Maximum	SD
Deep squat	2.2	2.0	3.0	0.4
Hurdle step	2.6	2.0	3.0	0.5
Inline lunge	2.9	2.0	3.0	0.3
Shoulder mobility	2.7	0.0	3.0	0.8
Active straight-leg raise	3.0	3.0	3.0	0.0
Trunk stability push up	0.6	0.0	3.0	0.9
Rotary stability	1.7	1.0	2.0	0.5

Table 5. Scores achieved by hip-hop dancers for particular FMS components

Parameters	Mean	Minimum	Maximum	SD
Deep squat	2.1	2.0	3.0	0.4
Hurdle step	2.2	2.0	3.0	0.4
Inline lunge	3.0	3.0	3.0	0.0
Shoulder mobility	2.9	2.0	3.0	0.4
Active straight-leg raise	2.6	2.0	3.0	0.5
Trunk stability push up	1.3	0.0	3.0	1.1
Rotary stability	1.6	0.0	2.0	0.6

Discussion

Currently, the literature lacks sufficient studies relating to the FMS assessment of dancers. For this reason, the comparison of results can only be applied to groups of women of similar age, practising other sport disciplines.

An analysis of the results gathered after the completion of the functional assessment tests among dancers reveals that the practice of a dance activity ensures an appropriate level of functional fitness. Despite the differences in the nature of activity and the training goals between the different dance styles, such as jazz and hip-hop, no differences were found in the level of functional fitness represented by the dancers. In the majority of examined individuals in both groups, the level of functional fitness was slightly above the limit of an increased injury risk.

The studies carried out by Chorba et al. [11] and Kiesel et al. [12] have demonstrated that the score of ≤ 14 points achieved in the FMS test represents the limit of an increased injury risk. Trzaskoma [13] cites an interpretation of the FMS scores that

has been commonly accepted for many years: 18-21 points – appropriate movement patterns, minimum injury risk; 14-18 points – abnormalities in movement patterns, presence of functional asymmetries and compensation strategies. Injury risk about 25-35%; < 14 points – injury risk increases above 50%.

The sum of points scored for all the components of the FMS test has been analysed in many FMS-related studies as a prognostic factor for the occurrence of injury. Both Chorba et al. [11] and Chimera et al. [14] in their respective studies mention the mean values of the overall FMS score for the examined individuals. Chimera discusses the varied results obtained in a group of young women practising different sport disciplines. The final FMS score oscillates between an increased injury risk and the limit value. The research findings obtained by both those authors might suggest that the level of functional fitness depends on the type of sport activity, which has not been confirmed by the present study. The same researchers have also examined a group of women practising dance and cheerleading. The final mean score obtained by that group was similar to the mean scores for both groups covered by the present study, i.e. 14 ± 1 [14]. In her research, Chorba et al. [11] has also analysed the mean scores achieved by a group of women engaging in sports activities, The mean score for the entire group of women was very similar to the scores obtained in the present study (mean score = 14.3 ± 1.77). When comparing the mean scores for the groups divided according to disciplines: football, volleyball and basketball, no significant differences between the groups were discovered, similarly to the findings of the present study.

Some authors [15,16] suggest that the composite FMS score does not provide reliable information about an individual's fitness level and his or her proneness to injury. Girard et al. [15] and Yongming et al. [16] argue that a detailed analysis of the scores achieved for the particular, separate FMS components is more appropriate for the assessment of an individual's functional fitness level. The detailed results obtained in the present study for the particular FMS components point to a considerable difference between the examined groups with respect to the scores achieved in the Active Straight Leg Raise Test. The test score seems to be higher among jazz dancers, with a mean score of 3.0 ± 0. The highest score among hip-hop dancers was achieved in the In-Line Lunge test, with a mean value of 3,0 ± 0. Both Chimera et al. [14] and Schneiders et al. [17] demonstrated in their research that the results achieved by the above-mentioned two samples were much higher for women than for men. However, none of the above-mentioned studies examined the differences in scores earned for the particular FMS components by groups representing different sports activities, within the same gender. Chorba et al. [11] compared only the final mean score with respect to the sport discipline practised by the women under study. No detailed analysis of the results of each of the 7 tests was performed in relation to physical activity.

In both groups of dancers under examination, the lowest score was achieved in the Trunk Stability Push-up Test. The mean score for that test was 0.6 ± 0.9 among jazz dancers and 1.3 ± 1.1 among hip-hop dancers. Identical research results were reported by Chimera et al. [14]. The Trunk Stability Push-up

Test proved to be the most difficult for the examined group of women, with a mean score of 1.71 ± 1.99. This is similar to Schneiders et al. [17] findings according to which 58.3% of the tested women achieved a score of 1 in the above test. The authors compared the above results with those achieved by a group of men engaged in a sports activity. The final score of the Trunk Stability Push-Up Test is to a considerable degree influenced by the result of the Spinal Extension Clearing Test. More than 50% of female jazz dancers achieved a positive result in the clearing test which resulted in a score of 0 for the Trunk Stability Push-up [9].

The present study did not reveal any differences between the examined groups with regard to the results of the clearing tests. However, both jazz and hip-hop dancers achieved the greatest number of positive results during the Spinal Extension Clearing Test. According to Cook et al [9], "pain changes everything", and the presence of pain indicates a considerable probability of hidden injuries, or an increased risk of an injury during further physical activity.

The majority of studies devoted to the FMS are concerned with the reliability of that method and its ability to predict the risk of injuries. Bonazza et al [18] in their meta-analysis conclude that the FMS, as a composite score, represents an infallible functional assessment tool. The research confirmed the ability to predict an injury risk by means of the FMS, where the limit of 14 and fewer points suggests that the probability of injury occurrence is twice higher than in the individuals whose score exceeded the limit value. The studies conducted by Alemany et al [19] have also confirmed the accuracy of the FMS tool in predicting injuries, and pointed out that the presence of pain during tests indicates a higher probability of injury, as does a low final score achieved during the FMS tests.

To sum up, the examined groups of female dancers show a sufficient level of physical fitness. No significant differences in functional fitness were found between hip-hop and jazz dancers based on the final score. Although the studies were conducted on small samples, they allow drawing the final conclusions. In the present study, differences were found in the detailed ratings for the particular components of the FMS test. Further research is needed in order to confirm the correlation between the detailed results for each of the seven test components, the type of the practised sports activity, and the risk of injury, which will enable the assessment of the functional fitness of dancers representing different styles, the specific nature of their activity and comparing those results with other sport disciplines.

Conclusions

1. The examined group of female dancers represents an overall appropriate level of functional fitness, with a mean FMS score above 14 points.
2. The FMS tests did not reveal any differences in functional fitness between jazz and hip-hop dancers.
3. The style of dance practised by the women and, thus, the type of physical activity, has an effect on the scores achieved for each of the seven FMS components.

4. Jazz dancers display a considerably diminished spine stabilization in a closed kinematic chain.

Adres do korespondencji / Corresponding author

Tomasz Ridan

e-mail: tomasz.ridan@awf.krakow.pl

Piśmiennictwo/ References

1. Russell JA. Preventing dance injuries: current perspectives. Open Access J Sports Med. 2013; 4: 199-210.
2. Koutedakis Y, Jamurtas A. The Dancer as a Performing Athlete: physiological consideration. Sports Med. 2004, 34(10): 651-61.
3. Seredyński A. Akrobatyka sportowa : charakterystyka dyscypliny, zbiór przepisów, zasad sędziowania, podział ćwiczeń akrobatycznych. Wyd. Uniwersytetu Rzeszowskiego, Rzeszów 2008.
4. Stracciolini A, Yin AX, Sugimoto D. Etiology and body area of injuries in young female dancers presenting to sports medicine clinic: a comparison by age group. Phys Sportsmed. 2015; 43(4): 342-7.
5. Leanderson C, Leanderson J, Wykman A. Musculoskeletal injuries in young ballet dancers. Knee Surg Sports Traumatol Arthrosc. 2011; 19(9): 1531-5.
6. Lee L, Reid D, Cadwell J, Palmer P. Injury incident, dance exposure and the use of the Movement Competency Screen (MCS) to identify variables associated with injury in full-time-pre-professional dancers. Int J Sports Phys Ther. 2017; 12(3): 352-370.
7. Hincapié CA, Morton EJ, Cassidy JD. Musculoskeletal injuries and pain in dancers: a systematic review. Arch Phys Med Rehabil. 2008; 89(9): 1819-29.
8. Gottschlich LM, Young CC. Spine Injuries in Dancers. Curr Sports Med Rep. 2011 Jan-Feb;10(1): 40-4.
9. Cook G, Burton L, Kiesel K, Rose G, et al. Movement – Functional Movement Systems: Screening, Assessment, Corrective Strategies. On Target Publications, Aptos, California 2010.
10. Cook G, Burton L, Hoogenboom BJ, Voight M. Functional Movement Screening: the use of fundamental movements as an assessments of function – part 1. Int J Sports Phys Ther. 2014 May; 9(3): 396-409.
11. Chorba RS, Chorba DJ, Bouillon LE, Overmyer C, et al. Use of a Functional Movement Screening Tool to Determine Injury Risk in Female Collegiate Athletes. N Am J Sports Phys Ther. 2010 Jun; 5(2): 47-54.
12. Kiesel K, Plisky PJ, Voight ML. Can serious injury in professional football be predicted by a preseason functional movement screen? N Am J Sports Phys Ther. 2007 Aug; 2(3): 147-58.
13. http://www.sport-olimpijski.pl/artykul/profesor-zbigniew-trzaskoma-2 (dostęp: 13.06.2018)
14. Chimera NJ, Smith CA, Warren M. Injury History, Sex, and Performance on the Functional Movement Screen and Y Balance Test. J Athl Train. 2015 May; 50(5): 475-85.
15. Girard J, Quigley M, Helfst F. Does the functional movement screen correlate with athletic performance? A systematic review. Physical Therapy Reviews 2016 Sep; 83-90.
16. Yongming L, Xiong W, Xiaoping C, Boyi D. Exploratory factor analysis of the functional movement screen in elite athletes. J Sports Sci. 2015; 33(11): 1166-72.
17. Schneiders AG, Davidsson A, Hörman E, Sullivan SJ. Functional movement screen normative values in a young, active population. Int J Sports Phys Ther. 2011 Jun; 6(2): 75-82.
18. Bonazza NA, Smuin D, Onks CA, Silvis ML, et al. Reliability, Validity, and Injury Predictive Value of the Functional Movement Screen: a Systematic Review and Meta-analysis. Am J Sports Med. 2017 Mar; 45(3): 725-732.
19. Alemany JA, Bushman TT, Grier T, Anderson MK, et al. Functional Movement Screen: Pain versus composite score and injury risk" J Sci Med Sport. 2017 Nov;20 Suppl 4:S40-S44.