© Archives of Budo, 2008; 4: 82-90

Received: 2008.10.16
Accepted: 2008.10.30
Published: 2008.11.05

Teaching of safe falling as most effective element of personal injury prevention in people regardless of gender, age and type of body build – the use of advanced information technologies to monitor the effects of education

Authors' Contribution:
A Study Design
B Data Collection
C Statistical Analysis
D Data Interpretation
E Manuscript Preparation
F Literature Search
G Funds Collection

Roman Maciej Kalina[1ABCDEFG], Bartłomiej Barczyński[2ABCDEFG], Władysław Jagiełło[3ABCDEF], Bartosz Przeździecki[4ABCDEF], Artur Kruszewski[5AB], Jan Harasymowicz[6ABD], Joanna Syska[6B], Katarzyna Szamotulska[7C]

[1] Faculty of Physical Education, Rzeszow University, Rzeszów, Poland
[2] Index Copernicus International S.A., Warsaw, Poland
[3] Academy of Physical Education and Sport, Gdańsk, Poland
[4] Finchley Memorial Hospital, London, England
[5] Academy of Physical Education Warsaw, Poland
[6] Paweł Włodkowic University College, Płock, Poland
[7] Institute Mother and Child, Warsaw, Poland

Summary

Background: Loss of balance, fall and collision with the ground or vertical obstacle can be the cause of personal injury and even death. The aim of this study is verification the following hypothesis: if methodical and educational standards are met, gender, age, and body build are not factors limiting the effectiveness of learning safe falling.

Material/Methods: The researches covered 688 people between 19 and 55 year old, who made four different in structure (but not in content) programs of *combat sports propaedeutics – basic of judo* (CSP-BJ). It used a specific test of making safe falls.

Results: The structure of the CSP-BJ had no influence on the educational effects. At average similar safe falling motor competence level, the oldest students follow activities the most slowly. Weak but statistically significant correlation is between age and a test of making safe falls and between Rohrer index and the test result only in a group of students where was the greatest diversity of age (spread 32 years).

Conclusions: Empirical data authorize to the general conclusion that verified the hypothesis is true. Monitoring the phenomenon in so-called virtual research group can accelerate implementation of a system of universal teaching of safe falls and increase the effectiveness of prevention of physical injury in a macro scale.

Key words: **prevention of injuries • safe falling • test of making safe falls • Virtual Research Groups • Index Copernicus**

Full-text PDF: http://www.archbudo.com/fulltxt.php?ICID=872099

Word count: 4294
Tables: 8
Figures: 3
References: 23

Author's address: Roman Maciej Kalina, Faculty of Physical Education, Rzeszów University, ul. Towarnickiego 3C, Rzeszów, Poland, e-mail: kom.kalina@op.pl

Background

Loss of balance, fall, and collision with the ground or vertical obstacle can be the cause of personal injury and even death. The scale of the phenomenon is large and concerns people of all ages. However, group exposed to the most severe consequences of these events are elderly [1]. Along with extending life of people in many developed countries of the world, the dynamic of this phenomenon will grow. Soon will be a complex problem on the joint of preventive medicine, motor rehabilitation (physiotherapy), education, social welfare, economics etc. An analysis of reports from different countries leads to the conclusion, which is the basic assumption of our researches **– falls are unavoidable, and the increased risk groups are primarily the elderly, whose numbers in many countries around the world will increase (!).**

In the United States in the years 1979–1992 as a result of falls and collisions died around 13 500 persons annually [2]. We did not found either in the literature or in personal contacts with scientists and teachers from the USA, that in follow of this information has been implemented an effective nationwide program of prevention of body injuries. This phenomenon is monitoring in the scientific journals American, European, Australian, and Asian. In 1999 the help has been given 647 721 British injured because of the fall. 202 424 hospitalized patients who finished the sixtieth years, received injuries because of the fall. Injury as a result the fall is the leading cause of death the people aged 75 years and older. Persons who have finished 65 years usually fall during the different activities at home. Over 50% of those who sustained unpleasant experiences related with fall – fall again. After a hip fracture, 50% of injured people were not able to live on their own. Hip fractures cost each year the National Health Fund of Great Britain 1.7 billion pounds [3]. Epidemiology of this phenomenon is similar in Poland. The incidence of falls increases with age. It concerns 25% of people between 65 and 74 years of age, 35% after 75 years of age, 40% after 80 years of age and 50% with finished 90 years of age and older. At least once a year falls every fifth hospitalized elderly person, every third elderly living at home, but 45–67% residents of social care. Almost half of falls leads to a specific injury. Identical with the British are a data of hip fractures (50% of elderly people who walked before the fracture, lose this ability and require twenty-four-hour care). In Poland the mortality as a result of sustained injuries during the fall is 59 deaths per 100 000 elderly persons, however in Sweden this rate amounts 23 deaths [4]. Particularly severe are the effects of unexpected events, which increase the risk of losing balance and fall of the body. During the rime in 1993 among citizens of Wroclaw (around 700 000 persons) the number of personal injury associated with the fall was five times or even ten times higher comparing with sunny days. Almost half of the injured have finished 40 year and in addition, and sustained the heaviest body injury [5]. Among the groups of increased risk of unexpected collapse or collision with vertical obstacles – except elderly person – are mentioned the person after amputations of lower limbs [5,6], person moving on a wheelchair [7], diabetes [8], affected by osteoporosis [3,5] and certain groups of athletes, stunts, soldiers etc [9].

Advanced are a research concerning the causes of falls and applications related to the falls prevention, especially elderly [3,10,11]. It has been shown by the empirical way that, generally it is the low efficiency of prevention, prepared only on increasing the awareness of threats of balance loss and of fall. An example – realization by the staff of the hospital such a program with 112 patients (reference group represented 10 558 persons aged 65 years or older who were not bed-ridden patients) for 12 months has not significant differences in reducing the number of injuries related to falls. In conclusion of studies the authors have found that increasing the intensity of this kind of preventive action must prevent in long-term the reduction of patients falls [10].

A very important element of the system of prevention of falling is appropriate environment in which people act, especially the elderly and persons at increased risk [10,11]. Both increasing the awareness of the fall risks and modifying an environment to decrease falls will not eliminate such incidents. It is estimated that it is possible to prevent 30–40% falls [3]. Thus, approximately 70% of people in specific situations must inevitably fall.

Our long-term researches and teaching applications [12] concentrate on prevention of personal injury associated with unintentional fall, as well as the avoidance of collisions with various objects, intentionally or unintentionally threatening our body (thrown object, rush vehicle, etc). Often effective avoidance a collision requires carrying the intentional fall out without or with the rotation of the body. Taking own experience into consideration, premises from the analysis of professional literature and the need to increase the efficiency of prevention of physical injury in man ontogenesis, as an objective of presented in this article researches we have adopted tests to verify the following hypothesis: if methodical and educational standards are met, sex, age, and type of body build are not factors limiting the effectiveness of safe fall learning.

Material and Methods

Person

The researches covered 688 people between 19 and 55 year old (262 women and 426 men), who made four different in structure (but not in content) programs of *combat sports propaedeutics – basic of judo* (CSP-BJ) (Table 1). The training conducted authors of the CSP-BJ program with students the faculties of physical education in two Polish universities.

Two courses (APE and UC_A) were implementing in the stationary course for 13 weeks, after one lesson time (every 45 minutes). Whereas, UC_B and UC_C courses every two weeks, together 8 lessons but each lasted 90 minutes. In this way afforded similar methodical standards in term of the level of education of teachers and their mental impact on students. Two different structures of lessons caused diversification of incentives in terms of physiological and psychomotorical (different conditions of assimilation and preservation of new motor activities). This educational system was not forced by research assumptions, but was result of actually existing study system in these universities.

Evaluation of motor competence from the scope of safe falling

A specific test of making safe falls was applied [12,13]. Test results was element of the semester exam of the „Theory

Table 1. Characteristic of researched people and structure of „combat sports propaedeutics – basic of judo".

Students (type of study, structure CSP-BJ)	Gender	Age (years)					Rohrer Indicator				Height (cm)				Weight (kg)			
		N	Mean	SD	Min	Max	Mean	SD	Min	Max	Mean	SD	Min	Max	Mean	SD	Min	Max
Academy of Physica Education (APE) (stationary 13 lessons for 45 minut for 13 weeks total 13 hours)	Female	154	20.51	0.98	19	25	1.24	0.11	0.97	1.75	170.31	6.94	153	187	61.49	7.85	44	88
	Male	130	21.36	1.18	20	30	1.32	0.12	1.07	1.67	181.66	6.86	165	199	79.60	10.53	58	111
	Total	284	20.90	1.16	19	30	1.28	0.13	0.97	1.75	175.50	8.92	153	199	69.78	12.86	44	111
University College (UC_A) (stationary: 13 lessons for 45 min for 13 weeks, total 13 hours)	Female	6	21.16	0.75	20	22	1.25	0.22	1.00	1.60	167.00	4.19	160	172	58.66	11.36	50	79
	Male	23	21.13	0.91	20	23	1.26	0.10	1.11	1.55	183.73	6.85	175	197	78.60	11.84	65	115
	Total	29	21.13	0.87	20	23	1.26	0.13	1.00	1.60	180.27	9.36	160	197	74.48	14.17	50	115
University College (UC_B) (extramural: 8 lessons for 90 min every 2 weeks, total 16 hours)	Female	29	23.72	4.83	19	35	1.26	0.14	1.04	1.60	167.75	5.00	160	182	59.53	8.16	47	80
	Male	193	23.45	4.98	19	49	1.33	0.16	1.02	1.97	18 0.06	5.96	165	195	77.78	9.01	55.5	100
	Total	222	23.49	4.96	19	49	1.32	0.16	1.02	1.97	178.45	7.16	160	195	75.05	10.74	47	100
University College (UC_C) (post graduate: 8 lessons for 90 min every 2 weeks, total 16 hours)	Female	73	33.90	6.52	23	47	1.36	0.21	1.08	2.57	165.32	5.71	152	180	61.82	10.89	48	120
	Male	80	35.92	7.81	23	55	1.47	0.18	1.14	1.91	175.89	8.66	169	190	83.24	10.43	60	108
	Total	153	34.96	7.27	23	55	1.36	0.18	1.08	2.57	172.04	8.45	152	190	73.01	15.01	48	120

and methodical of combat sports". There are basis to assert that students were motivated to disclose their real possibilities of psychomotorical from safe falling.

Structure of test for safe falls

The test comprises execution of four consequent tasks constituting a series of seven falls:
1. rear fall and rear fall with turn;
2. front fall;
3. fall to the side (left and right);
4. front fall with turn over the shoulder (left and right).

Instruction for test execution and evaluation criteria:
- At the command „ready" the tested individual assumes the fighting stance;
- At the examiner's signal, who simultaneously initiates the stop watch, the pupil executes test tasks (1 to 4); the examiner prompts the defined sequence and switches off the stop watch once the pupils has finished task 4;

Table 2. Evaluation criteria for test of making safe falls.

Result of test (total points)	Time of test implementation (s)	Evaluation
100–95	20	*Excellence*
90–85	25	*More than good*
80–75	30	*Good*
70–65	35	*More than sufficient*
60–55	40	*Sufficient*
<55	<40	*Insufficient*

– Each task, from the motor viewpoint, is subject to evaluation in a 4-level scale: **25-, 20-, 15-**, **0** points, taking into account the following criteria:
  • **25** points for perfect and dynamic execution of a particular task (of all its elements);
  • **20** points for faultless and fluent execution of tasks, but not a dynamic one; or for dynamic execution with minor technical errors;
  • **15** points for execution of the task in an insufficiently dynamic way and with mistakes, which nevertheless do not affect a change in the type of movement;
  • **0** points, essential type of movement is not maintained, and moreover the tested person is unable to assume the defence stance during execution of tasks or move in a way accepted for behaviour in defence fights;
– If any of the tasks gets an appraisal of **„0"** it means that the test is discontinued and an unsatisfactory mark is given (owing to assumed essential assumptions the test cannot be repeated on the day of the exam);

[receiving at least **15** points of each task allows calculation of the total result of the test, which comprises from **100** to **55** points (this is a consequence of summing up points for implementation of four tasks) and making a pedagogic appraisal after associating the result with time of test execution – see Table 2];

– Result of **„55"** points, is an effect of deducting **„5"** points (for lack of appropriate fighting stance after completion of particular tasks) from the sum of the possibly lowest result.

The way of carrying the test out is available (in text and video) on the website of the journal Archives of Budo (*www.archbudo.com*) in the top-left window under link **Safe Falls Academy** (*www.archbudo.com/text.php?ids=263*) [13].

Evaluation of the type of body build

Rohrer index was used as criteria of a simple typology of the body build of F. Curtius [14]. As a reference standard for somatic types of young people applying for studies of the physical education in Poland (standard appropriate to students of APE and UC_A), assumed the characteristics of M. Kowalewska [15].

Statistical analysis

In the estimation based on empirical data took into consideration arithmetic mean, standard deviation, maximum result, and the minimum result. In order to determine the significance of the differences between the two means used *t test for independent samples*. In studies of the correlation of pairs of empirical variables used the Spearmana coefficient of correlation. The significance of the differences and the correlation studied between empirical variables the most important to verify the hypothesis.

Results

At the lowest diverse group of surveyed people in terms of age were UC_A students – distance 3 years – while the youngest among postgraduate students (UC_C) were 23 years old, and the oldest 55 (Table 1). Sevenfold higher standard deviation of students age UC_C suggests that both groups differed significant. The average test results for safe falls in both groups show that students do not differ statistically significant in terms of motor competence in the field of the safe fall (Figure 1).

It is the first direct proof that age is not a factor limiting the possibility of mastering this important in life skill. Taking into account the average outcome of all groups are grounds to assert that statistical student – regardless of the program structure of the CSP-BJ – mastered the skill of safe fall at the level *more than good*. Statistically significant differences in the relationship APE – UC_C and UC_B – UC_C inform about the qualitative diversity of these groups of students (in proportion, there are more people with higher motor competence in this field in groups of APE and UC_B than in the oldest group of people – UC_C). Qualitative effect is expressed more clearly by the time test difference (Figure 2). At the average similar level of motor competence of safe fall, APE students have done these actions the quickest and compared with the other students this are the differences statistically significant ($p<0.01$) – the slowest made elderly (UC_C). The structure of the CSP-BJ programs in principle had no impact on the educational effects. Individual test results spread from the level of 60 points (*sufficient*) – in the UC_A group from 65 points (*more than sufficient*) – to 100 points (*excellence*) in all groups (Figure 1). A slightly different structure of individual differences in levels found between women and men educating according to the same systems PCS-BJ (Figure 3).

The lowest result among APE female students is 70 points and at UC_B male students is 65 points (in both cases, level *is more than sufficient*). These test results exceed – both female and male students – educated according to the same program standards. However, this result is not related directly to a statistically significant difference between men and women APE. The results dispersion of students APE measured standard deviation is the lowest among all researched groups of students and at the same time almost identical. For this group of students the verified hypothesis is true. Statistically significant differences in test results between women and men in the other educational groups do not confirm this hypothesis. In the case of the UC_A – although the distance in age does not exceed 2–3 years – that is the result of only 6 women. Cardinality of men and women in UC_B and UC_C groups are higher but determined by diversity of age – in groups of women dispersion is 16 and 24 years. For men dispersion is 30 and 32 years. These results cannot consider as a direct scientific proof that the hypothesis is false.

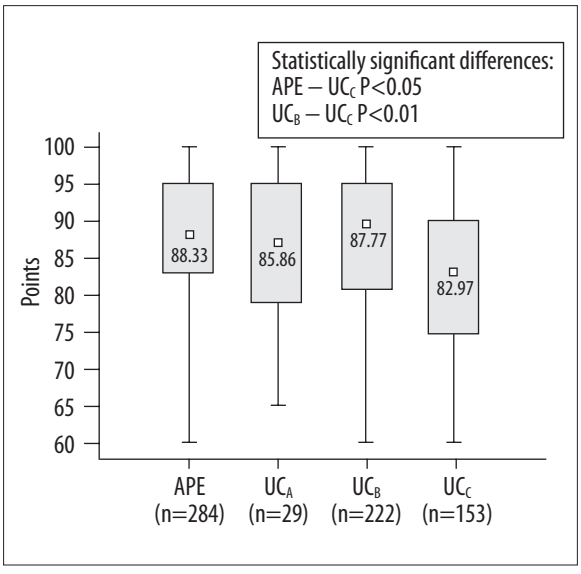

Figure 1. Total result test for safe falls of students who carried out all sorts of the CSP-BJ program.

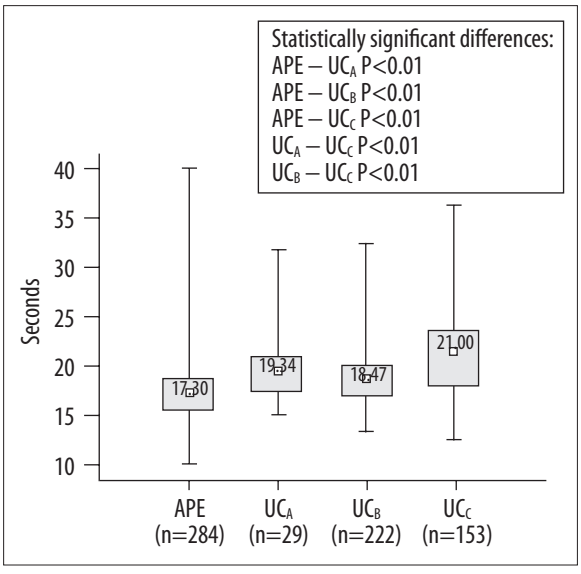

Figure 2. Completion time of test for safe falls by students who carried out all sorts of the CSP-BJ program.

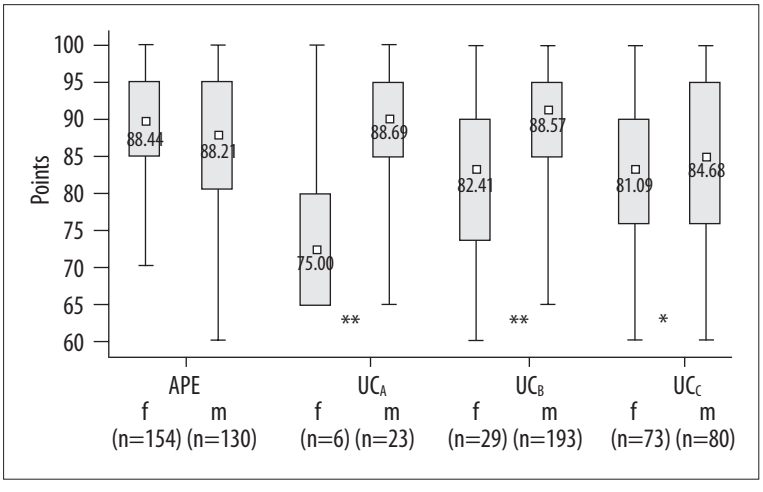

Figure 3. Total result test for safe falls of women and men (comparative study of differences between students educated according to the given variety of the CSP-BJ program) * p<0.05; ** p<0.01.

Statistically significant differences in the results of the second, third and fourth tasks test of making safe falls occurred between women and men in groups UC$_A$ and UC$_B$ (Tables 4–6). These test tasks have done men each of at a higher level (defined by the average result). Dispersion of individual test tasks results from 15 to 25 points among women and men (Tables 3–6) shows that sex is not a factor limiting the possibility of professional learning separate techniques of safe fall, but the other factors. Along with age increase the possibility of exposure of movements of the human body, what prove statistically significant (p<0.01) but weak correlation this factor with the execution time of test by students UC$_C$ group (Table 7). Students of this group differ in age up to 32 years, and are relatively proportional represented by women (n=73) and men (n=80) and are educated according to uniform variant of the PCS-PJ program. Moreover, only in this group revealed a statistically significant (weak or average) negative correlation between age and the result of test for safe falls and the age and the various tasks of the test. This group of students is the most differentiated in terms of body build – the Rohrer index from 1.08 to 2.57 (Table 1).

Also in that group, a body build factor is negatively correlated to the result of the test (Table 8), two partial tasks and positively with the time used for test. It is empirical prove that fat people may carry out controlled body falls in a less professional way and a bit slower than slim people may. Test results assure that these people mastered safe fall skill at a level sufficiently correct to conclude that they can protect their body in situations of sudden loss of balance, fall, and collision with the ground or vertical obstacle.

Weak positive correlation (r=0.195) of Rohrer index with the quality of execution a *front fall with turn over the shoulder* by APE students prove that a person with athletic body build mastered the skills of safe fall at a higher level. For this group of students of the physical education is not a reasonable interpretation that the result concerns fat people.

Discusion

Analyses of empirical data have been done by the online research platform *Virtual Research Groups* (VRG) a part of sys-

Table 3. Differentiation results of *rear fall and rear fall with turn* between women (f) and men (m) in separate educational groups.

	APE		UC_A		UC_B		UC_C	
	f	m	f	m	f	m	f	m
N	154	130	6	23	29	193	73	80
X	**22.40**	**22**	**20**	**21.95**	**20.68**	**21.7**	**21.09**	**21.81**
SD	2.63	2.89	3.16	2.91	3.19	3.21	3.65	3.3
Min	15	55	15	15	15	15	15	15
Max	25	25	25	25	25	25	25	25
Difference	**0.4**		**1.95**		**1.02**		**0.72**	

Table 4. Differentiation results of *front fall* between women (f) and men (m) in separate educational groups.

	APE		UC_A		UC_B		UC_C	
	f	m	f	m	f	m	f	m
N	154	130	6	23	29	193	73	80
X	**23.11**	**23.13**	**18.33**	**23.04**	**21.55**	**23.52**	**21.23**	**21.76**
SD	2.74	2.64	4.02	3.61	4.03	2.79	4.06	3.78
Min	15	55	15	15	15	15	15	15
Max	25	25	25	25	25	25	25	25
Difference	**0.02**		**4.71***		**1.97***		**0.53**	

* p<0.01.

Table 5. Differentiation results of *fall to the side* between women (f) and men (m) in separate educational groups.

	APE		UC_A		UC_B		UC_C	
	f	m	f	m	f	m	f	m
N	154	130	6	23	29	193	73	80
X	**21.94**	**21.86**	**19.16**	**22.39**	**20.86**	**22.61**	**20.27**	**21.31**
SD	3.04	3.26	3.76	2.55	3.79	3.23	3.8	3.79
Min	15	55	15	15	15	15	15	15
Max	25	25	25	25	25	25	25	25
Difference	**0.02**		**3.23***		**1.75****		**1.04**	

* p<0.05; ** p<0.01.

Table 6. Differentiation results of *front fall with turn over the shoulder* between women (f) and men (m) in separate educational groups.

	APE		UC_A		UC_B		UC_C	
	f	m	f	m	f	m	f	m
N	154	130	6	23	29	193	73	80
X	**20.97**	**21.1**	**17.5**	**21.3**	**19.31**	**20.72**	**18.49**	**19.31**
SD	3.02	3.29	4.18	3.44	3.71	3.57	3.4	3.44
Min	15	55	15	15	15	15	15	15
Max	25	25	25	25	25	25	25	25
Difference	**0.13**		**3.8***		**1.41****		**0.82**	

* p<0.05; ** p<0.01.

Table 7. Correlation results *of test for safe falls* with age of examined persons.

	APE (n=284)	UC_A (n=29)	UC_B (n=222)	UC_C (n=153)
Rear fall and rear fall with turn	–0.063	–0.292	0.010	–0.467**
Front fall	0.009	–0.006	0.320	–0.256**
Fall to the side	0.037	–0.288	0.064	–0.236*
Front fall with turn over the shoulder	–0.077	–0.165	0.053	–0.196*
Result of test	–0.055	–0.235	0.062	–0.381**
Time of test implementation	0.176	0.183	–0.036	0.297**

* p<0.05; ** p<0.01.

tem Scientists Index Copernicus throughout dedicated electronic case report form (eCRF) of a "Safe falling test" study. Any researcher or team that meets the criteria of credibility can network to "Safe falling test" Virtual Research Group. At https: *scientists.indexcopernicus.com* website can apply to Scientists Index Copernicus system, where during registration procedure and later during describing own achievements simplest can authenticate own scientific expertise and teaching competence. Researchers who cannot prove the scientific and educational achievements, should have recommendation(s) from the well-known researcher(s) (with whom it is possible to contact through the Scientists Index Copernicus), or the recommendation of a scientific institute, university, etc. Finally at the Scientists Index Copernicus use search engine to find "Barczynski Bartlomiej" – Study Administrator – and contact him to get an access to the "Safe falling test" Virtual Research Group.

In this article, we present the results of observation of the effects of education (in fact, semester results of specific mo-

Table 8. Correlation results *of test for safe falls* with Rohrer factor at examined persons.

	APE (n=284)	UC_A (n=29)	UC_B (n=222)	UC_C (n = 153)
Rear fall and rear fall with turn	0.179	0.290	–0.020	–0.252*
Front fall	0.059	0.334	–0.104	–0.242*
Fall to the side	0.044	0.218	0.062	–0.113
Front fall with turn over the shoulder	0.195*	0.303	0.043	–0.126
Result of test	0.171	0.360	–0.002	–0.255**
Time of test implementation	–0.074	–0.091	–0.044	0.272**

* p<0.05; ** p<0.01

tor competence tests) in two physical education faculties, two Polish universities – state APE and private UC. This may be faculties of all sorts of universities or other educational centers around the world, in which the specific educational and methodical procedures are applied (i.e. teaching safe falling within judo, aikido, hapkido programs etc). Safe falling is of course a part of preparations for combat sports in which it is acceptable to throw competitor out of balance and causing its collapse (judo, jujitsu, sambo, sumo, wrestling, unifight, etc) and is an element of self-defense training. In the case of individual self-defense systems, are taken into account the specific ways of fall mainly as consequence of the grasp (specific techniques for fighting). A good example is the popular aikido, as well as less known Russian style of hand-to-hand combat "ROSS" [16].

Comparing motor competence from the scope of safe falling makes sense mainly from the perspective of common personal injury prevention in the daily activities of man. The *test for safe falls* meets the criteria of universal tool of the evaluation for this category of motor competences and is inspired primarily on falling techniques used in judo. Abilities of collision with ground in case of loss of the balance are subject of an evaluation in every possible direction and in according to the principles theory of safe falls [17]. Of dominating influence on occurrence of injuries during falls is **human body strain energy** – its value and distribution. Jaskólski and Nowacki explain this phenomenon in a theoretical way and assume that the surface of a human body is homogenous and flexible. In consequence, they derive a theorem (backed by mathematical formulas) assuming that total strain energy is a sum of **strain energy of distortion** and **strain energy of volume change**. A falling individual may decrease the unit deviation energy by: (a) increasing body area in contact with the base during fall; (b) increasing time of braking or braking distance during collision itself. Calculations show that only a double increasing in those two values decreases a unit deviation energy („*e*") by 16 times, while its five-fold increase allows reducing the „*e*" value as many as 625 times [17].

A very important result of "Safe falling test" in Virtual Research Group is empirical proofs that neither age nor sex, nor the type of body build is a barrier to learn how to protect body at the time of collapse in such a way that there is a high probability of avoiding or minimizing the effects of a collision with the ground or vertical obstacle. In the meaning of the average result of the test – what should be stressed, but not in terms of individual possibilities of people regardless of age – slightly slower test execution by the elderly is from the one hand explained by the motor (biological) potential changes at persons after 40 years of age and older.

On the other hand, should take into account individual abilities to learn new motor activities, the state of motion, muscle strength, the level of coordination abilities, mental attitude for this kind of exercises and understanding the meaning of learning and improvement exercises of safe falling. In our opinion the mental attitude together with the energy possibilities of the organism are likely factors that determine the greatest intensity and number of repetitions of exercises in the course of learning and improvement (training). As a result of adaptive effects. These factors largely explain the variance from the general result of test for safe falls and variance empirical data (individual test tasks, the time of execution). Variance of the results is not (as if popularly it seems) the largest in groups of students with the highest mean of age. On the contrary, variance of the results of the most difficult element of the test – *front fall with turn over the shoulder* – is the largest among women whose age is between 20–22 years (UC_A).

Significant low correlation of Rohrer index with result of the test, with *rear fall and fall with rear turn*, with *front fall* and with *time of test implementation* and only in case of persons with the highest age diversity (the oldest relating to remaining groups in terms of average age) confirms theoretical assumptions and direct observations. Fat person generally slower stand up after the fall and may have difficulties with the correct protection of the head during the rear turn. During front fall, it is more difficult fat people than slim person is or with athletic body build absorb collision with the help of forearms. Often in the final phase of a collision, come to contact with the ground and the front part of the body (belly and thighs). Such execution *front fall* is qualifying to evaluate this element of test at level of 15 points (with the criteria in range 15–25 points).

However, there was no correlation Rohrer index with the most difficult in terms of coordinating elements of test – *front fall fall to the side* and *with turn over the shoulder.* This is proof that with a proper physical fitness of body weight and more specifically, the type of body build is not a factor making difficult a dynamic, correct execution of these types of controlled falls. The results of our researches show that stu-

dents of the physical education stationary and non-stationary studies do not differ in type of body build from the students from before 25 years [15]. According to the criteria M. Kowalewska [15] postgraduate students (UC_C – graduates of another kind of studies than physical education) are characterized by obesity – both women and men.

We find obtained results as preliminary, because we hope on widening range of researchers and sharing empirical data in frame of active VRG (researchers and teams keen on "Safe falling test" Virtual Research Group can get access to web-based platform by direct e-mail contact with Bartlomiej Barczynski: *barczynski@wp.pl*). Monitoring – in the framework of the project takes into account basic information about the system of teaching and training of safe falling (number of lessons during the course, the structure of classes during the day, week, the number of weeks of training, breaks separating individual lessons, qualifications of teachers etc).

Cyclical generalization of empirical data and comparatistic in a short time can contribute to an effective optimizing teaching methodology and dissemination of knowledge (scientific, methodical, resulting from experience of practice etc) related to the safe falling as very important, the basic element of personal injury prevention. The results presented here researches show that this option is available for each, regardless of age, sex, body build. Previous studies have shown that physical fitness factor does not prejudge of the possibility of learning safe falling at a very high level. Correlation of both factors is low or is missing (in the case of a specific tasks test), both for women [18] and men [19,20]. What is more, the theoretical and empirical knowledge about safe falling open a real perspective of effective teaching of safe falls the person after amputations of lower limbs and blind persons [1,5,6,12,17].

References in the previous paragraph to study correlation between the results of fitness tests and motor competence in the field of the safe falling do not concern directly *test for safe falls*. The authors of those studies associated the results of fitness tests with the results *safe fall technique*, which represents the first group of defensive activities (G1) *basic self-defense skill test* [21]. The structure of test for safe falls and G1 is identical, what enable comparison effects of different educational systems. In term of average result, at the best were evaluated APE students (88.33 points), UC_B (87.77 points) and the UC_A (85.86 points). UC_C students (82.97 points) are equal the level of competence in the field of motor safe falling to military academy students (81.88 points), who participated in experimental military training course, based on combat sports and self-defense exercise [20], and students of the detectives school from Krakow (81.76 points) [19].

It is an important proof that education closely connected with teaching methods (techniques) of safe falling for prevention of personal injury equal to educational of persons prepared professionally for the contest in the direct fight, whose physical training program exceeds several times the number of hours of the CSP-BJ program. Moreover, there are empirical proofs that students of the detectives' school from Lodz learning the self-defense in every semester and intervention techniques are yielding with safe falling competence APE and UC students. The task G1 students of the detectives school during the second semester exam done on the level of 66.7 points and in the fourth on the level of 79.2 points [22]. Much lower educational effects ascertained at young women after the nine months training of modern gymnastic-dance forms with elements of self-defense (59.35 points) [23], as well as military academy students trained according to traditional standards (48.13 points) [20]. These differences may be caused the quality of teaching process, with methodological competence of teachers and the degree of involvement of safe falling instructors.

Conclusions

Verifying hypothesis as a true authorizing primarily the results of observation, argumentation from the major correlative studies and detailed empirical variables, but also a synthesis and generalization of results of personal researches in the light of available in scientific literature empirical data concerning etymology and prevention of the body injuries related to fall. The results of *correlative research* studies verifying high accuracy used *test for safe falls*. Continuing research by the Virtual Research Group and sharing the methodical knowledge through *Safe Falls Academy* (by the *Archives of Budo*) may considerably intensified the prevention of physical injuries by universal teaching of safe falls, people in different ages (regardless of sex and preferred physical activity or a daily shortage) and even allow for learning in independent manner.

References:

1. Kalina RM, Obodyński K, Przeździecki B et al: Universal teaching the ability safe falling down as the most effective method of the prevention of body injuries. In: Mucha D, Zięba HR (eds.), Promocja zdrowia wobec zagrożeń cywilizacyjnych. Nowy Targ: PPWSZ; 2007; 279–85 (in Polish, summary in English)
2. Doyle R: Lethal Accidents, Scientific American Magazine; 1979–1992; August 1996
3. Finchley Memorial Day Hospital [editorial]. Information on falls. For patients and carers. Produced by the staff at the Falls Clinic FMH. London, 2005
4. Żak M: Czy wiesz jak zapobiegać upadkom osób starszych? Stowarzyszenie na Rzecz Opieki Długoterminowej i Pomocy Społecznej „Dom Pod Słońcem". Toruń, 2007 (in Polish)
5. Kalina A, Kalina RM, Klukowski K: Ćwiczenia unikania zderzeń i bezpiecznego upadku dla potrzeb rehabilitacji. Wychowanie Fizyczne i Zdrowotne; 1998; 1: 20–26 (in Polish)
6. Kalina RM, Kalina A: Theorietical and methodological aspects of teaching lower extremity amputees safe falling. Advances in Rehabilitation, 2003; XVII: 71–87
7. Gavin-Dreschnack D, Nelson A, Fitzgerald S et al: Wheelchair-related Falls Current Evidence and Directions for Improved Quality Care. J Nurs Care Qual, 2005; 20(2): 119–27
8. Maurer MS, Burcham J, Cheng H, Morley JE: Diabetes Mellitus Is Associated With an Increased Risk of Falls in Elderly Residents of a Long-Term Care Facility. Journals of Gerontology Series A: Biological Sciences & Medical Science, 2005; 60A(9): 1157–62
9. Chodała A: Evaluation of the ability to deal blows used in self-defence and overall physical fitness. In: Dąbrowski A, Jasiński T, Kalina RM (eds.): Sporty walki w edukacji dzieci i młodzieży – perspektywa metodyczna. Szkoła Wyższa im. P. Włodkowica. Płock; 2002; 207–10 (in Polish, summary in English)
10. Ray WA, Taylor JA, Brown AK et al: Prevention of Fall-Related Injuries in Long-term Care: A Randomized Controlled Trial of Staff Education. Archives of Internal Medicine, 2005; 165(19): 2293–98
11. Tse T: The environment and falls prevention: Do environmental modifications make a difference? Australian Occupational Therapy Journal, 2005; 52: 271–81

12. Kalina RM, Kruszewski A, Jagiełło W, Włoch G: Combat sports propedeutics – basics of judo. Warsaw: Wydawnictwa AWF, 2003
13. Harasymowicz J, Kalina RM: Honourable self-defence – the theoretical and methodological basis of training. Płock, Wydawnictwo Novum, 2006
14. Curtius F: Klinische Konstitutionslehre. Berlin, 1954
15. Kowalewska M: Propozycja zmiany klasyfikacji F. Curiusa w świetle badań własnych. Przegląd Antropologiczny, Poznań, 1974; 40(2): 337–38 (in Polish)
16. Retuinskih AI: Russian Style of Hand-to-hand Combat. The "ROSS" Training System. American academy for Russian Martial Art and Combat skill, 1997
17. Jaskólski E, Nowacki Z: Teoria, metodyka i systematyka miękkiego padania. Część I. Teoria miękkiego padania. Wrocław, WSWF, 1972; 11: 83–88, (in Polish)
18. Syska J, Bógdał D: Connection between the ability of safe falls and overall physical fitness. In: Dąbrowski A, Jasiński T, Kalina RM (eds.): Sporty walki w edukacji dzieci i młodzieży – perspektywa metodyczna. Płock, SWPW, 2002; 211–18 (in Polish, summary in English)
19. Sterkowicz S, Chwała W, Ambroży T: Zdolności motoryczne warunkujące rezultat w teście podstawowej umiejętności samoobrony. In: Korzeniowski L (ed.), Kształcenie pracowników ochrony. Kraków, LIPORT LFK, 2001; 154–69 (in Polish)
20. Chodała A, Kalina RM: The connection of versatile physical fitness with the skills of safe falling. In: Sokołowski M (ed.): Bio-social aspects of physical culture in the army. Poznań, AWF, 2003; 101–9 (in Polish, summary in English)
21. Kalina RM: The combat sports and the training of self-defence in the education of the defensive youth. PTNKF. Warszawa, 1997; Vol. 2, (in Polish, summary in English)
22. Kalina RM, Jagiełło W, Wiktorek P: Motor competence in self-defence of students of a detectives' school during their course of studies. Archives of Budo, 2007, 3(3): 1–6
23. Syska J: Psychomotoryczne efekty uprawiania przez kobiety nowoczesnych form gimnastyczno-tanecznych z elementami samoobrony. Rozprawa doktorska. Warszawa, AWF, 2005; (in Polish)