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BELT WHIPPINGS IN BRAZILIAN JIU JITSU: A CASE STUDY EXPLORING CONDITIONAL CONSENT AND THE VALUE OF OPTIONS

ROB LAWLOR

ABSTRACT

In this paper, considering the practice of whipping students with belts, when grading, I argue that the most obvious objections, considering the harm involved or questioning the validity of the consent, are inconclusive. However, I argue that, even if we assume the consent is valid, the practice can still be shown to be problematic. This argument relies on the idea of *conditional* consent.

Keywords: ethics; martial arts; consent; violence in sport; rituals

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INTRODUCTION

If you do not train in Brazilian Jiu Jitsu (BJJ), you are unlikely to be familiar with the belt whippings that are common at many BJJ clubs. In BJJ, the students wear a uniform (a gi) and a belt similar to those worn in judo. In many BJJ clubs around the world, when a student is promoted to the next grade he has to go through the following "ceremony": The other students and instructors form two lines, facing each other. They then take off their belts (made of thick cotton) fold them in half, and then in half again. The student being promoted then walks slowly through the two lines of students who then whip the student as he walks past them.

Given the thickness of the uniform top, this is a relatively harmless practice, at least in the form described above. However, the nature of these gradings can be altered in a number of ways:

1. In some cases, students are required to remove the top of their uniform, such that they get whipped with the belts on their bare flesh. Furthermore, there have been cases of people then rubbing fiery jack into the raw back afterwards.

2. In some cases, people have tied knots in their belts, starting with small knots, increasing to knots tied upon knots so that the belt essentially becomes like a club: solid and at least as big as a fist.
3. In some cases, people have – as a joke – tripped the student up as he walked through, and then carried on whipping him on the ground, and then kicked the student while he was on the ground.[1]

So is this just harmless fun, or would BJJ be better without these belt whippings? What, if anything, is wrong with belt whippings?

Ryan Hall

Ryan Hall was a student of the BJJ coach, Lloyd Irvin. I do not claim to know the details of the case, and it is not clear that the facts have been established, so I do not wish to make any specific claims about what happened between Irvin and and his students. There were, however, accusations of misconduct and the abuse of power, with many describing the environment as cult-like, talking specifically about "a rape culture".[2]

In 2013, Ryan Hall wrote an open letter to the martial arts community, urging coaches and students to question their own practices, and the practices of the clubs they belong to. (Hall, 2013, http://livingthemartialarts.com) He urged people to question things that they considered suspect, and to be willing to challenge those things, and not just blindly do what the instructor asked them to do or go along with what the rest of the club members were doing.

In a BJJ forum I asked if anyone thought this could apply to the practice of belt whippings. In response, a few supported me, many seemed annoyed at the question, and a few responded by saying that Ryan Hall was writing about martial arts instructors forming cults, and didn't see what it had to do with the belt whippings.

My point was that Ryan Hall wrote: "For whatever reason, serious students of the martial arts too *often forego their own responsibility for critical thought* in order to be accepted by someone they perceive to be a guru" (my emphasis).

Ryan Hall also wrote: "If you aren't sure anymore that you know what's right and what's wrong, get a reality check about your situation, from people outside your academy. Whom do you have access to who is known to have integrity? Be honest: would your grandmother be proud of the place you call your martial arts home?"

I can't speak for anyone else, but, from my own experience, it is fair to say that everyone I know, outside of BJJ, thinks the belt whippings are either crazy or, at least, just a bit weird.

A couple of things strike me as being rather odd, from my own personal experience. First, as far as I know, there is no combat sport that allows strikes to the spine. Even in

[1] Number 2 I have experienced first hand. Numbers 1 and 3 I have only heard about, from other students and coaches, mainly talking about cases in America and Brazil.

[2] I have deliberately avoided providing any references here. This is not a paper about Lloyd Irvin, or the accusations against him, and I am not taking a position on these issues. To provide reference might imply that I take those sources to be authoritative or true. I mention these accusations only because they are important in understanding the context of Ryan Hall's letter.

mixed martial arts competitions, like the Ultimate Fighting Championship, better known as the UFC, strikes to the spine are not allowed, on the grounds that they are too dangerous. This is a sport that allows kicks, knees, elbows and punches to the face, and which can be won by a knockout, or by breaking your opponent's leg. And *this* sport considers strikes to the spine to be too dangerous. Yet, for a bit of fun, or for tradition, we tie our belts into a knot, the size of a fist, or bigger, and then hit our friends repeatedly in the back.

The other thing I find odd is the level of acceptance. I have not heard of many people complaining about it. I am aware of only a couple of clubs that have banned the practice (although there are other clubs that never did it in the first place). And, on the face of it, people do seem to consent to it. But should we accept that people really do consent?

Ryan Hall also admits that, "At times, I have been a fool. I have made rationalizations for sociopaths, given them a pass on their behaviour and even their history because I wanted so badly to believe."

Admittedly, Ryan Hall goes on to say that he had become part of a cult. I am not suggesting that the belt whippings are as radical as this. What I am suggesting is that, maybe, the most plausible way to explain why those involved seem to accept the whippings, and even talk positively about them, is that they are trying to offer a rationalisation for something that is actually pretty crazy – or at least, a bit weird and of no value.

Psychologists talk about this in terms of cognitive dissonance. People don't like holding contradictory beliefs, so they find a way to rationalise the situation, to remove the dissonance.

An example of this is explored in an experiment by Leon Festinger and James M. Carlsmith (1959). Here's a very crude summary. Volunteers were asked to perform a tedious task. They were then asked to lie to other volunteers, to tell them that the task is actually quite interesting. Some were given $1 to lie while others were given $20. (And remember that this was 1959, so $20 was a reasonable amount of money.) A control group weren't given any money. The individuals were then asked to report what they actually thought of the task. Those paid only $1 gave more positive reports than those paid $20. Why? According to Festinger and Carlsmith, the answer is cognitive dissonance. The subject thinks, I just told that person the task was interesting, but it was actually really tedious. And this causes dissonance, which is uncomfortable. Now, the person paid $20 can just think: well, I know why I lied. I was paid a lot of money. So that's fine. But the person who was paid only $1 would have to think, I just lied to someone, and *only for a $1*. Why would I do that? So this person tries to rationalise his behaviour. He tells himself it was more interesting than it really was, in order to reduce the dissonance.

So how do we explain the fact that I don't know anyone who hasn't experienced the whippings but says, "that sounds great" or "I wish my judo club would introduce these whippings", but I do know plenty of people who have experienced these whippings but claim that it is a valuable tradition, and a valuable part of their club, and that it is just a bit of fun – something they enjoy.

I could be wrong, but in many cases I suspect that this is an example of cognitive dissonance. The alternative is that the person has to admit to themselves: "I wanted to refuse, but I wasn't able to say that I didn't want that to happen." But they don't want to have to say that. Or they have to say to their non-BJJ friends, "I really don't like it, but I want to be part of the club, so I go along with it."

Again, belt whippings may not be as significant as Ryan Hall's experiences, but I do see a parallel when he talks about rationalising behaviour that he clearly disagreed with, and when he writes: "I have even created rifts with my real family because I was unwilling or unable to see through my rose-colored lenses what was clear as day to them about my adoptive one." A lot of what Ryan Hall talks about can, plausibly, be interpreted as rationalisation in response to cognitive dissonance, and this is what he is trying to persuade people to avoid.

However, even if we can demonstrate that people are irrational, or lying to themselves, when they say that they like the belt whippings, this doesn't show that it is morally impermissible. (As I say later, I actually don't dismiss the possibility that *some* people do enjoy it.) So what are the relevant questions if we want to focus on ethics, rather than just rationality and cognitive dissonance?

Consent

The area in which the idea of consent is most fully developed is medical ethics. In this context, there are three components to valid consent:

1. The patient must be provided with sufficient information.
2. The patient must be competent – capable of understanding the information, and to reason in order to arrive at a decision.
3. The patient must make a voluntary decision, free from duress, coercion, force or fraud.

In most cases, if you have been training long enough to be grading yourself, you will almost certainly have seen someone else grade before you. As such, if you are about to grade, you probably will know what to expect. So, on the face of it, the first of these doesn't look problematic, in most cases, at least (though I will return to this later). And the second shouldn't be a problem either. So, if there is a problem with consent, it is most likely to be because there is some question about whether the consent is truly voluntary, free from duress.

It is very easy to underestimate how difficult it is to say no to something, even when someone wants to. This was demonstrated dramatically by an experiment by Stanley Milgram. Here is Peter Goldie's summary of the experiment:

> The experiment essentially involves an "experimenter", a "teacher", and a "learner". The experiment (the original one) takes place in Yale University, and the experimenter is the man in the grey technician's coat giving the instructions. The teacher is the subject of the experiment, but he thinks its purpose is to test the effects of punishment on learning through his administering increasingly severe electric shocks on the learner, who is strapped into a chair at the outset of the experiment so that he cannot escape, with electrodes attached to his wrists. In fact, experimenter and learner are in cahoots, and the learner will not be shocked as the teacher believes […] The learner is given a paired-word learning test […] The teacher is told by the experimenter to administer a shock of step-by-step increasing intensity to the learner

each time he gets an answer wrong; the first shock level is a mild 15 volts, increasing in 15-volt increments up to a maximum shock level of 450 volts. The teacher does this by moving a lever on a control panel in front of him on which the voltages are marked, together with words describing the level of shock, increasing in stages from "slight shock" up to 60 volts, to "danger: severe shock" up to 420 volts, followed by "XXX" for 435 and 450 volts. By pre-arrangement, the learner will give wrong answers roughly three times out of four. If at any stage the teacher indicates an unwillingness to go on, the experimenter gives him a series of pre-arranged "prods" as Milgram calls them, starting with "Please continue" up to "You have no other choice, you must go on". If at any time the teacher says that the learner does not want to go on, the experimenter says to the teacher: "Whether [the learner] likes it or not, you must go on until he has learned all the word pairs correctly. So please go on." (Goldie, 2000, p. 162)

The most striking thing about this experiment is the huge difference between the expected results and the actual results. Milgram and others involved in the experiment expected that few, if any, would go beyond 150 volts. Also, in later studies, the set up of the experiment was explained to people, and they were asked what they would do in the teacher's position. Each one was confident that, in the same situation, they would stop very early, at or before 150 volts. In addition, they were also asked to guess what the original participants actually did in the experiment. In their predictions of what others would do, it was generally thought that less than one in a thousand would go all the way to the maximum 450 volts.

In contrast with these expectations, the majority of subjects (26 of the 40) went all the way to 450 volts and not one stopped before 300 volts.

The most common explanation given for this surprising result is that people find it difficult to say no, particularly in response to a perceived authority figure. Most of the participants talked about how they had wanted to stop. They really did believe they were inflicting harm, and possibly in danger of killing the "learner", and they didn't want to do this. But, yet, they found themselves unable to refuse. Admittedly, a BJJ coach may not be comparable to a scientist, in a white coat, in a prestigious university. On the other hand, in its own context, the BJJ coach is seen as an authority figure. Add to that the expectations of the rest of class, and the fear of being considered a wimp or a coward, there is good reason to doubt whether the consent (of those doing the whipping or of those on the receiving end) is really valid.

There is also another important lesson from the Milgram experiment, which relates to the possibility of escalation. Some people have suggested that the significance of the authority figure alone cannot explain the result of the Milgram experiment. It is likely that, if the scientist had asked the "teacher" to *start* at 450 volts, significantly less than 26 out of 40 would have been willing to give that serious a shock. Ross and Nisbett offered the following explanations:

> First, there is the "step-wise character of the shift from relatively unobjectionable behaviour to complicity in a pointless, cruel, and dangerous ordeal", making it difficult to find a rationale to stop at one point rather than another. Second, "the difficulty

> in moving from the intention to discontinue to the actual termination of their participation", given the experimenter's refusal to accept a simple announcement that the subject is quitting […] Third, as the experiment went on, "the events that unfolded did not 'make sense' or 'add up'". (Ross & Nisbett, quoted in Harman, 1999, p. 322)

Imagine that you have been training for over 5 years. You have seen a number of gradings, and have already graded a couple of times yourself. As such, you do have some idea of what to expect when someone grades. At the same time, however, you have noticed a *change* in the gradings. Originally, people kept their gi tops on, and it seemed a fairly harmless tradition. But then the whippings lasted longer, with individuals having to walkthrough the lines of their fellow students repeatedly; those being whipped were required to take their gi top off; and then the coach, and some of the more enthusiastic students, tied knots in their belts; and the knots got bigger. You didn't really like the way it was going, but – as with the Milgram experiment – it was difficult to "find a rationale to stop at one point rather than another". And when it was your turn to grade for your brown belt, you certainly couldn't object at that point. You hadn't objected to anyone else's gradings. You had joined in the whippings with everyone else. If you objected now, you would be a hypocrite and a coward.

Also, even if you are not grading yourself, just focusing on your involvement in the whipping of other students, you may still want to refuse. The following example is fictional, but it doesn't seem to me to be unrealistic and – regarding the possibility of legal action – is based on information provided by a practicing lawyer.

> One of the senior students is to be promoted to brown belt. Michael had participated in a grading once before, and hadn't really understood what was going to happen, so he had joined one of the lines without really understanding what was going to happen, and then followed everyone else's lead. However, he didn't like being involved and he participated reluctantly, whipping the student only half-heartedly.
> This time, however, he did know what was going to happen. He intended to excuse himself, saying he didn't want to participate, but when urged to join the others by the coach, he found himself incapable of speaking up.
> Reluctantly, he joined the others, telling himself he wouldn't really join in. He would only go through the motions. The coach and a couple of the senior students started tying knots in their belts.
> The student to be graded walked between the students, while the others whipped or clubbed him with their belts. On his third pass through the lines he fell to the ground, after being hit hard on the spine. Thinking he had simply tripped, some of the students crowded around him, kicking him while he was down, and laughing at the fact that he had tripped.
> When he later went to hospital, he was told that he had a (relatively) minor spine misalignment and a broken rib.

The following is the opinion of a practicing criminal solicitor:

> The injury inflicted is all important at court. If you actually break something it is nearly always upgraded from a common assault to an actual bodily harm. It may

be that the court would impose a strict community penalty if no breakage occurred, because they undoubtedly would take into account that the victim "consented" at least to a minor degree – but only if the injury caused was very minor bruising. If you are talking about a spinal injury and a broken rib then prison is almost inevitable and it would be an ABH not a common assault. Probably 4 months custody. The more serious the injury the less likely the victim could be said to be "consenting" to it.

However, in the circumstances, if there is a clear line between the injuries sustained from the whipping as opposed to kicking then it might be that individuals are charged separately. But as it appears that it is a joint enterprise they'd probably all be charged with ABH and it would be for the various lawyers to argue involvement. The Crown might accept lesser pleas at a later date after discussing with the victim who appeared to do what. Or even if they all pleaded guilty to ABH they still might all get different sentences according to their actual involvement.

However, it would only be a total defence if Michael was actually under duress, if for example they told him that they would seriously hurt him (GBH or death) if he didn't join in. Not getting completely stuck in would be mitigation, but would be very unlikely to be accepted as a complete defence. Frankly, the court will say he should have walked away.

This suggests that it is not only the person being whipping who is harmed by the practice.

Some may be tempted to suggest that Michael is only harmed in this case because he is prosecuted. And one might suggest that it is the law that is at fault in this case, for not being sensitive to the fact that Michael's involvement was negligible. But there is a reason why the law treats such cases as a "joint enterprise". Imagine that a thousand people all line up to punch someone in the face, ultimately injuring him so badly that he goes into a coma and later dies. Would it be appropriate for each individual to be convicted of nothing more than common assault when, collectively, they have killed him?

However, we should not be too quick to assume that the consent is not valid, for two reasons.

First, we should not simply assume that it is obvious that no one would choose to participate voluntarily. You may not think it sounds like your idea of fun, and think that no one in their right mind would choose to do that, but maybe that is just a lack of imagination on your part. Why assume that, because you wouldn't like it, no one could like it? While some people see these whippings as barbaric, others may enjoy the challenge of an endurance test, and want to show that they can endure more than anyone else.

If we fail to take these claims seriously, then we simply fail to address what may be one of the strongest defences of the tradition: people enjoy it, and they participate because they want to. If we do not address this defence, and simply dismiss it, refusing to take it seriously, we will never engage with those who participate in the belt whippings. They will simply insist that we do not understand – and they might be right. People who are appalled by the idea of being punched in the face may not be able to appreciate how someone could enjoy boxing – but many people clearly do. Similarly, if you want to argue that the belt whippings are wrong because there is a risk of serious harm, you cannot

dismiss, as irrelevant, the claim that those involved are simply less risk-averse than you, and maybe even enjoy the risk.

Thus, I argue that this defence of the practice needs to be taken more seriously, and can't just be dismissed without further consideration. In particular, there does appear to be empirical evidence that people can enjoy abusive, humiliating and painful activity. Consider, for example, the participants of the TV program Jackass or consensual sado-masochistic sex.

Of course, in relation to sado-masochistic sex, although it seems that some people can and do enjoy painful and humiliating activities, many argue that these acts should not be permitted, even in cases where the participants do give their consent. Discussing sado-masochism in R v Brown [1994] 1 AC 212, Lord Templeman said:

> The violence of sado-masochistic encounters involves the indulgence of cruelty by sadists and the degradation of victims. Such violence is injurious to the participants and unpredictably dangerous. I am not prepared to invent a defence of consent for sado-masochistic encounters which breed and glorify cruelty and results in offences under sections 47 and 20 of the Act of 1861.

Presumably, the same arguments could be used to argue against belt whippings in BJJ, even in cases where those involved consent, and want to participate (although, admittedly, the belt whippings in BJJ are tame in comparison to the sado-masochistic activities that are typically discussed in law). Nevertheless, it seems reasonable to suggest that there isn't merely a similarity between belt whippings and sado-masochistic activities. The belt-whippings simply *are* – by definition – sado-masochistic activities. That isn't to say I think the belt whippings are sexual. I do not claim that they have anything to do with sado-masochistic sex, just that they are sado-masochistic activities: the enjoyment of inflicting and enduring pain. (If we are assuming that people do enjoy it.)

The second reason we shouldn't be too quick to assume that the consent is not valid is that it could be argued that, if people really don't want to participate in the belt whippings, and don't want to be on the receiving end, there is a very simple way to avoid them. Don't turn up to training. Simply do not train in BJJ and do something else instead. (This makes the example of belt whippings quite different from the Milgram case – at least after the individual has been training for some time, and has experienced the belt whippings before.)

I suggest therefore that we must take seriously the possibility that people actually enjoy the belt whippings.

In what follows, I will argue that BJJ would be better off without the belt whippings, and that there is something wrong with BJJ clubs expecting people to endure the belt whippings that go with gradings, even if we reject the claim that the consent is not valid.

Conditional Consent

Even if people do give informed consent, and even if we conclude that the consent is valid (and not merely the result of duress), we may still be able to criticise the practice of belt whippings in BJJ.

Even in cases in which it is plausible to claim that consent was given, the consent would appear to be conditional. So you may have the option to refuse, and you may be

able to make this choice freely, but nevertheless it is clear that you are required to consent, *if you want to be part of the club*.

So now the question is, is there anything wrong with conditional consent? If I run my own club, and I want to insist that individuals can only join my club if they are willing to be initiated into the club, why shouldn't I be allowed to do whatever I want to do to the club members? The potential members still have a choice: either they can join the club, enduring the initiation, or they can walk away. It is a free choice. What is wrong with this?

Consider the following two cases:

John wants to join a group – called The Sado-masochists – who whip each other with knotted belts, giving out increasingly extreme beatings, with members aiming to outdo each other in terms of violence and endurance. This is all they do. They do not train in BJJ or any other martial art. They just whip each other. In order to join the group, John has to be whipped to show that he meets their standards.

Jack wants to join his local BJJ club. Unlike other BJJ clubs, however, this club doesn't only have the whippings at gradings. In addition, new members are whipped on their first day of training. Anyone who refuses is not allowed to join the club. Therefore, in order to join the club, Jack has to consent to a whipping.

So, essentially, both clubs have the same requirement if you want to join. However, whilst I have no objection to the first case, I do think that there is something problematic about having to consent to whippings in order to join a BJJ club. I will now explain why this is problematic, even if the consent is valid.

Conditional consent and the value of options

On one view, all that matters is that Jack and John are free to choose. They don't have to consent if they don't want to. Of course, if they don't, they won't be allowed to join. John will not be allowed to join the Sado-masochist club, and Jack will not be allowed to join the BJJ club. But it is my club. So why can't I decide what people need to do if they want to join? No one is forcing you to join the club.

If you want to use this argument to defend practices such as belt whippings in BJJ, then you have to accept the implications of this argument. The same logic would suggest that there was nothing wrong with the club coach requiring all members to provide sexual services in order to remain in the club, or to progress to the next grade.

The right conclusion, I suggest, is that it is not enough to be allowed to choose. It also matters what options are available to people. It is important that people have valuable options. One of the things that is problematic about belt whippings is that it removes valuable options – especially when it becomes so widespread that it is almost impossible to be involved in BJJ without being required to participate in the whippings too. For example, if it is practically impossible to find a BJJ club in your area that does not involve belt whippings, this is not good for you, or for the sport. People should have the option to participate in BJJ without being required to consent to participating in these whippings.

This conclusion is consistent with the claim that some people can enjoy these practices, and that people opposed to the belt whippings simply do not understand how others could enjoy these sado-masochistic activities. It is also consistent with the claim that those people who do enjoy it, and consent to it willingly, should be allowed to. It just

shouldn't be a condition of joining a club, and shouldn't be so closely associated with BJJ that it isn't possible to enjoy that sport without also having to participate in an entirely different and unrelated activity.

Thus, on this account, the BJJ club is more problematic that the Sado-masochists. Unless you agree with Lord Templeman about the impermissibility of sado-masochistic activities, regardless of consent, there is nothing wrong with the Sado-masochists asking John to consent to a whipping before he is allowed to join their club, whilst the same cannot be said about the BJJ club.

The BJJ club is objectionable, because it removes a valuable option – the option to train in BJJ, and be part of the club, without having to participate in the whippings.

The Sado-masochists' having the same initiation, however, is not objectionable in the same way, because what he is required to do is precisely what he wants to do – it is what he is joining the group to do in the first place.

CONCLUSION

The argument above should not be taken as evidence that I dismiss the concerns considered before. I have simply remained agnostic for the sake of argument.

Given the evidence from psychology, it seems there is good reason to think that, for some at least, the individual's claim that he or she enjoys the activity may be a rationalisation, to avoid cognitive dissonance. For those who do not dismiss all forms of paternalism, this might be considered sufficient to argue that belt whippings should not be a part of BJJ.

Given the evidence from the Milgram experiment, and given the level of pressure from coaches and peers, there may be reason to challenge the validity of any consent given. I have challenged the suggestion that the consent is not valid. However, I do not take those challenges to be conclusive. It seems to be unclear to me whether we should consider the consent valid or not.

Ultimately though, even if we assume the consent is valid, I have argued that this is not sufficient to demonstrate that there is nothing wrong with the belt whippings in BJJ.

REFERENCES

Festinger, L., Carlsmith, J. M. (1959). Cognitive Consequences of Forced Compliance. *Journal of Abnormal and Social Psychology*, 58(2), 203–210.

Goldie, P. (2000). *The Emotions: a philosophical exploration*. Oxford: Clarendon Press.

Hall, R. (2013). *An Open Letter to the Martial Arts Community* [online]. (Accessed 27th January 2013.) Available from: http://livingthemartialarts.com/.

Harman, G. (1999). Moral Philosophy Meets Social Psychology: Virtue Ethics and the Fundamental Attribution Error. *Proceedings of the Aristotelian Society*, 99(3), 315–331.

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UNOLYMPIC UNIONISM OR APOCRYPHAL OLYMPISM? IDEAS FOR FUTURE ANTI-DOPING GOVERNANCE

JACOB KORNBECK

ABSTRACT

This article aims to present ideas for future anti-doping governance by considering the relative merits of trade union-based athlete representation (ATU) as opposed to the current system of so-called athletes' commissions or athletes' committees (AC). It therefore revisits recent examples of the rejection of trade unionism in anti-doping governance and questions the legitimacy of current arrangements.

In order to investigate the normative basis of current practice and possible revisions, the author examines the use made, in the World Anti-Doping Code, of the concept of 'Olympism'. The question is asked whether 'Olympism' is an appropriate justification for rejecting athlete representation via trade unions.

Keywords: Doping; World Anti-Doping Agency (WADA); athletes; trade unions; Olympism; Ancient Olympic Games

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INTRODUCTION

This paper aims to present ideas for future anti-doping governance by considering the relative merits of trade union-based athlete representation (ATU) as opposed to the current system of so-called athletes' commissions or athletes' committees (AC). What may seem a 'rather academic discussion', is actually one that touches upon some of the currently most salient power struggles in and around anti-doping, as will be illustrated by the following two vignettes:

- Vignette 1: In November 2011, World Anti-Doping Agency (WADA) Chairman John Fahey, in chairing a WADA Foundation Board meeting, his remarks being recorded (apparently) verbatim in minutes subsequently published online for all to read, warned that certain "associations […] were based along the lines of a union and took their authority from membership, which involved receiving paid fees to have people look at what

were described as the conditions under which they operated". Mr Fahey thought that it was "incumbent on all who believed that sport was a very different and separate operation to other workplaces to make that clear. […] He in no way saw their role as being representative of sportsmen and women, and he urged all members not to give them any oxygen" (WADA, 2011, p. 48) (for more details, see Kornbeck, 2014).

- Vignette 2: In March 2015 the Cycling Independent Reform Commission (CIRC), appointed by Union Cycliste Internationale (UCI), recommended "that UCI facilitate the creation of a strong riders' union. The purpose of the union would be to give riders a collective voice, particularly on issues of ownership, revenue sharing, the racing calendar and anti-doping. The riders' union should also be given a number of votes in Congress, so that riders have a say in how UCI is run. Membership could be linked to voting eligibility in the presidential elections" (Marty, Haas, & Nicholson, 2015, p. 221).

What these examples show is that the choice between an in-house organised AC system (with resources provided by sports organisations themselves), as opposed to an externally organised ATU system (with resources provided by ATU members), represents a contentious field wherein claims for legitimacy, power, regulation and advocacy are fielded and exchanged. While WADA's rejection of ATU-based representation appears to match the preferences of some sports organisations, including the IOC, the proposals made by CIRC to ICU could, if implemented, constitute an alternative route to athlete representation, in that case chosen by another sports organisation. Unsurprisingly, Mr Fahey's statement was condemned vehemently by the ATU side (FIFPro, 2012) (for details see Kornbeck, 2014). Similarly, CIRC's proposals would most likely be met with resistance in some quarters of the sports movement, were they to become reality. But this raises the question: is there any normative element of the current anti-doping regulatory system that would pose a conceptual barrier to such innovation? According to the hypothesis to be explored in this paper, the references made in the World Anti-Doping Code (WADA, 2015) to 'Olympism' could indeed pose such a conceptual obstacle. But would this obstacle be inherently insurmountable?

PURPOSE

To explore whether the Code's references to 'Olympism' are inherently insurmountable, we need to look at how the Code draws on the Olympic heritage, as promoted by the Olympic movement, to build legitimacy. This exercise will be performed in full conscience of the fact that, although the modern Olympics are not mere copies of the Ancient ones; they would be unthinkable without their Ancient precursors, from which they derive much of their magic. Though today's IOC and affiliates constitute a powerful business franchise organised around a Swiss charity (for legal arrangements see Mrkonjic, 2013), Coubertin's heart rests in a stele in Ancient Olympia. It therefore seems warranted to enquire into the relation between contemporary 'official' Olympic attitudes and practices, and what we know about athlete representation in the Ancient world.

METHODS

The paper is based on the following theoretical assumptions. Anti-doping governance can be structured with or out without athlete involvement. If athlete involvement is chosen, athlete representation may be ensured with or without seats attributed to athlete representatives on anti-doping governing boards, etc. If a model with athlete representatives is chosen, this may be based on any combination of representatives sent by Athletes' Commissions and/or Athletes Trade Unions: AC-only, ATU-only or AC-cum-ATU style (in any possible proportion). AC representatives may be elected, as in the case of the IOC AC, though the franchise may be limited and carry bias: IOC AC candidates have been previously selected by their NOCs, not by their peers, before they stand for election (see IOC Athletes' Commission, 2012), while the WADA AC is appointed by WADA on the basis of nominations made by stakeholders, i.e. sports organisations and governments (but not athletes). ATU representatives have a mandate from fee-paying members. The WADA governance system does not foresee ATU seats on the WADA Foundation Board, though it does reserve seats for IOC AC members. Consequently it is of interest to establish whether AC and ATU representatives have taken different stances on key issues related to anti-doping policies.

Despite the methodological 'N = 1' style bias implied when very limited material forms the basis of an investigation, it is also of interest to establish whether WADA's underlying texts specifically make provisions against the inclusion of ATU representatives, in particular as regards the concept of 'Olympism' used in the Code (WADA, 2015) to justify the entire regulatory system. Similarly, the use of a total of five vignettes poses the question of their reliability. Vignettes (whether written by informants or by researchers) add an element of creativity to the research effort (Schoenberg & Ravdal, 2000), while they also carry bias in the on account of the often unsystematic way in which they are selected, constructed and presented. Yet they have a striking illustrative value.

To this end, the paper will revisit the already well-established body of knowledge from classics around the status of Ancient Olympians. In its investigation of Ancient concepts, the paper will draw mainly on a single publication (Finley & Pleket, 1976), yet desk research suggests that recent research (Coakley, 1992; Perseus Project, 1996; Spivey, 2012; Swaddling, [1980] 2011; Toohey & Veal, 2007) does not appear to have overruled the findings of the 1970s. Furthermore, the authority of Finlay and Pleket's work is attested to by Pfitzner (2013, p. 107, footnote 21), who has declared himself deeply indebted 35 years later; and by the remarkable fact that the book was reprinted 29 years later without a single alteration to the text (Finley & Pleket, 2005). As such, the lead question will be: is it reasonable for the authors of the Code to claim that its concept of anti-doping is based on an *authentic* Olympic ideal, and is it defensible on this basis to exclude ATUs from anti-doping governance? Are its critics inappropriately attached to an Unolympic Unionism, or do its proponents draw on a concept of Aprocryphal Olympism?

ACs versus ATUs: only semantic differences?

The choice between AC-based versus ATU-based models of athlete involvement in anti-doping governance has obvious semantic implications: the AC-based model is a pledge to uphold the traditional 'specificity'-based self-concept of sporting bodies, as epitomised in Mr Fahey's reference to the uniqueness of sport, as well as in the Code itself, whereas the ATU-based model is one that tends to downplay the specific character of sport and, instead, seek a rapprochement with the mainstream of society. But are these implications more than merely semantic ones? It was predictable that the election of Sir Craig Reedie (UK) as the successor of Mr Fahey (Australia) at the helm of WADA at the World Conference on Doping in Sport (in Johannesburg, South Africa, November 2013) would see a resurgence of ATU criticism and expressions of hope that Sir Craig would adopt a less confrontational style towards ATUs. In the words of Uni Global Union (Sport) General Secretary Walter Palmer, sports bodies should recognise "the positive role that unions can play" and the idea that it is "normal to have unions around the table" (Rumsby, 2013). But is there any evidence that ATU representation leads to different outcomes for athletes, or is the conflict merely a matter of symbolic interaction? Three further vignettes will illustrate this point:

- Vignette 3: One of the most controversial anti-doping cases in recent years was the CAS case *International Skating Union (ISU) v Pechstein*, in which an unusual blood value had sufficed for a ban (McArdle, 2011). Significantly, indirect evidence was seen as sufficient to impose a sanction without recourse to direct evidence, raising the question of guilt acutely (Kornbeck, 2015a). Crucially, from October 2013 onwards, Ms Pechstein, a federal police sergeant, received support from the German police trade union (*Gewerkschaft der Polizei*, GdP), who decided to sue the ISU on her behalf including criminal charges (perjury) as well as civil compensation claims (Der Tagesspiegel, 2013). The German sports confederation (DOSB) initially referred to her as guilty, and to her decision to take the case to court as inappropriate (DOSB 2013). But when she was acquitted, in January 2015, by a court in Munich as well as by a panel of independent scientists appointed by DOSB, the latter rehabilitated her unconditionally, insisting that she had been innocent all the time (Stein & Hannemann, 2015). GdP praised the courage of DOSB President Alfons Hörmann in admitting that DOSB had consistently erred until then (GdP, 2015). The GdP involvement is evidence that a mainstream trade union went counter to the preferences of the sports movement and the anti-doping system, and without a court ruling Ms Pechstein would most likely never have been acquitted. No AC seems to have spoken out, be it for or against Ms Pechstein. While GdP is not an ATU, its role nevertheless makes it seem plausible that any independent unions may provide an alternative form of athlete representation and advocacy.
- Vignette 4: One of the most controversial proposals made as part of the revision of the 2009 Code was the one to abolish the requirement for a B sample, although the testing of the B sample is often the only procedural means for indicted athletes to claim their innocence effectively. While the proposal (inconspicuously floated in the middle of the

revision process) was met with firm resistance from ATUs, the EU, some governments, and a range of sports organisations (Kornbeck, 2015b), it was favoured by the IOC and WADA. Surprisingly, it received wholehearted support from the WADA AC: "Removal of the B sample is a matter of trust. If athletes trust the anti-doping system there shouldn't be any difficulties in doing so; […] The right to a fair hearing would be quicker and less complicated without the B sample; Faith in laboratories is crucial. Laboratories must be held responsible for the quality of their work" (WADA AC, 2011).

● Vignette 5: When the entry into force of the 2009 Code led to streamlined and, in many cases, more arduous athlete surveillance in accordance with so-called 'whereabouts' requirements (requiring athletes to provide whereabouts constantly to allow tracking them for testing purposes, but also allowing sanctions to be imposed for three no-shows), the matter became highly controversial and dragged political actors from the mainstream of society (in particular from the European privacy and data protection community) into the conflict (Waddington, 2010). However, on a privacy issue related to the storage of samples, the WADA AC had already resolved, in November 2005, that "clean athletes have nothing to hide" (WADA AC, 2005a); and they did not oppose the 'whereabouts' requirements.

The material presented in Vignettes 3–5 suggest that the AC model leads to outcomes that differ radically from those achieved through ATU representation. These selected examples are corroborated by further, numerous, documented ones (see Kornbeck, 2014); they confirm the mission of the WADA AC in its own words: "Members assist in raising awareness about anti-doping and the promotion of the Play True message, as well as actively liaising with and providing feedback to government, regional and national leaders about anti-doping initiatives" (WADA AC, undated). The text does not even mention the possibility of critically representing athletes' interests vis-à-vis WADA; indeed the WADA AC has adopted guidance to AC members on how to react to "athletes who do not support the fight against doping in sport," including the following recommended response: "This is an inaccurate message sent by an isolated athlete. […] If the athlete in question does not want to follow the rules, then he has no place in the sporting community" (WADA AC, 2005b). One scholar concluded that the AC "can hardly claim to be the legitimate representative of athletes in general" (Waddington, 2010, p. 265). But if AC versus ATU representation leads to dissimilar outcomes, then what is the role of Olympism?

Unolympic Unionism?

As a cross-cutting justification for all provisions found in the Code, a preambulatory section called the 'Fundamental Rationale' includes the following programmatic statements: "Anti-doping programs seek to preserve what is intrinsically valuable about sport. This intrinsic value is often referred to as 'the spirit of sport'. It is the essence of Olympism, the pursuit of human excellence through the dedicated perfection of each person's natural talents. It is how we play true. The spirit of sport is the celebration of the human spirit, body and mind, and is reflected in values we find in and through sport" (WADA, 2015, p. 14).

As examples of this purported Olympism, an expressly non-exhaustive list is provided, including 'Ethics, fair play and honesty', 'Health', 'Excellence in performance',

'Character and education', 'Fun and joy', 'Teamwork', 'Dedication and commitment', 'Respect for rules and laws', 'Respect for self and other Participants', 'Courage', as well as 'Community and solidarity', to conclude thus: "Doping is fundamentally contrary to the spirit of sport" (ibid., p. 14). What may be the single most crucially normative section of the Code thus links the anti-doping system of the Code very narrowly to the Olympic heritage of the IOC.

Apart from the fact that worldwide sport is far more than the Olympic movement, and the fact that the concept requires operationalisation to become meaningful (Loland & Hoppeler, 2012, p. 352), it has been used successfully in establishing Olympism and the equally vague 'spirit of sport' as the yardstick of anti-doping. Although the modern Olympics differ from the Ancient Games, just like the ideology and rules of the IOC have changed over time, altering the 'Olympic legacy' in the process (Chatziefstathiou, 2005; Chatziefstathiou & Henry, 2007, 2008, 2012), they draw large portions of their attraction from them, and their rules draw legitimacy from the vaguely noble Greco-Roman legacy. This however begs the question whether today's 'Olympism' was also that of the Ancient world and, more specifically, whether the ATU-reticent part of WADA's message is matched by anything 'Olympic' as regards the Ancient Games which are still drawn upon as a source of legitimacy for today's Games.

In Ancient Olympism, the Gods "issued no Ten Commandments" (Finley & Pleket, 1976, p. 20). Oaths were sworn to Zeus, as "the patron of justice and the punisher of injustice, but again not as its creator" (ibid., p. 20). Although the Olympic festival was essentially religious, the human nature of the rules was recognised, though the Gods could be invoked to have them respected. In classical times, the Games benefited from the hospitality of Elis, a small and politically weak *polis* (ibid., pp. 22–23). They were governed and managed by the local authorities, not an international committee (ibid., p. 24), and there was nothing comparable to WADA or the CAS. It was as if today's Games were to be held permanently in Lausanne under the authority of its council and aldermen. Elis alone set the standards.

"The 'true amateur' never existed in Antiquity" (Finley & Pleket, 1976, p. 131), when – rather than pledging fair-play – competitors "prayed for 'either wreath or death'" (ibid., p. 21) and "defeat brought undying shame" (ibid., p. 20). The claim that ancient Greek athletes were amateurs appears to be a myth (Young, 1984) and, according to a more recent piece of scholarship, "that this sentiment has a bogus justification from Classical antiquity is surely proven" (Spivey, 2012, p. 267). Today's sport organisations see law suits by athletes as inappropriate, as seen in the Pechstein case (Vignette 3), because the Signatories of the Code expect that "each government will respect arbitration as the preferred means of resolving doping-related disputes" (WADA, 2015, Article 22.4, p. 116). Signatories are sport organisations, as governments cannot sign the Code; their expectation is that governments will discourage the use of their own courts, because arbitration is believed to be more appropriate in a sporting context.

Given that the 'Fundamental Rationale' applies in a cross-cutting fashion to the Code in its entirety, we may further infer that Pechstein's lawsuit and her trade unionism were both Unolympic. Yet the Greek word *agon* denotes both a sporting contest and a lawsuit (Finley & Pleket, 1976, p. 21). Stadia and courtrooms were a ritualised battlegrounds; the stadium knew no second or third places: only winners (ibid., p. 22). Records were not

kept, measurements were mostly impossible and there was no notion of winning in bad style (ibid., p. 22): what counted was winning visibly as perceived by the audience and referees. No handshake was practised before or after contests (ibid., p. 40) and the gruesome *panktration* knew no fair-play rules (ibid., pp. 39–41); winning was what mattered.

Professionalism and trade unionism appear to have gone hand in hand at the Ancient Games, although they were structurally as well as ideologically different from the modern Games, even if they did resemble today's in some other aspects (Finley & Pleket, 1976; Kornbeck, 2014). All the four major Games of the Hellenic world (the so-called Pan-Hellenic Games) offered prizes, in addition to the floral/vegetal wreaths/crowns which have become so emblematic in posterity: wreaths/crowns of olive (Olympian), laurel (Pythian), wild celery (Nemean) or pine (Isthmian) on account of the specific affiliation of those plants with the gods concerned. In contrast with the modesty of these cultic prizes, the amount of monetary prizes appears to have increased steadily over time (Finley & Pleket, 1976, p. 24). Monetary prizes are known from the 2nd century BC onwards, when they already could amount to the size of a skilled worker's annual wages (ibid., p. 56), and athletes appear to have been "all equally professional" (ibid., p. 57) – and proud of it, it seems. So were their home cities, regularly offering them additional prizes, honours, pensions, erecting statues of them, etc.: "Victorious athletes were professionals in the sense that they lived off the glory of their achievement ever afterwards. Their hometowns might reward them with free meals for the rest of their lives, cash, tax breaks, honorary appointments, or leadership positions in the community. The victors were memorialized in statues and also in victory odes, commissioned from famous poets" (Perseus Project, 1996).

Unsurprisingly, this professionalism led to a certain proto-trade unionism over time, although the use of modern concepts to denote Ancient social practices obviously carries a certain bias. From Roman times, original evidence had survived, including a papyrus from AD 194 representing the membership certificate of a boxer named Herminus (first discovered in the British Museum and reported in 1907) (Finley & Pleket, 1976, p. 81; Plate 26 between pp. 90–91). This document shows that high fees were paid (just like today's trade unions are found in highly professionalised sports, where membership fees give unions the means to ensure independent representation). There is even evidence of unions having set up office in Rome, in order to be closer to the relevant departments of the Imperial administration (ibid., p. 81). Guilds were organised along the lines of priesthoods, each being devoted to a particular god. In this they differed from today's unions, but *not* from other professional associations found in Antiquity (ibid., p. 80). The existence of professional guilds – as early as the 2nd century BC – is affirmed by Toohey & Veal (2007, pp. 20–21) as well as Spivey (2012, p. 206) who further underscores the existence of epigraphic evidence (including 'the Neronian club house at Olympia') (ibid.). Drawing on Coakley (1992, p. 56), they quote Xenephanes (5th century BC) as a critic of professionalism. They note that those who favour a less professionalised version of the modern Games "have harked back to the Ancient Games", where this reading cannot be sustained by historical fact. "But therein lies another Olympic myth" (Toohey & Veal, 2007, p. 22).

These findings on athlete trade unionism in Antiquity seems to be uncontested. But then why would WADA be so successful in using 'Olympism' the way they do, and why should they want to do so in the first place?

DISCUSSION

Apocryphal Olympism?

Although the Olympic movement has mutated over time (Chatziefstathiou, 2005; Chatziefstathiou & Henry, 2007, 2008, 2012), it continues to hark back to the Ancient Olympics. Together with the semantic effects of using words like 'Olympics', 'Olympic' or 'Olympism', the tastefully scholarly set-up of the Olympic Museum in Lausanne, or Pierre de Coubertin's stele in Olympia all build powerful bridges to Antiquity. Although the IOC dropped its amateur clause in the 1980s and now seems set to continue along the same path, a certain cultural lag may be at play, since it used to govern an amateur movement for so many decades.

The writings of IOC President Avery Brundage abound in references to an Olympism, the apocryphic nature of which does not seem to have been on the radar of their author. To Brundage, "sport to be sport must be amateur. If it is not amateur, it is work or business, and the participant is a professional" (Brundage, 1954, p. 20). The Ancient critic of professionalism, Xenophanes, was familiar to him (ibid., p. 21), who never missed an opportunity to emphasise the role of Coubertin in crafting the modern Olympic ideal. Rome was seen as decadent, Hellas as noble: "This amateur conception was something new – it belonged, to the so-called 'Golden Age' when civilization blossomed and flowered as never before. Alas, the Games became commercialized, excesses appeared, denounced by the scholars and philosophers of that day and age who cried out against the subsidization and proselyting of competitors, the over-emphasis and the other abuses; the 'Golden Age' came to an end and the glory of Greece faded" (Brundage, 1957, p. 62). He even blamed the loss of amateur sports for having enabled the Barbarian invasions and the breakdown of the Roman Empire (Brundage, 1956, p. 50). "The ancient Games were at least semi-religious in character and they were amateur in nature, with emphasis on grace and beauty of body, mind and spirit" (Brundage, 1955, pp. 16–17). Brundage never seems to have worried much about checking the historiographical or philological details behind his sweeping statements and kept stating and restating that the Greek Games knew no professionals.

Although Brundage's (or even de Coubertin's) writings are not in force as IOC or WADA rules, still the Code in force is based on a concept of Apocryphal Olympism that is not recognised in the Code. We might therefore look for alternative explanations and ask if the current arrangement favour any actors in particular.

In this vein, it seems worthwhile recalling that, according to one sport historian, the emergence of anti-doping rules can be interpreted as a successful agenda designed to promote (predominantly middle/upper class) amateurs against (predominantly working class) professionals at an earlier stage of the history of modern Anglo-Saxon sports (Gleaves, 2011). According to another study by the same historian, the very first anti-doping rules may have emerged, in 19th century equine sports, with a view to protecting the interests of the gambling market (Gleaves, 2012).

Taken at face value, these findings would indicate that anti-doping is not essentially about athletes. Our comparison of today's use of 'Olympism', connected with WADA's reticence towards ATUs (and with the available knowledge of 'Olympism', professionalism and trade unionism in Antiquity) essentially echoes the already familiar

verdict that some of Coubertin's "claims concerning the appeal to the spirit of the Ancient Games are based on assumptions which are not necessarily empirically grounded" (Chatziefstathiou & Henry, 2012, p. 114). The fact that such key policies can be pursued for decades based on references, some of which may be lacking empirical grounding, is significant in that it suggests that sport, as a system of social organisation and social practices, may demand total submission from its constituents.

Unolympic Unionism?

Claims to the 'specificity' of sport are legion. Sport may not be the only sector raising such claims, yet in today's world it may be more successful than many others. Is it because sport is more like art (Edgar, 2013) than like science or technology? Is it because sport (as so often claimed by its governing bodies) provides services to society that no other sector can provide? Is it due to psychological inertia, legal precedence and/or political path dependency? Or is it because networks based on sport are too powerful to be resisted, including because they offer opportunities for mutual benefits? These hypotheses cannot be tested in the concluding section of a paper, yet they do indicate potentially fruitful paths for further reflection on the issues raised here. They do not, however, answer the question why Apocryphal Olympism should be relied upon to portray ATUs as the illegitimate manifestation of Unolympic Unionism. In most contexts, the best communication strategy would seem to be one based on hard-tested facts the veracity and relevance of which are not directly open to contestation by opponents. That this does not seem to be a source of concern seems significant in itself: perhaps because the world of sport precisely is *not* 'most contexts'?

At the heuristic level, critics may argue that this adds little of novelty: if 'Olympism' has been distorted in general, why should anti-doping be any different from other aspects of sports governance? A reply to this critique could be that anti-doping bodies could either drop the reference to 'Olympism', or they could admit ATUs to the table and maintain 'Olympism' as a lead value, this time in greater accordance with historical fact. Quite another matter is the question whether the time is propitious for enlarging effective collective bargaining to new categories of workers, as it has been noted that the crisis seems to have curbed rather than strengthened such rights in the EU workforce as a whole (Clauwaert & Schömann, 2012). If workers' rights are diminishing in general, and the crisis provides a welcome foil on which to argue for such reforms, how can sport be expected to perform better?

Maybe the answer should be drawn from the prodigious ability of sport to create growth as well as employment in the middle of the crisis (SportsEconAustria et al., 2012). Its elasticity makes it more resistant than many other sectors: sport can actually afford to offer better-than-average conditions for workers. As it happens, not all athletes are workers (though the scale between amateur and professional is one beset with the greatest diversity of grey shades), yet improving workers' rights could lead to improved representation and advocacy for amateur and recreational athletes as well. If ATUs are successful not merely in negotiating more equitable, people-friendly rules and practices in the interest of their members, such reforms would of necessity benefit all athletes – non-workers as well as workers.

Finally, the discussion and findings of this paper should not be taken as supporting narrow bargaining practices in the exclusive interest of a few, well-aid, unionised athletes. "After all, the ultimate accountability forum is the general public" (Peers & Costa, 2012, p. 460), and just like the current system suffers from too many rules and arrangements having been carved out behind closed doors, so would future rules and arrangements suffer, if they too were to emerge in a similar way. An enlargement of the franchise ought to be accompanied by an increase in transparency. But transparency may be needed anyway to make anti-doping sustainable in the long term (Kornbeck, 2015a).

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REFERENCES

Brundage, A. (1954). Avery Brundage on Amateur Sport and Broken Time. *Revue Olympique/Olympic Review*, 51, 20–21.

Brundage, A. (1955). The Address of President Avery Brundage at the opening ceremony of the session of the I.O.C. *Revue Olympique/Olympic Review*, 51, 16–17.

Brundage, A. (1956). Speech of Avery Brundage. *Revue Olympique/Olympic Review*, 53, 49–50.

Brundage, A. (1957). Speech of Avery Brundage at the Solemn Opening Ceremony of the International Olympic Committee Session, Melbourne, November 19, 1956. *Revue Olympique/Olympic Review*, 57, 61–63.

Chatziefstathiou, D. (2005). *The Changing Nature of the Ideology of Olympism in the Modern Olympic Era.* Unpublished doctoral thesis, Loughborough University, England. Available from: http://www.la84foundation.org/SportsLibrary/Books/IdeologyOfOlympism.pdf.

Chatziefstathiou, D., Henry, I. P. (2007). Hellenism and Olympism: Pierre de Coubertin and the Greek challenge to the early Olympic movement. *Sport in History*, 27(1), 24–43.

Chatziefstathiou, D., Henry, I. P. (2008). Olympism, Governmentality and Technologies of Power. *Esporte e Sociedade Journal (Sport and Society Journal)*, 12, July–August, 320–337.

Chatziefstathiou, D., Henry, I. P. (2012). *Discourses of Olympism: from the Sorbonne 1894 to London 2012.* Houndmills: Palgrave Macmillan.

Clauwaert, S., Schömann, I. (2012). The Crisis and National Labour Law Reforms: a mapping exercise. *European Labour Law Journal*, 3(1), 54–69.

Coakley, J. J. (1992). *Sports in Society: issues and controversies*. St. Louis, Missouri: Mosby.

Der Tagesspiegel (2013). Hilfe für Claudia Pechstein. Polizei-Gewerkschaft stellt Strafantrag gegen Eislauf-Verband. *Der Tagesspiegel*, 13. 11. 2013. Available from: http://www.tagesspiegel.de/sport/hilfe-fuer-claudia-pechstein-polizei-gewerkschaft-stellt-strafantrag-gegen-eislauf-verband/9071288.html.

DOSB [Deutscher Olympischer Sport Bund] (2013). DOSB-Erklärung zur Initiative von Claudia Pechstein, 22. 10. 2013. Available from: http://www.dosb.de/de/leistungssport/spitzensport-news/detail/news/dosb_erklaerung_zur_initiative_von_claudia_pechstein/.

Edgar, A. (2013). Sport and Art: an essay in the hermeneutics of sport. *Sport, Ethics and Philosophy*, 7(1), 1–9.

EEAA [European Elite Athletes Association] (2008). EU athletes position statement on anti-doping [online]. Available from: http://www.euathletes.info/news/?no_cache¼1&tx_ttnews%5Btt_news%5D¼21.

FIFPro (2012). Players unions condemn statements WADA chairman. 27. 7. 2012. Available from: http://www.fifpro.org/news/print_news/2005.

Finley, H. W., Pleket, M. I. (1976). *The Olympic Games: the first thousand years*. London: Book Club Associates.
Finley, H. W., Pleket, M. I. (2005). *The Olympic Games: the first thousand years*. (Reprint) Mineola, NY: Dover Publications.
GdP [Gewerkschaft der Polizei] (2015). GdP: Pechstein-Rehabilitierung durch DOSB-Präsidenten ist Akt der Fairness. Available from: http://www.gdpbundespolizei.de/2015/01/gdp-pechstein-rehabilitierung-durch-dosb-praesidenten-ist-akt-der-fairness/.
Geeraert, A., Drieskens, E. (2015). The EU controls FIFA and UEFA: a principal–agent perspective. *Journal of European Public Policy*, 22(10), 1448–1466.
Gleaves, J. (2011). Doped Professionals and Clean Amateurs: Amateurism's Influence on the Modern Anti-Doping Movement. *Journal of Sport History*, 38(2), 401–418.
Gleaves, J. (2012). Enhancing the Odds: horse racing, gambling and the first anti-doping movement in sport, 1889–1911. *Sport in History*, 32(1), 26–52.
IOC Athletes' Commission (2012). *IOC Athletes' Commission Election Manual*. Lausanne: IOC. Available from: http://www.olympic.org/Documents/Commissions_PDFfiles/Athletes/Election_manual_DEF.pdf.
Kornbeck, J. (2014). *Olympic Heritage, Athletes' Trade Unions and Anti-Doping Governance*. Vienna: Wiener Verlag für Sozialforschung. Available from: http://www.wvfs.at/files/WT_WP-7_Kornbeck.pdf.
Kornbeck, J. (2015a). Private Regulation and Public Trust: Why Increased Transparency could Strengthen the Fight against Doping. *Deutsche Zeitschrift für Sportmedizin*, 66(5), 121–127.
Kornbeck, J. (2015b). The Stamina of the Bosman Legacy: the European Union and the revision of the World Anti-Doping Code (2011–2013). *Maastricht Journal of European and Comparative Law*, 22(2), 278–299.
Loland, S., Hoppeler, H. (2012). Justifying Anti-Doping: the fair opportunity principle and the biology of performance enhancement. *European Journal of Sport Science*, 12(4), 347–353
Marty, D., Haas, U., Nicholson, P. (2015). *Cycling Independent Reform Commission: Report to the President of the Union Cycliste Internationale*. Lausanne, 2015.
McArdle, D. (2011). Longitudinal profiling, sports arbitration, and the woman who had nothing to lose: some thoughts on Pechstein v. the International Skating Union. In: M. McNamee, V. Møller (Eds.). *Doping and Anti-Doping Policy in Sport: Ethical, Legal and Social Perspectives.* New York: Routledge, 50–65.
Mrkonjic, M. (2013). The Swiss regulatory framework and international sports organisations. In: J. Alm (Ed.). *Action for Good Governance in International Sports Organisations. Final report.* Copenhagen: Play the Game/Danish Institute for Sports Studies Copenhagen, 128–132.
Peers, S., Costa, M. (2012). Accountability for Delegated and Implementing Acts after the Treaty of Lisbon. *European Law Journal*, 18(3), 427–460.
Perseus Project (1996). *The ancient athlete: amateur or professional?* (Perseus Project, Classics Department, Tufts University, Medford, Mass.). Available from: http://www.perseus.tufts.edu/Olympics/amat.html.
Pfitzner, V. C. (2013). Was St Paul a Sports enthusiast?: realism and rhetoric in Pauline athletic metaphors. In: N. J. Watson, A. Parker (Eds.). *Sports and Christianity: historical and contemporary perspectives*. London et al.: Routledge, 89–111.
Rumsby, B. (2013). Sir Craig Reedie set to be named World Anti-Doping Agency president. *The Telegraph*, 15. 1. 2013. Available from: http://www.telegraph.co.uk/sport/othersports/drugsinsport/10450718/Sir-Craig-Reedie-set-to-be-named-World-Anti-Doping-Agency-president.html.
Schoenberg, N. E., Ravdal, H. (2000). Using vignettes in awareness and attitudinal research. *International Journal of Social Research Methodology*, 3(1), 63–74.
Spivey, N. (2012). *The Ancient Olympics*. Oxford et al.: Oxford University Press.
Swaddling, J. [1980] (2011). *The Ancient Olympic Games*. London: British Museum Press.
SportsEconAustria et al. (2012). *Study on the Contribution of Sport to Economic Growth and Employment in the EU: Study commissioned by the European Commission.* Final Report. November 2012. Available from: http://ec.europa.eu/sport/library/documents/f-studies/study-contribution-spors-economic-growth-final-rpt.pdf.
Stein, M., Hannemann, R. (2015). Kniefall des deutschen Sports vor Claudia Pechstein. *Berliner Morgenpost*, 30. 1. 15. Available from: http://www.morgenpost.de/sport/article136935850/Kniefall-des-deutschen-Sports-vor-Claudia-Pechstein.html.
Toohey, K., Veal, A. J. (2007). *The Olympic Games: A Social Science Perspective.* 2nd ed. Wallingford: CABI Publishing.

WADA [World Anti-Doping Agency] (2011). Minutes of the WADA Foundation Board Meeting. 20. 1. 2011. Montreal, Canada. Available from: http://www.wada-ama.org/Documents/About_WADA/FoundationBoard_Minutes/WADA_Foundation_Board_Meeting_Minutes_20Nov2011_ENG_FINAL.pdf.

WADA [World Anti-Doping Agency] (2015). *World Anti-Doping Code 2015*. Available from: https://www.wada-ama.org/en/resources/the-code/world-anti-doping-code.

WADA Athlete Committee (undated) Athlete Committee. Available from: http://www.wada-ama.org/About-WADA/Governance/Athlete-Committee/.

WADA Athlete Committee (2005a). WADA Athlete Committee Meeting Summary 7 November 2005. Available from: http://www.wada-ama.org/Documents/About_WADA/AthleteCommittee_Summary/WADA_AthleteCommitteeOutcomes_200511.pdf.

WADA Athlete Committee (2005b). WADA Athlete Committee, Attachment 1, Response to athletes who do not support the fight against doping in sport. Available from: http://www.wada-ama.org/Documents/About_WADA/AthleteCommittee_Summary/WADA_AthleteCommitteeAttachment1_200511.pdf.

WADA Athlete Committee (2011). WADA Athlete Committee Meeting Notes March 22–23, 2011. Available from: http://www.wada-ama.org/Documents/About_WADA/AthleteCommittee_Summary/WADA_AthleteCommitteeOutcomes_201103.pdf.

Waddington, I. (2010). Surveillance and Control in Sport: a sociologist looks at the WADA whereabouts system. *International Journal of Sport Policy and Politics*, 2(3), 255–274.

Young, D. C. (1984). *The Olympic Myth of Greek Amateur Athletics*. Chicago: Ares Publishers.

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A CONTRIBUTION TO THE HISTORY OF JEWISH PHYSICAL EDUCATION AND SPORT IN THE CZECH LANDS

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ABSTRACT

The history of physical education of the Jewish minority in Czechoslovakia is an integral and significant part of the history of physical education in the Czech Lands. This paper deals with its formation, gradual development, and closure at the beginning of World War Two; and it is divided into several sections. The first focuses on the ideological basis of Jewish physical education and sport, and the specifics of the Czech Lands environment; and subsequent sections on the very formation and development of Jewish physical education in the Czech Lands up to 1918.

The focal point of this paper is the section on the origin and development of the Union Maccabi in the Czechoslovak Republic, its organizational structure, and international relations, including participation in international Maccabiah games and its violent termination. The paper also includes mention of the failed attempt to establish a Jewish umbrella organization of physical education and sport and the effort to restore Jewish physical education and sport in Czechoslovakia after World War Two.

Keywords: Jewish physical education and sports; zionism; Makabi; Bar Kochba; Hagibor; functionaries; activities

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INTRODUCTION

The history of Jewish physical education and sport forms an integral and important part of the history of this phenomenon in the Czech Lands. This remains true even though this promisingly developing phenomenon, co-existing without problems together with the Czech physical and sports movement, was suddenly and irretrievably destroyed 70 years ago by the arrogant oppression of Hitler s Germany. Only a small fraction of the original inhabitants of the Jewish nationality survived the World War Two. Due to this fact, a post-war return to the pre-existing extent of Jewish physical education and sports was vitiated.

In a short post-war episode of good relations of the then Czechoslovakia with a newly rising Jewish state, the elaboration of the history of Jewish physical education and sports in the Czech Lands was not seen as a matter of important contemporary interest, and remained outside the main directions of mutual cooperation. After the sharp cooling of Czechoslovak-Israeli relations, which resulted entirely from the change of Soviet foreign policy in the Middle East, the elaboration of the history of Jewish physical education and sports became a tabooed theme in Czechoslovakia for a long period of time. Even immediately after the Czechoslovak Velvet Revolution, this fragment of the history of Czech physical education and sports, which is very interesting from various points of view, remained at the edge of interest. The solution in the Czech Lands was limited to a few occasional contributions. This essay should at least partly contribute to the payment of the debt owed by Czech historiography of physical education and sports to the former citizens of Jewish nationality.

The ideological resources of the Jewish physical education and sports and the specification of the milieu in the Czech Lands

The physical education and sports organizations and associations of the Jewish inhabitants in the most countries, where this phenomenon appeared, derived their activities from the ideological point of view from the program of Zionism. This world-wide Jewish political nationalist movement, which name originated from the name of the mountain Zion in Jerusalem, came into existence at the end of the 19th century. Its main long-term target was the foundation of the independent Jewish state in Palestine.

The Zionist movement in the nowadays sense of the word, started to be formed in the Czech Lands on the basis of the Herzl political Zionism from the eighties of the 19th century. In the difference from the Western Europe Jews, the Jews in the Czech Lands did not live in homogenous society, but as a "third nation in the country of nobody" between Czechs and Germans. Even Theodor Herzl was fully aware of the negative impacts of this situation. In his essay Prague Jews between nations, he criticized strong assimilation tendencies of the local Jews and recommended not to tend to become either Czechs or Germans, but recommended to openly declare their Jewish nationality. The organized Zionist movement in the Czech Lands started to develop more significantly after the Herzl s death in 1904.

During the period before the World War One, the Zionist movement in Czech Lands was mostly limited to the academic surroundings. In front of the Zionist movement stood the association Bar Kochba.[1] The young Zionists from Bar Kochba strengthened the impact on the cultural restoration of the Jewish nation. Those Jews tried to find again their Jewish cultural and national identities through the teachings of Hebrew, Jewish history and literature.

Within the Czech Lands basic difference existed between Zionism in the German border areas and in the Czech and Moravian inlands. It took longer period of time before the larger number of Jews started to join the Zionist organizations in the German

[1] The name Bar Kochba was derived from the name of the leader of the upbringing of Jews against Romans under the emperor Hadrian in the 2nd century.

surroundings. This could be explained by the fact that in the mostly German milieu, the most middle class Jews considered it unsuitable to stay aside from their German neighbours and pointed on their different origin. In the Czech inland, the Jews from the Czech milieu started to come forward to Zionism quite soon. The Czech-German nationalist disputes could impact sometimes as a catalyst for those Jews, who until recently did not care much about their national consciousness or were persuaded about the possibility of their assimilation with either Czech or German entities. The foundation of Bar Kochba was dominated by the Jews from the Czech milieu and slowly the other Jews from the German milieu joined.

Contrary to the beginnings, the situation changed to a certain measure during the First Republic. The constantly larger number of Jews from the German border areas started to declare the Jewish nationality and at the same time they organized themselves in Jewish associations, what could be explained by the growing nationalism and anti-Semitism in the German border areas. Inlands, on the contrary, the new generation of former Zionists did not feel the urge to organize themselves in the Zionist associations and integrated naturally to the Czech entity.

On the other hand, at the end of the twenties and the thirties, it came to the new growth of the Zionist activities also in the Czech inland, where new youth organizations were founded and the printing of the Zionist magazines written in Czech was raised. A larger number of Czech speaking Zionists resulted from the fact that even at the Jewish national schools the Czech language had the priority as an official state language.

The Czech milieu was favourable to the Jewish activities and this fact was in discrepancy with the situation in the most neighbouring countries and it was proven by the existence of the independent Jewish sports associations in the frame of the Czechoslovak sports associations with the right to the national autonomy and proportional representation. It should be mentioned here that the Jewish Football Association in the Czechoslovak Republic was allowed to administrate inside and outside paperwork in Hebrew and arranged the first issuance of the Czech-Hebrew railway passes for the players organized in this association. It was for the first time in history that the Hebrew was recognized as an official language in Europe (Bureš & Plichta, 1931).

The origin and the development of the Jewish physical education and sports in the Czech Lands until 1918

For the Czech physical education, the founders of the first private physical education institutes in the Czech Lands, Dr. Hirsch and Dr. Seegen, both Jewish nationals, were of great importance. Hirsch was the apprentice in the German Dessau where he was familiarized in detail with the German physical education – Turner education. Upon his return to Prague and since the foundation of the private orthopaedic institute, he became the promoter of the Jahn gymnastics and also of fragments of Swedish systems. Their students became later the founders of the association Sokol (Pick, 1971).

The period between sixties and seventies of the 19th century, the period of the political liberalism was at the peak in Austria. It was enabled by the December Charter. The Charter also involved the life of associations. The key laws for the activities of the associations were the laws on the right to associate and the right to gather (Křesťan, Blodigová, & Bubeník, 2001).

Both laws formed the part of the December Charter from 1867. The law on associations distinguished the types of associations, defined the conditions of the foundation of various associations, and contained the conditions, which should have been fulfilled by associations. If the association did not fill the conditions, could have been officially forbidden. In this sense of liberal political frame, the Jewish associations were founded on the territory of the Czech Lands Subsequently, the founded associations were cultural, neighbouring, scientific, musical and later also physical education and sports. The first Jewish physical education association on the Czech territory was Bar Kochba, founded by students of the Wiener University E. Fried, M. Jerusalem, L. Werner and E. Zweig in the town of Moravian Ostrava in 1893 (Bureš & Plichta, 1931). Some foreign sources declare that the year of foundation of the first Jewish physical education association in Moravian Ostrava was the year of 1899 (Pick, 1971). In 1899, the Jewish gymnastics association also appeared in Moravian Ostrava. The Jewish sports movement constantly proliferated and new associations were founded – in 1901, in the cities of Olomouc and Uherské Hradiště, in 1902 in Kolín and Opava and in 1903 in Prostějov.

Already in 1903, after the 6th Zionist congress in Basel, the Jewish Turner Association was founded, which was the predecessor of the latter founded Makabi. The highest functions were occupied by the representatives of the association Bar Kochba Berlin but the Jewish associations from the Czech Lands were highly represented.

In the second wave of foundation of associations, other towns followed – Privoz in 1905, Znojmo in 1906, Brno in 1907, Prague in 1908, Mikulov and Jihlava in 1910, Hagibor Prague in 1912, Břeclav, Miroslav and Hakoah Olomouc in 1913, Hodonín and Kroměříž in 1914.

The Jewish sports associations in the Czech territory formed the area of Czech and the area of Moravia-Silesia. From the point of view of organization, all those associations belonged under the greater administration unit of the former Austria-Hungary, so called Western Austrian area. This comprised of 23 sports associations with 2500 gymnasts and athletes. The delegates from such a big region met for the first time in December 1912 in Vienna. The program dealt with ideological questions; however the main issue was the preparation of the sports and physical education part of the 11th Zionist congress, planned for 1913 in Vienna.

This general assembly took place from 6th to 8th of December. This congress was also accompanied by the sports and physical education performances. The Czech Lands were represented by the associations from Boskovice, Brno, Břeclav, Miroslav, Moravská Ostrava, Olomouc, Prague and Uherské Hradiště. Various important decisions were adopted at the congress but there were practically implemented as after the termination of the World War One. The most significant issue was the adoption of the common name Makabi.[2]

[2] Makabi means wrestler. The name is derived from Judas Makabiah, the fighter for freedom of Jews in the 2nd century before Christ. The ideological importance of the name of the movement and associations then means the active participation in the fight for freedom and joyful future of the Jewish nation. Makabi is supposed to be a centre of the regeneration movement of the Jewish nation and supposed to be a place of the education to reliability, devotion, manhood and perseverance. In this whole essay, the name of the association Makabi is written with one "k" as it was registered on the official application for the registration to the registrar of associations. Státní ústřední archiv Praha (SUA), fond ministerstva vnitra, sign. D 3111, k. 5073, Svaz Makabi 1924–1946 [Association Makabi 1924–1946].

Even in the eve of the war on the 21st of June 1914, the public physical education and sports performance of the Jewish associations of the Western Austrian region took place in Brno. During the war, most activities of the association life were suppressed.

Shortly before the beginning of the World War One, the most significant Jewish sports club in the Czech Lands was founded and it was the Jewish sports club Hagibor. This club originally formed a physical education and sports section of the political association Poale Cion, which was the movement of the socialist Zionists. In December 1914, when Hagibor was still a part of the association Poale Cion, their members organized the first social gathering in the hotel At Golden Angel in Celetna Street.

Hagibor achieved independence once during the war. Its first elected chairman was Dr. Rudolf Beck, Vice-chairman Oskar Kaminski. Both men kept Hagibor at life due to their personal dedication during the war, which a unique act.

The foundation and the development of the Association Makabi in the Czechoslovak Republic in the years 1918–1938

The numerous activities were performed and developed by other Jewish physical education and sports associations. And on the basis of those fragments, the new association Makabi was founded in Czechoslovakia. It continuously became one of the strongest Makabi organizations in the world and one the main Jewish associations in Czechoslovakia.

After the foundation of the Czechoslovak Republic various associations called Makabi existed. The impulse came from the Prague Makabi to gather all those associations and this new gathering started to publish the bulletin "Makkabiblatter". The leading representatives contacted other fourteen associations, existing in Czech and Moravia and Silesia. On 29th and 30th of March 1919, 44 delegates of the Jewish gymnast associations and sports clubs gathered in Brno for the 1st general congress of the Jewish physical education associations in the Czechoslovak Republic. The main credit for the organization of the new gathering belonged to Ing. Richard Pacovsky, who also gave ideological speech at the gathering. He also came up with a proposal to divide each organization to districts. The decision on district organizations was adopted at the following congress at Brno in June 1919. This congress was followed by the public gymnast performance and sports competitions. The representatives of 21 clubs decided here to create a provisional Czechoslovak organization Makabi. Unanimously voted leadership was formed by R. Pacovsky, A. Herzog, K. Mauthenerova, V. Mauthner and E. Singerova. The site of the organization was in Prague. The conference also created a Jewish Soccer Association.

Thanks to the activities of the new leadership, the organization was enlarged from 21 associations in 1919 to 31 associations in 1921, which registered 2000 members. The year 1921 was the important turning point in the history of the Czechoslovak and in fact the world movement Makabi. In July the first Czechoslovak district competitions were organized in Brno. The competitions were attended by 650 members and 27 associations. Two months later, at the occasion of the organization of the 12th Zionist congress in Karlovy Vary, the sports competitions were organized between September 1–14 and Czechoslovakia was strongly represented. In this period, the international conference of associations Makabi was held. The delegations from ten countries including Palestine were negotiating on the renewal of the gymnast associations and other sports associations

under the newly registered name "Makabi World Association". As the chairman of this organization, Heinrich Kuhn from Berlin was appointed. The unification of the associations Makabi was not trouble free and comprised of many continuous steps.

The great importance for the development of the movement Makabi had the sports competitions at the occasion of the thirteenth Zionist congress at Karlovy Vary from 6th to 8th August 1923. This world conference helped not only to the survival, but also to the consolidation of the world sports movement in 18 countries.

The processing of the continuous reunification was implied in Czechoslovakia as well. The new leadership was voted in March 1924. Dr. Robert Heller from Chomutov became a chairman, Viktor Mauthner from Prague a highest commander, Richard Pacovsky was the technical delegate of the movement. The new leadership concentrated on the creation of the firm and unified movement. The following circumstances supported this effort.

The representatives of the Moravian districts gathered in Brno on the 7th of September 1924 and created a new Moravian organization Makabi. Afterwards, the organization "Association Makabi" was established in the Czechoslovak Republic, with the site in Prague.[3] The excerpts from the articles of the Association Makabi:

§ 1. The association is called Association Makabi in the Czechoslovak Republic, in German language – Tschechischer Makabikreis, in Hebrew – Histadrut lehitamlut u lesport bečechoslovakiea. This association is not political. The members of the association are Jewish physical education and sports associations, which adopted the regulations of the following paragraphs. The association resides in Prague.

§ 2. The purpose of the association is to strengthen the physical prowess of the Jewish population and to enhance the moral level so that they can keep lively the Jewish nation and its homeland.[4]

Starting from 1924, the movement in Czechoslovakia grew tremendously. It was composed of 32 sports clubs with 2500 members. The number raised constantly during the following years. The growing organization required the creation of the following districts according to a Moravian example (Pick, 1971):

- Czech district – Prague (Hagibor, Makabi), Chomutov, Karlovy Vary, Liberec, Most, Pardubice, Plzen, Teplice-Šanov, Ústi nad Labem
- Brno district – Brno (Makabi, Bar Kochba), Boskovice, Břeclav, Jihlava, Mikulov, Podivín, Pohořelice, Znojmo
- Moravská Ostrava district – Moravská Ostrava, Bohumín, Hrušov, Novy Jičín, Olomouc, Vítkovice
- Uherské Hradiště district – Uherské Hradiště, Hodonín, Kroměříž, Kyjov, Prostějov, Strážnice, Uhersky Brod
- Slovak district

The movement Maccabi was spread to the smaller towns as well. The main example was for them the organization Sokol. As per the Sokol example and their main specialists,

[3] Státní ústřední archiv Praha (SUA), fond ministerstva vnitra, sign. D 3111, k. 5073, Svaz Makabi 1924–1946 [Association Makabi 1924–1946].

[4] Státní ústřední archiv Praha (SUA), fond ministerstva vnitra, sign. D 3111, k. 5073, Svaz Makabi 1924–1946 [Association Makabi 1924–1946].

Augustin Očenášek and Frantisek Trnka, the training hours were introduced, where trainers for various district clubs were trained. In a short period of time, they started to organize the district and regional public performances.

The activities of the Jewish sports clubs were oriented not only to the gymnastics and the basic physical education. In the frame of several years, their activity was enlarged constantly and started to accommodate other sports branches as well. It was especially light athletics, soccer, swimming, ice hockey and other winter sports. For each of these branches, which are stated here, there existed a special officer at the association Makabi. Each sports branch had its firm place in the leadership of the Jewish sports organization.

The new leadership was elected at the regional conference in Brno in 1926. The leading function of the chairman of the movement, which he presided until the end of the First Republic, was appointed Artur Herzog from Prague. He was the leading person which shielded all the regional groups and sports clubs Makabi, as well as from the organizational point of view. As the commander of the association, Max Gelbkopf was appointed. Gelbkopf was originally from Brno. In 1927, his compatriot Otto Hirsch replaced him.

The growing movement meant also the growth of financial expenses, but also further possibilities. Makabi was in the situation when it could introduce new sports branches and to a certain extent without any fear from losing its existence.

The minister of the public health and physical education of that time, Dr. Ludwig Czech, who was also a Jewish national, helped to secure means within the frame of his resources.

The further enlargement of the importance of the Czechoslovak association Makabi occurred after the World Conference Makabi in Vienna in 1927, where he was authorized to lead temporarily the world movement and Dr. Karl Sonnenfeld from Brno was elected to the position of the vice-president of the world organization. This organization associated at that time twenty states. The following conference of the world association, which terminated the so-called transition period, was held in Brno on 27th of May 1928. Dr. Herman Lelewer from Berlin was elected a president and to the role of the vice-president was repeatedly elected Dr. Karel Sonnenfeld.

A couple months later, on 5th and 6th of August, the public competitions took place. They were organized in Brno. At this occasion, for the first time, a visit to a newly founded centre of the young members of Makabi in Blansko, approximately ten kilometres north of Brno, was organized. A largely numbered representation of the Czechoslovak Makabi participated in October of the same year at the competitions to honour the thirteenth anniversary of Berliner Jewish sports club Berlin Bar Kochba. At the end of twenties and thirties, the sport took its leading role over the physical exercises. This was the reason why the officers of Makabi, especially in bigger towns, tried to establish own sports fields not only for the physical exercises and light athletics but also for tennis, soccer, volleyball, basketball and other sports. They were successful especially in the cities of Brno, Prostějov, Moravská Ostrava and Uherské Hradiště. The main effort of those organizations was to create conditions for the education of sports and competitive swimming. Regional and district rallies as well as the sports meetings were not only important sports activities but also welcomed social activities.

Second Czechoslovak regional gymnastics and athletics races took place in Moravian Ostrava in 1929. The Czechoslovak sportsmen appreciated the participation of foreign delegations. There performed the representatives from Belgium, France, Germany, Lithuania, Palestine, Poland, Romania and Yugoslavia. Approximately 2000 sportsmen participated in races, one third of them was formed by the gymnasts. The performances and competitions took place in front of the audience of about 6000 people.

Parallel with this event, the World Conference Makabi took place in Moravian Ostrava. As the previous conferences, also this one contributed to the further improvement of the situation inside the movement. Makabi had a broad basis especially among Jewish youth. The strongest position had the movement in Austria, Czechoslovakia, Poland and Germany. Here the Jewish sportsmen achieved the high performance and participated in the representation of the state. For the further development, both organizational as well as financial, the leadership of the world union was transferred to Berlin. In the forefront was Dr. Hermann Lelewer. The educational aspect was enforced and the movement started to implement the Palestinian concept. Such a far reaching decision was done in Moravská Ostrava as well. This decision was promoted by the Palestinian delegate Josef Yekutieli, who presented his idea to organize the first world Maccabiah.

The participation in the international Makabiah belonged without a doubt to the most important activities of the Czechoslovak Makabi. The first one took place in spring l932 in Palestine and at this, from the point of view of the Jewish sports history important historical event, over 25,000 Jews participated and they came from the whole world. Among them 500 active sportsmen from 16 countries. We should also add other 2000 sportsmen from the host country. The games should have shown to a certain extent, which level was acquired by the sportsmen from the Palestinian clubs Makabi and if they were able to compete with the foreign competition. Czechoslovakia sent a team of 120 athletes and gymnasts.

The Czech team travelled quite dramatically at the overcrowded Greek boat Attiki from Italian Trieste across Athens to Tel Aviv. The way from Trieste to Greece was a very unpleasant experience due to the stormy sea, sea diseases of participants and too bad food. The organization of the Makabiah did very well and the participants received warm acceptance. Tel Aviv, which had at that time 50,000 inhabitants, was totally under the auspice of the Makabiah. There was enthusiastic atmosphere on the streets. The sports festival was very well organized thanks to the experienced foreign referees and energetic Palestinian organizers. Only a primitively equipped swimming pool harmed excellently prepared swimmers from Czechoslovakia and Austria. The Czechoslovak team was very successful and in the final evaluation gained the 4th place from 13 participating countries, even though it did not have participants in seven sports branches. The absolute success was brought by swimmers and tennis players (Herzog, 1966). The sportsmen returned back to Czechoslovakia after ten days.

The majority of the most important meetings of the world union to the preparation and organization of the first Makabiah in 1932 and especially the second Makabiah in 1935 were organized together with German Makabi circle in the former Czechoslovakia. Only several meetings took place secretly in Berlin.

Due to the enormous success of the summer games and due to fairly big support of the leadership of the world organization Makabi, the winter games took place. They were

organized in February 1933. The host country became Poland, namely the Tatra resort Zakopane. The games took place in despite of the strengthening pressure from the Hitler Germany. Shortly after, the principal members of the leadership of the world organization Makabi moved to London. Dr. Lelewer chaired the organization as he moved to London from Berlin.

The second Maccabiah took place in Palestine from 2nd to 7th April 1935. Even though happenings in Europe headed toward the onset of Nazism, which very sensitively marked the Jewish community not only in Europe, it was achieved that this important sports social event took place. The games were attended by sportsmen from 27 countries. There were 2100 athletes and gymnasts from abroad and 2400 sportsmen from Palestine.

There were not only the gymnastic and athletic competitions on the program. For the first time, the members of the sports club Hatzair from abroad participated. The Palestinian members of this club were 2600 in total. Everyone participated in this great event. The construction of the Olympic village was supported by their member fees and also members from Czechoslovak Makabi.

The world congress of Makabi took place in Brno in August 1935. The events of our Western neighbours overcame the German borders. The world union Makabi was now lead by the chairman Selig Brodetsky from London. In this for Europe very bad time, the world Makabi had over 300,000 members. In Czechoslovakia, 82 clubs with 10,300 members existed.

The second winter Makabiah took place in Bánska Bystrica, Slovakia, in February 1936. The sports results achieved there brought recognition not only in the Jewish sports circles.

The third and the last regional congress of the Czechoslovak association Makabi took place from the 4th to 6th July 1937 in Slovak town Žilina. It was traditionally accompanied by the public physical exercise performances and various sports competitions. Around 2000 sportsmen from the Czechoslovak Makabi participated in this event. The leadership of the association remained in the hands of Artur Herzog, who presided from 1926. His nearest contributors were Leo Bleyer and then in sequence Richard Pacovsky, Viktor Mauthner and Otto Hirsch.

The anti-Semitic politics of the NSDAP party in Germany lead to the strengthening of the social and cultural lives, but also to the solidarity of the Jewish community in Czechoslovakia. On the basis of the decision of the association Makabi, it was decided to adopt non-participation of the Jewish sportsmen from Czechoslovakia at the Olympic Games in Berlin in 1936. The Czechoslovak Olympic committee took this decision into consideration and declared that they would not force any Jewish sportsmen to participate. This meant a significant weakening of the Czechoslovak Olympic representation. There were masters of Czechoslovakia and record men in many sports branches among Jewish sportsmen. It affected light athletics, but especially swimming, water polo and water jumps.

In the frame of the association Makabi, a section of youth Makabi-Hacair worked and it was founded in 1926 (Pick, 1971). This movement, composed of approximately 2500 members, took care about the systematically and complex education of youth, not only from the physical point of view, but also ideological. It concentrated on knowledge and independent expression of mind. This ideal of connection of physical prowess and knowledge was not common at many clubs. The members of Makabi-Hacair wanted to actively participate in the construction of Palestine. A part of members moved to Palestine and founded Kibbutz Ra'anana. This act created a chain between the movement and Palestine. The acceptance to this movement was conditioned by the completion of an

examination, which was composed by the way of the spiritual examination as well as the examination from the physical prowess – athletics, swimming, gymnastics, bicycle riding on time and also skiing (Bureš & Plichta, 1931). Especially at gymnastics and athletics, the limits were quite demanding. It was mandatory for men to examine at the bar, uneven bars and horse, then floor exercise, to jump minimum 125 cm high, 450 cm long, to throw weight minimum 7 m, run 100 m under 14 sec and swim 300 m in running or 100 m in standing waters, Women had the same disciplines, but the content of gymnastics was different, limits for jumps and ball throw lower and run and swimming shorter. The firm part was so-called cultural examination about the basis of Makabi, about the history of Jewish Turner movement, about the world association Makabi, about the history and organization of Zionism, Keren-Hajesod, Keren-Kajemeth, Ocar-Makabi, about the history of Palestine, about Judaism and its economic and social charter, about holidays of Jewish nation, about everyday hygiene and about sports, about organization of the respective Makabi circle, Hatikwah and about Jewish leadership (Bureš & Plichta, 1931). The brass badge for the age category 18–34 years, silver badge for category 35–41 years and golden badge for age category over 41 years.

The activity of Makabi was followed on the regular basis by the Jewish press, printed in the then Czechoslovakia, especially in periodicals Selbstwehr and Jewish news. The association Makabi in the Czechoslovak Republic was from 1929 a member of the all sports committee of the Czechoslovak Republic and was represented at all meetings by its delegates.

The Czechoslovak legislation dealing with the associations, came from the regulations of the Austrian regional law adopted in 1867, was valid until January 1939. The German law was immediately implied on the territory of the Czechoslovak border regions, which were given up in October 1938 according to the Munich treaty. The majority of Jews, who did not manage to escape from the annexed border regions, were subsequently deported to Nazi concentration camps starting from November 1938. In the remaining Czech-Slovakia, there were at the end of 1938 and especially after the 15th of March 1939, when the Protectorate of Bohemia-Moravia was forcefully introduced, issued a serious of non-democratic regulations, which very strongly changed and hardened the regional activities, especially at the Jewish associations. The fundamental impact on the inhibition of the life of the Jewish associations had especially the order of the German protector on the Jewish property from the 21st June 1939. All the Jewish property came to arrization according to this order and was entrusted to the newly created Centre for Jewish Immigration. The public regional activities of Jews due to this fact were frozen from autumn 1939, even though some associations managed to secretly organize activities until May 1940. Later on, it was impossible to elude the issued discrimination regulations and orders.

Nevertheless, a part of Jews continued in the sports and physical education activities outside the Jewish associations and visited especially several Prague Czech sports clubs and Sokol. Unfortunately, these activities did not avoid prying of the Czech activists who publicly offended this and proclaimed that some clubs act "inadmissibly" and liberally towards their Jewish fellow citizens. In autumn of 1941, the Prague Paper reported that Jews were involved in sports activities at the playground of the club Slavoj Žižkov.[5] The

[5] Pražský list, 14. 11. 1941, s. 7. [Prague Paper, 14. 11. 1941, p. 7.]

liquidation of Sokol sports club, which was in motion at that time, was also reasoned by the fact that it was under the raising Jewish influence in some of their branches. Sokol officially expelled Jews from their rows long time before that, but it was only a formal act and it was not respected in reality.[6]

The legal cessation of the Jewish associations in the Protectorate was surprisingly long-term issue. This is proven also by the almost two-year lasting official liquidation of the association Makabi. The association applied in December 1939 at the ministry of interior for the official confirmation of the legal continuation of their association. It came to a prolonged negotiations and as lately as on the 29th August 1941, the police directory in Prague sent a letter to the ministry of interior: "We inform that the above named association was erased on the basis of the note from the Zentrale für Jüdische Auswanderung, Prag (Centre for Jewish Immigration, Prague) from the 13th of May 1941, from the regional registrar as expired."[7]

The activity of the Jewish associations was renewed as late as after the liberation of Czechoslovakia on the basis of the edict of the President of the Republic, who cancelled the orders from the period of restrictions. President Benes renewed the cancelled regional law and activities and entrusted the Jewish religious community in Prague with the renewal of Jewish associations. Their representatives were in many cases forced to declare the disappearance of the association due to the drastic loss of membership during the war years. The renewal of association took place on the 11th December 1945, when the association Makabi wrote to the directory of the national security responsible for the region Prague II that in the sense of the edict of the President of the Republic from the 25th September 1945 they decided to continue in their activity immediately and it came to it on 15th December. Ing. Drucker, Ing. Weiss and E. Diamant had merit in the renewal of the association. The post-war activity of the association Makabi did not last long as it ceased to exist due to the directive reunification of the physical education and sports organizations and was deleted from the regional registrar on 15th of June 1950.

The Jewish physical and sports association in the Czechoslovak Republic

This organization was supposed to be a chain between the national and physically oriented movement Makabi and the Jewish sports represented especially be the Jewish soccer association. The Jewish soccer referees and the Jewish sports clubs successfully developed the activity in Prague (Hagibor[8], Hakoah[9] and other big towns as well. It was

[6] Národní střed, 28. 10. 1941, s. 5. [National centre, 28. 10. 1941, p. 5.]

[7] Státní ústřední archiv Praha (SUA), fond ministerstva vnitra, sign. D 3111, k. 5073, Svaz Makabi 1924–1946 [Association Makabi 1924–1946].

[8] Hagibor Prague was enlarged gradually to the most important Jewish sports association in the period of the first republic in Czechoslovakia. The club was composed of single, relatively independent sports sections. The football section, then during the World War One the light athletic section, after the war the hockey section (field and ice), the swimming and tennis sections. Hagibor also offered other sports like rowing, chess, and winter sports and also women s sports. The swimming and light athletic sections became the most important sections during the time. Especially in those sports sections, the sportsmen of Hagibor achieved the excellent results. The site of the club was at Celetna street No. 22. The club colors were blue-white. Státní ústřední archiv Praha (SUA), fond zemského úřadu – spolkový katastr, sign. 2 A/5762, k. 535 – Židovský sportovní klub Hagibor 1922 [SUA, Jewish sports club Hagibor 1922].

[9] The constituting meeting of the Jewish sports club Hakoah Prague took place on August 29, 1926. This club was aimed especially to the association ball games, Egon Muller was elected the chairman, the CEO Josef

founded officially on 17th September 1921.[10] The most significant representatives were the chairman Dr. Evzen Stern and two vice-chairmen Artur Herzog and Evzen Justic. The last one was at the same time the chairman of the Jewish football association. The excerpts from the articles of the Jewish physical education and sports community in the Czechoslovak Republic say:

§ 1. The association is named in HebrewAguda lehitamlut u lesport bececho slovakea, in Czech the Jewish physical education and sports community in the Czechoslovak Republic and in German Jüdische Turn- und Sportgemeinde in der Tschechoslowakische Republik. The site is in Prague.

§ 2. The purpose of the community is the reunification of all Jewish sports and physical education associations, promotion of the constant physical education of the Jewish people and the encouragement of the national self-confidence.

The Jewish physical education and sports community never started to fulfil its proposed role of the organization to arch over the Jewish physical education and sports in Czechoslovakia and after several years, negotiations on its dismissal took place. The decision on dismissal was adopted by the general assembly, which took placed in Brno on the 29th of August 1927. Further, its vice-chairman Arthur Herzog announced to the police directory in Prague that the association was voluntarily dismissed on the 8th of November 1927. According to the attached minutes, the dismissal of the community was approved unanimously. A message on the dismissal of the community was published in the Official List on the 24 November 1927. Later, this decision was impeached by several members, as the general assembly was not attended by three quarters of members according to articles. After the further negotiations, the community stopped to exist in fact and officially in 1928. This clearly shows that the original high-spirited plans on the creation of the official chain among national oriented physical education movements and rather non-political Jewish sports did not came to fulfilment and both branches of the Jewish physical education and sports in Czechoslovakia were connected only informally.

CONCLUSION

Although the full and free development of Jewish physical education in our country presents only a relatively short period, it makes an integral part of the history of this important social phenomenon. In general it is possible to say, that the Czech environment was extremely friendly to Jewish activities, which became apparent especially in contrast to the situation in most neighbouring countries. The first Jewish gym club in the Czech

Steiner, cashier Hynek Manler and the head of the football section Josef Haudniczky. The provincial political administration recommended to the police directory on September 25, 1926, to register the association Hakoah Prague to its association registrar. According to the approved charter, it's was the association non-political, was not allowed to organize political activities or participated in the political activities. The sign of the association was the fi ve-pointed David star of the golden color. Státní ústřední archiv Praha (SUA), fond zemského úřadu – spolkový katastr, sign. 2 A/467, k. 721 – Sportovní klub Hakoah 1926 [Sports club Hakoah1926].

[10] Státní ústřední archiv Praha (SUA), fond ministerstva vnitra, sign. 6/59/20, k. 1040 – Židovská tělocvičná a sportovní obec 1921–1928 [Jewish physical education and sports community 1921–1928].

Lands was founded as early as in 1893. More clubs began to be created and 20 clubs were set up to the World War One. Even more favourable situation for formation and activity of the Jewish gym clubs came after the establishment of Czechoslovakia. Immediately after its formation a provisional organization and in 1924 definitive one was founded – Maccabi Association in Czechoslovakia. It became one of the important parts of World Maccabi organization. Among the most significant activities of the Czechoslovak Maccabi belonged unquestionably participation in international Makabiah games, where the Czechoslovak delegations were many times successful.

The situation for Jewish associations in Czechoslovakia changed radically in October 1938, and especially after 15th March, 1939 when they began to be restricted in their activities and discriminated against in every way. Their official termination took place in 1941, when their factual activity did not exist anyway.

An attempt to restore Jewish associations came about after 1945, but in most cases closure of a club was stated because of radical decrease of membership during the war years. The directive unification of physical education and sports organizations after 1948 marked the definitive end to the existence of Jewish physical education in Czechoslovakia.

REFERENCES

Bělina, P., et al. (1992). *Dějiny zemí Koruny české.* Prague: Paseka.

Brod, P. (2000). *Židé v Československu.* In: *Židé v Sudetech* (pp. 277–283). Prague: Česká křesťanská akademie.

Brüll, B. (1937/38). Československý Makabi. *Židovský kalendář*, 18.

Bureš, P., Plichta, J. (1931). *Sport a tělesná výchova v československé republice cizině.* Prague: Almanach sportu.

Crhová, M. (1999). Sionistická volební politika na konci 20. let. *Paginae historiae*, 7.

Čapková, K. (1998). Tělo a duch – židovské sportovní organizace v Čechách a na Moravě. *Věstník židovských náboženských obcí v Českých zemích a na Slovensku*, 60(8, 9), 8–10.

Čapková, K. (2005). *Češi, Němci, Židé? Národní identita Židů v Čechách 1918–1938*. Prague: Paseka.

Čapková, K. (2001). Židé v Čechách za první republiky. *Česko – Slovenská historická ročenka 1935*.

Čapková, K. (2004). Uznání židovské národnosti v Československu 1918–1938. *Český časopis historický*, 102(1), 77–103.

Doherty, J. K. (1953). *History of Modern Track and Field.* New York: Prentice-Hall Inc.

Färber, F. (1997). Makabi – významná tělovýchovná a společenská organizace před 2. sv. válkou. In: P. Pálka (Ed.). *Židé a Morava*: *sborník z konference konané v listopadu 1996 v Kroměříži* (pp. 60–63). Kroměříž: Muzeum Kroměřížska.

Färber, F. (1997). *Židé a sport v naší době.* In: P. Pálka (Ed.). Židé a Morava*: sborník příspěvků přednesených na konferenci konané 12. listopadu 1997 v Kroměříži* (pp. 125–127). Kroměříž: Muzeum Kroměřížska.

Friedmann, F. (1934). Židé v Čechách. In: H. Gold (Ed.). *Židé a židovské obce Čech v minulosti a současnosti*. Prague.

Fuchs, E. (1966). Der tschechoslowakische Makkabikreis – Eine Würdigung und Ehrung seiner Toten. *Zeitschrift für die Geschichte der Juden*, 3(2/3), pp. 146–150.

Goldschmidt, S. (1938). *Makabi.* Berlin.

Henry, W. (1937). *History of the Olympic Games in Antwerp 1920.* New York.

Herzog, A. (1966). Erinnerungen und Eindrucke von der I. Makkabiah in Tel-Aviv im Jahre 1932. *Zeitschrift für die Geschichte der Juden*, 3(2/3), pp. 143–145.

Holan, J. (2004). *Historie židovské tělesné výchovy a sportu v Českých zemích.* Diploma thesis. České Budějovice: University of South Bohemia in České Budějovice.

Janecký, A. (1946). *Slavné postavy naší atletiky.* Prague: Českomoravské akciové tiskařské a vydavatelské podniky.

Kössl, J., Štumbauer, J., Waic, M. (2004). *Vybrané kapitoly z dějin tělesné kultury*. Prague: Karolinum.
Křesťan, J., Blodigová, A., Bubeník, J. (2001). *Židovské spolky v Českých zemích v letech 1918–1948*. Prague: Sefer.
Květoň, V. (1937) *Letecká kniha československé mládeže.* Prague: Karel Synek.
Laufer, J. (1955). *50 let v našem sportu.* Prague: Mladá fronta.
Lederer, R. (1923). O židovském skautingu. *Listy židovské mládeže*, 6, 57.
Pěkný, T. (2001). *Historie Židů v Čechách a na Moravě.* Prague: Sefer.
Phillip, R. (1921). *Wir Juden und der Sport.* Vienna.
Pick, J. C. (1943). Jewish Sport in Czechoslovakia. In: *Bulletin of Czechoslovak Jewish Representative Committee, affiliated to the World Jewish Congress.* New York.
Pick, J. C. (1971). Sports. In: *The Jews of Czechoslovakia*, vol. 2 (pp. 185–228). Philadelphia – New York.
Rybár, C. (1991). První republika. In: C. Rybár (Ed.). *Židovská Praha, Glosy k dějinám a kultuře* (pp. 134–156). Prague: Akropolis.
Štumbauer, J. (1995). *Dějiny spolkové tělesné výchovy a sportu v Č. Budějovicích od poloviny 19. století do roku 1938*. Habilitation thesis. Prague: Charles University in Prague.
Walters, G. (2007). *Berlínské hry: olympijský sen ukradený Hitlerem.* Prague: BB/art.

Archive sources

Státní ústřední archiv Praha (SUA), fond ministerstva vnitra, sign. 6/59/20, k. 1040 – Židovská tělocvičná a sportovní obec 1921–1928.
Státní ústřední archiv Praha (SUA), fond ministerstva vnitra, sign. D 3111, k. 5073 – Svaz Makabi 1924–1946.
Státní ústřední archiv Praha (SUA), fond zemského úřadu – spolkový katastr, sign. 2 A/5762, k. 535 – Židovský sportovní klub Hagibor 1922.
Státní ústřední archiv Praha (SUA), fond zemského úřadu – spolkový katastr, sign. 2 A/467, k. 721 – Sportovní klub Hakoah 1926.
Státní oblastní archiv Třeboň (SOA), fond Policejního ředitelství Č. Budějovice, č. kartonu 798, č. rejstříku 193, Židovská tělocvičná jednota Makabi České Budějovice.

Periodicals

Národní střed. Roč. 1941.
Pražský list. Roč. 1941.
Selbstwehr. Roč. 1920–1938.
Židovské zprávy. Roč. 1920–1934.

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RELATIONSHIP BETWEEN 1RM BACK SQUAT TEST RESULTS AND EXPLOSIVE MOVEMENTS IN PROFESSIONAL BASKETBALL PLAYERS

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ABSTRACT

The objectives of this study were related to the research of the relations between the abilities of professional basketball players in the performance of one repetition maximum (1RM) back squat and explosive movements, such as 5, 10 and 20-metre running, and vertical jump; as well as the detection and comparison of these abilities between players who play on the outside and inside positions. The study involved 35 professional basketball players (22 outside and 13 inside) who were selected as candidates for the national team of Bulgaria. Independent variables of muscular strength were obtained by applying the 1RM back squat test (142.06 ± 29.31 kg), and were normalized with respect to the body mass (*1RM Squat/kg* (1.51 ± 0.25)) and by applying suitable allometric exponent (*1RM SquatAl* (6.86 ± 1.16)). Dependent variables were obtained using two tests: *20-metre run* (times registered at 5 and 10 metres) and *vertical jump* (used to calculate the variable *peak anaerobic power (PAPW)*). The results indicated that none of the variables of strength were significantly related to the speed performance, while moderate correlations occurred between the normalized strength variables (*1RM Squat/kg* and *1RM SquatAl*) and vertical jump ($r = 0.310$ and $r = 0.308$ / $p < 0.05$). The results obtained show greater correlation ($r = 0.660$ / $p < 0.01$) in the ability to deliver power when performing squat and mechanical work performed in vertical jumps. Outside and inside players were significantly different in three variables only: *peak anaerobic power, body height and body weight*.

Keywords: vertical jump; acceleration; peak anaerobic power; testing

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INTRODUCTION

Basketball is an intermittent and dynamic activity that consists of short but very intense activities, followed by longer or shorter periods of passive or active rest, during which

a basketball player recovers (Spencer et al., 2005; Taylor, 2004). It has complex requirements based on a combination of individual skills, team play, tactics and motivational aspects (Trninic & Dizdar, 2000). During the game, players perform a series of tasks typical for each player, which are based on a certain motor, technical and tactical skills; success in the realization of greater number of tasks, which players perform in the game, is achieved by quick actions on a relatively small space (Trninic et al., 2010a; Trninic et al., 2010b). Abdelkrim et al. (2007) registered 1050 ± 51 different actions of an individual player during a basketball game. These actions include different movements, such as running, dribbling, shuffling, and jumping, which are multidirectional, intense and short-lasting (Crisafulli et al., 2002). This is why basketball practice must contain sprint and strength training, agility exercises with emphasis on technique, and the development of perception and decision making (Young & Farrow, 2006). Therefore, coaches should emphasise short and intense activities (speed and agility) as well as testing of vertical jump, agility T-test, sprints over very short distances (5 or 10 m), etc. (Cronin et al., 2003).

Undoubtedly conditioning is very important for success in professional basketball. Basketball-conditioning coaches pay the most attention to the training and testing of specific speed (agility and acceleration) and strength/power (Simenz et al., 2005).

Lower body strength is particularly important in basketball. It is the foundation of a basketball player's explosive movements. Maximum strength is the base for the development of specific forms of power and the ability of players to quickly generate as much force as possible is very desirable in basketball. This requires optimal muscular strength of the lower extremities (Zatsiorsky, 1995).

In strength training for the lower body of basketball players, along with ballistic multijoint exercises, back squat exercises with variations are used (Hedrick, 1993; Simenz et al., 2005). It is well known that the back squat is a very useful exercise because it involves movement of several joints (ankle, knee and hip joints) and thereby engages a large number of muscle groups (Bachle et al., 2000; Chandler & Stone, 1992). In addition, the exercise has the necessary neuromuscular specificity and positive transfer to the basic sports activities (Garhammer, 1981; Zatsiorsky, 1995).

Except for the purpose of training maximum strength of the lower extremities, the back squat is often used as an effective exercise of specific warm-up and preparation for the execution of explosive movements, primarily jumps (*post-activation potentiation*). Therefore, the acute effects of back squat performance on explosive movements have been the subject of several studies (Stieg et al., 2011; Sotiropoulos, et al., 2010; Witmer et al., 2010).

In contrast, there are studies that have researched the relationship between the present or general skills in the performance of back squat and explosive movements. They showed strong correlation between maximal strength in half squats and sprint performance and jumping height (Carlock et al., 2004; Chelly et al., 2010; Chelly et al., 2009; McBride et al., 2009; Wisløff et al., 2004). In order to enhance jumping power output, maximum strength in the back squat exercise has to be improved and included as a dominant part of training programs (Stone et al., 2003). Since in these studies the athletes (they were not basketball players) were of different levels of sport mastery, or age, the obtained correlations are expected and understandable.

The (main) idea of this study was to investigate these capabilities in professional basketball players as a homogenous representative group (sample), as well as their interrelations, primarily related to importance of explosive movements in basketball.

It is assumed that the current capabilities of professional basketball players in back squat performance with a maximum load would have a positive influence on their explosive movements, which are very common and important in basketball.

Furthermore, it is well known that in basketball, primarily on the basis of morphological characteristics and then according to specific duties during the play, there are two main types of players: inside and outside players (Trninic et al., 2010a; Trninic et al., 2010b). There is a common idea in practice that these two types of players differ in general skills in the performance of back squat and explosive movements. Inside players are stronger and outside ones are more explosive. The intention of this study was to verify this notion with reliable representative sample of players.

The primary objective of this study was to examine the correlation between professional basketball players' abilities to perform back squats with a maximum weight and explosive movements, such as running at 5, 10 and 20 m, and on vertical jump. The secondary objective was related to the detection and comparison of these abilities between outside and inside basketball players. As far as we know, there has not been any study that researched these relationships on such a homogenous and representative group (sample) of professional basketball players.

MATERIAL AND METHODS

Participants

The study sample included 35 professional Bulgarian basketball players of the First Bulgarian Basketball League (average age 21.37 ± 2.91 years). Experts of the Bulgarian Basketball Federation choose them since they were the best national players and candidates for the national team. Two subgroups were formed according to their playing position: outside players (playing positions 1, 2 and 3 – N = 22), average age 20.90 ± 2.09 years, and inside players (playing positions 4 and 5 – N = 13), average age 22.15 years ± 3.91. We selected more outside players, because they are also more numerous in a game. Specifically, during a basketball game, there are three outside and two inside players among five players on the court, or among 12 players of basketball team there are usually 8(7) outside and 4(5) inside players. Thus, a similar relation of outside and inside players should also be formed in national selections. The subjects provided their written consent and participated voluntarily in the measurements that had been approved by the Ethical Committee of Faculty of Sport and Physical Education, University of Belgrade.

Measures and Procedures

Dependent variables. Two tests were applied: a 20-metre sprint run, and a vertical jump test. The *20-metre sprint run* was conducted on a marked track in a basketball hall, with photocells (*Micro Gate, Italy*) positioned at 5, 10 and 20 metres from the starting line and

at 1-metre height. The subjects started from a standing position with a foot sticking out at a distance of 70 cm from the first photocell and were assigned to run the distance of 20 metres as quickly as they could. In that way, three variables were acquired, expressed in seconds(s): *running time of 5 metres (Run5m), running time of 10 metres (Run10m) and running time of 20 metres (Run20m).*

The Reach Vertical jump test was applied according to the instructions given by Bloomfield et al. (1994). The player dips his fingers of the right hand in gym chalk, stands beside the wall and makes mark on the wall after reaching as high as possible without lifting the heels from the floor. This value is recorded, after which player jumps as high as possible without taking a step, marking the wall at the peak of the jump. The difference between this height and standing reach height (to the nearest 0.5 cm) is recorded as the variable *Vertical jump*. The best score out of three attempts is recorded. From this variable, a variable *peak anaerobic power* is calculated (*PAPw*) using the formula given by Sayers et al. (1999):

PAPw (Watts) = 60.7 × jump height (cm) + 45.3 × body mass (kg) – 2055

Independent Variables. They were obtained by applying the *back squat* test (variable *1RM Squat*). The testing protocol given by Bachle et al. (2000) was used. Lifting was successful if, in the lowest point of the squat, the thigh was parallel to the ground before lifting (determined visually) and if the load was lifted without assistance. An Olympic bar of 20 kg was used (*Panatta Sport, Italy*). The maximum lifted weight was normalized in two ways: in relation to kg of body mass (*1RM Squat/kg*) and using allometric formula ($S_n = Sm^{2/3}$; S_n – normalized force, S-force obtained in test, m-body mass) for obtaining the index of muscle strength developed by Jaric (2002), the variable *1RM SquatAl*. In addition, *body height* was measured with a stadiometer (*Seca 220, UK*) as well as *body mass* with portable scales (*Tanita BF683W, GER*).

Statistical Analysis

The data were first processed using basic descriptive statistics, with which the following were calculated: arithmetic mean (M), standard deviation (SD), minimum (Min) and maximum values (Max). Relationships between variables were calculated using correlation analysis (Pearson). The Regression analysis–Stepwise method was used for investigation of the independent variables' impact on the dependent variables. In examining the differences between the two groups of players, an independent sample *t-test* was used, and the effect size (Cohen) was calculated. Levels of significance were set at $p < 0.01$.

RESULTS

Descriptive parameters for outside and inside players and a comparison of these two groups, (t-test) are shown in Table 1. The differences between outside and inside players in terms of dependent and independent variables were not so obvious and were statistically significant only in the variables PAPw, body height and body mass. For these variables, the value of effect size was calculated. There are almost medium differences between groups in the variable PAPw ($r = 0.385$). On average, outside players achieved

better results in three acceleration variables: run 5, 10 and 20 metres, but inside players achieved better results in 1RM Squat (maximum lifted weight) and vertical jump.

Table 1. Descriptive statistics of all variables – outside and inside players; and results of t-test

Variable	Outside players (N = 22)			Inside players (N = 13)			t-test
	Mean ± SD	Max.	Min.	Mean ± SD	Max.	Min.	t
1RM Squat (kg)	136.18 ± 28.01	210.00	95.00	152.00 ± 29.85	210.00	108.00	–1.58
1RM Squat/kg	1.51 ± 0.29	2.32	1.00	1.50 ± 0.16	1.79	1.26	0.09
1RM SquatAl	6.77 ± 1.30	10.42	4.56	7.00 ± 0.91	8.58	5.54	–0.55
Run 5 m (s)	1.05 ± 0.05	1.17	0.96	1.07 ± 0.06	1.18	0.98	–1.18
Run 10 m (s)	1.79 ± 0.07	1.95	1.68	1.82 ± 0.09	2.00	1.69	–1.09
Run 20 m (s)	3.03 ± 0.11	3.20	2.81	3.10 ± 0.15	3.48	2.90	–1.67
Vertical jump (cm)	58.31 ± 6.21	70.00	45.90	59.00 ± 5.94	71.00	47.00	–0.32
PAPw (W)	5567.70 ± 499.53*	6647.00	4421.90	6072.00 ± 694.44*	7235.50	5118.60	–2.82

* Sig. ($p < 0.01$); ** Variables measured in time units have reverse character so, higher value means worse result

Table 2. Correlation coefficients between variables

Variables	Run 5 m	Run 10 m	Run 20 m	Vertical jump	PAPw
1RM Squat	0.110	0.247	0.243	0.267	0.660**
1RM Squat/kg	–0.103	–0.014	–0.047	0.310*	0.215
1RM SquatAl	–0.024	0.089	0.065	0.308*	0.403**

* Sig. ($p < 0.05$); ** Sig. ($p < 0.01$)

Table 2 shows a strong correlation between the variables 1RM Squat and PAPw, as well as between variables 1RM Squat and Body mass. Medium-high correlation coefficients were obtained between the variable 1RM Squat Alom and PAPw. There are no significant correlations between independent variables and variables of acceleration and vertical jump, except between the variable vertical jump and variables 1RM Squat/kg and 1RM SquatAl.

The stepwise method of regression analysis obtained a significant influence of the independent variables only on the dependent variable PAPw. Therefore, the results of a regression analysis are presented in Table 3, only for the dependent variable PAPw. In the first step, the variable 1RM Squat is extracted, and in the second variable 1RM SquatAl is.

Table 3. Results of regression analysis, Stepwise method: dependent variable – *PAPw*, predictors – *1RM Squat*, *1RM Squat/kg* and *1RM SquatAl*

Model Summary ANOVA				
Model	R	R^2	F	Sig.
1	0.69	0.47	29.32	0.00
2	0.93	0.87	109.53	0.00

Coefficients					
Model	B	Std.Error	Beta	t	Sig.
1 (Constant) First step	90.35	12.87		7.02	0.00
1RM Squat	0.48	0.09	0.67	5.42	0.00
2 (Constant) Sec. step	1385.27	7.92		17.30	0.00
1RM Squat	1.08	0.07	1.56	14.53	0.00
1RM SquatAl	–88.31	8.80	–1.07	–10.04	0.00

DISCUSSION

The subjects achieved very similar results of running at a distance of 5 metres and almost identical results at a distance of 20 metres in comparison to the results of other professional basketball players from the available studies (Staff, 2000). Furthermore, they are similar in terms of vertical jump (Ziv & Lidor, 2010), back squat (Hunter, 1993), as well as of body height and body mass (Staff, 2000). Therefore, these data have a suitable value and may be included in the database for the subsequent research in the population of professional basketball players.

The results of comparison (t-test) between the two groups of players (Inside and Outside players) were expected. Similar results can be found in the literature in some tests of strength or speed for basketball players at different positions (Bache et al., 2000; Staff, 2000). In contrast, these results disprove certain prejudices resulting from basketball practice that outside players are able to accelerate more quickly and that inside players are more powerful. They nominally differ in these abilities, i.e. the average results in the speed tests are better for outside players, while in tests of maximal strength the average results are better for inside players, but not statistically significantly. Statistically significant differences in body height and body mass were expected, as well as in the variable PAPw due to the significantly higher body mass of inside players. The higher value of peak anaerobic power that the inside players have shows their greater potential to perform mechanical work.

The results indicated that none of the variables of strength (1RM Squat, 1RM Squat/kg, 1RM SquatAl) significantly correlated to the speed performance of basketball players. It can be assumed that these strength variables explain the variance of execution of treated speeds in this sample to a very small extent. Similar findings were reported by Baker and Nance (1999) in which they found no significant relationship between a 3RM squat and the sprint performance at 10 m ($r = -0.06$) and at 40 m ($r = -0.19$) in professional rugby league players. A statistically significant lack of correlation ($r = 0.3$) between the squat (1RM) and the 40 m sprint performance was also reported by Wilson et al. (1996).

It can be assumed that certain specificities of squat performance and speed performance result in the obtained correlation. The specificity of the contraction regime in squat performance suggests that there is little similarity in the movements of acceleration/deceleration implicit in the movement of limbs in speed performance (Cronin & Hansen, 2005). Consequently, in terms of *speed specificity*, during the squat the speeds that are realized

are different from real sprint speeds, in which, as the distance and speed increase, fast SSC performance has a growing importance and contribution to the movement. A special feature is the number of involved joints and joint kinematics and dynamics during movement and during tests they are usually significantly different from the ones measured during sprint running. Since closed kinetic chains, i.e. movements that include multiple joints are used during the sprint realization, the legitimacy and the relation between the use of iso-inertial and/or isokinetic measurements and sprint performance can be questioned.

Given that the size of the realized force and the speed of muscle contraction according to the *F-v relation* are inverse, it follows that overdeveloped force (provided that it is not converted into explosive power by training) negatively affects the expression of running speed, especially in the phase of maximum running speed. Since fast performance of SSC is realized during running, for its realization an overdeveloped force extends the time of transition from eccentric to concentric muscle contraction (coupling time). In that way, a negative transfer is achieved and this extends the phase of foot contact with the ground during sprint. It is known that the duration of contact with the ground, frequency and the length of step are decisive factors in the realization of maximum running speed (Luhtanen & Komi, 1978; Mero & Komi, 1994). These allegations are based on our assumption that the subjects in the sample developed a high level of expression of maximum force, and that they did not *convert it into a specific (explosive and speed) power*, and therefore it has *no impact on the results of the run at 5, 10 and 20 m*. Specifically, the force developed by training represents a latent ability whose positive transfer in maximum running speed is only possible through the conversion of force into explosive and speed power.

Relatively moderate correlations between vertical jump and 1RM Squat, especially when the force obtained in the squat test is normalized as described above, suggest that, because of the similar patterns of movement during squats and jumps, there is a significant relationship between these measurements. The vertical jump is a typical test of explosive power ($E = F/t$). It can be influenced by increasing the force with the same performance speed (of muscle contraction) or by increasing the speed of the jump performance with the same level of force. Therefore, an explosive jump is that with the optimal ratio of developed force and possible speed of the muscle contraction performance. It is known that an increase in force reduces the possible speed of movement performance until the performance of maximum isometric force at which the speed of movement performance (muscle contraction) is zero, and the power is also equal to zero (Jaric, 1997). According to the results shown in Table 1 (subjects achieve even 210 kg in half squat), it can be assumed that the players have either developed the force that is greater than the optimal, or have not converted enough force to an explosive and speed power, so in this case there is no positive transfer of the achieved level of force on the expression of results in explosive power. It can be assumed that the average jump height (58.31 ± 6.21 cm, 70.00 cm = max, min = 45.90 cm) is not at the highest level, according to Ostojić et al. (2006) who state that the average vertical jump is higher than 70 cm, and other statements of Latin et al. (1994), according to Ostojić et al. (2006), that the average jump is 71.4 ± 10.4 cm. The assumption is that these players have developed a level of force, but on the basis of jumping ability (M = 58.57 ± 6.04), it is evident they do not have a pronounced ability to increase the rate of force development (RFD); therefore, a high level of force demonstration is reached relatively slowly, i.e., during a long time. If the force achieved by training by applying an appropriate method converts to explosive

power, then it has a more significant and positive impact on the vertical jump and running at 5 m and 10 m. In these activities when the inertia of the body is overcome, the transfer of force is greater, because during start relatively slower SSC performance is implemented and there is more time to generate force.

The resulting correlation indicates a relatively greater connection between the ability to produce force when performing squats (1RM Squat) and mechanical work performed in vertical jump (PAPW). The results of regression analysis (values of coefficient of determination R^2) show that maximal force affects on peak anaerobic power (Table 3). Variable 1RM Squat is separated in the first step of regression and that significantly influence on peak anaerobic power ($R^2 = 0.47$). Variable 1RM SquatAl is separated in the second step, so far synergic effect of these two variables are even more important determines the peak anaerobic power. Values of 1RM are revitalized with the introduction of variable 1RM SquatAl, what has contributed that the impact force to the peak anaerobic power increases by 40%. This can be explained by the fact that allometric parameter reconciles the heterogeneity of the sample in terms of the body dimensions that are typical in the basketball team. Since the mechanical work (A) depends on the realized force (F) at the distance (s), and realized power is directly proportional to the work performed ($P = A/t$), the power reached is a direct function of the realized force. Considering that there is an effect of force in a squat (1RM Squat) on the vertical jump, especially if it is normalized, then a high correlation between half squat (1RM Squat) and the power realized during vertical jumps is expected, and expressed as PAPW ($r = 0.660$; $p < 0.01$).

CONCLUSION

In conclusion, according to the presented results, basketball players achieved similar results in almost all variables as other professional basketball players from literature did. The acquired results support the assumption that they either developed force that is greater than optimal, or they did not sufficiently convert the developed force to explosive and speed power, and in this case there was no positive transfer of the achieved level of force on the expression of the results in speed performance.

It was shown that inside and outside players are not significantly different in back squat, sprint variables and vertical jumps. There were significant differences in in the variable of peak anaerobic power (PAPW) in favour of inside players. The higher value of peak anaerobic power that the inside players have shows their greater potential to perform mechanical work.

REFERENCES

Abdelkrim, B. N., Elfazaa, S., El Ati, J. (2007). Time-motion analysis and physiological data of elite under-19-year-old basketball players during competition. *Brit J Sport Med*, 41(2), 69–75.

Bachle, T. R., Earle, R. W., Wathen, D. (2000). *Resistance training*. *Essentials of strength training and conditioning*. Champaign, IL: Human Kinetics.

Baker, D., Nance, S. (1999). The relation between running speed and measures of strength and power in professional rugby league players. *J Strength Cond Res*, 13, 230–235.

Bloomfield, J., Ackland, T., Elliot, B. C. (1994). *Applied Anatomy and Biomechanics in Sport*. Melbourne: Blackwell Scientific Publications.

Carlock, J. M., Smith, S. L., Hartman, M. J., Morris, R. T., Ciroslan, D. A., Pierce, K. C., Newton, R. U., Harman, E. A., Sands, W. A., Stone, M. H. (2004). The relationship between vertical jump power estimates and weightlifting ability: a field-test approach. *J Strength Cond Res*, 18, 534–539.

Chandler, J. T., Stone, M. H. (1991). The squat exercise an athletic conditioning: a position statement and revise of the literature. *Strength Cond J*, 13(5), 51–60.

Chelly, M. S., Cherif, N., Amar, M. B., Hermassi, S., Fathloun, M., Bouhlel, E., Tabka, Z., Shephard, R. J. (2010). Relationships of peak leg power, 1 maximal repetition half back squat, and leg muscle volume to 5-m sprint performance of junior soccer players. *J Strength Cond Res*, 24(1), 266–271.

Chelly, M. S., Fathloun, M., Cherif, N., Amar, M. B., Tabka, Z., Van Praagh, E. (2009). Effects of a back squat training program on leg power, jump, and sprint performances in junior soccer players. *J Strength Cond Res*, 23(8), 2241–2249.

Crisafulli, A., Melis, F., Tocco, F., Laconi, P., Lai, C., Concu, A. (2002). External mechanical work versus oxidative energy consumption ratio during a basketball field test. *J Sport Med Phys Fit*, 42, 409–417.

Cronin, J. B., Hansen, K. T. (2005). Strength and power predictors of sports speed. *J Strength Cond Res*, 19(2), 349–357.

Cronin, J. B., McNair, P. J., Marshall, R. N. (2003). Lunge performance and its determinants. *J Sport Sci*, 21(1), 49–57.

Hedrick, A. (1993). Strength and power training for basketball. *National Strength and Conditioning Association Journal*, 15(4), 31–36.

Hunter, G. R., Hilyer, J., Forster, M. A. (1993). Changes in Fitness During 4 Years of Intercollegiate Basketball. *J Strength Cond Res*, 7(1), 26–29.

Jarić, S. (1997). *Biomechanics of human locomotion with sports biomechanics*. *The second revised edition*. Belgrade: Dosije.

Jarić, S. (2002). Muscle strength testing: use of normalisation for body size. *Sports Med*, 32, 615–631.

Luhtanen, P., Komi, P. V. (1978). *Mechanical factors influencing running speed*. In: E. Asmussen, K. Jorgensen (Eds.). Baltimore: University Park Press, 23–29.

McBride, J. M., Blow, D., Kirby, T. J., Haines, T. L., Dayne, A. M., Triplett, N. T. (2009). Relationship between maximal squat strength and five, ten, and forty yard sprint times. *J Strength Cond Res*, 23(6), 1633–1636.

Mero, A., Komi, P. V. (1994). EMG, Force, and Power Analysis of Sprint-Specific Strength Exercises. *J Appl Biomech*, 10(1), 1–13.

Ostojić, S. M., Mazić, S., Dikić, N. (2006). Profiling in basketball: physical and physiological characteristics of elite players. *J Strength Cond Res*, 20, 740–744.

Sayers, S. P., Harackiewicz, D. V., Harman, E. A., Frykman, P. N., Rosenstein, M. T. (1999). Cross-validation of three jump power equations. *Med Sci Sport Exer*, 31(4), 572–577.

Simenz, C. J., Dugan, C. A., Ebben, W. P. (2005). Strength and conditioning practices of national basketball association strength and conditioning coaches. *J Strength Cond Res*, 19(3), 495–504.

Sotiropoulos, K., Smilios, I., Christou, M., Barzouka, K., Spaias, A., Douda, D., Tokmakidis, S. P. (2010). Effects of warm-up on vertical jump performance and muscle electrical activity using half-squats at low and moderate intensity. *Journal of Sports Science and Medicine*, 9, 326–331.

Spencer, M., Bishop, D., Dawson, B., Goodman, C. (2005). Physiological and metabolic responses of repeated-sprint activities specific to field-based tem sports. *Sports Med*, 35(12), 1025–1044.

Stieg, J. L., Faulkinbury, J. K., Tran, T. T., Brown, L. E., Coburn, J. W., Judelson, D. A. (2011). Acute effects of depth jump volume on vertical jump performance in collegiate women soccer players. *Kinesiology*, 43(1), 25–30.

Stone, M. H., O'bryant, H. S., McCoy, L., Coglianese, R., Lehmkuhl, M., Schilling, B. (2003). Power and maximum strength relationships during performance of dynamic and static weighted jumps. *J Strength Cond Res*, 17(1), 140–147.

Taylor, J. (2004). A tactical metabolic training model for collegiat basketball. *Strength Cond J*, 26(5), 22–29.

Trninić, S., Dizdar, D. (2000). System of the performance evaluation criteria weighted per positions in the basketball game. *Collegium Antropol*, 24(1), 217–234.

Trninić, S., Karalejić, M., Jakovljević, S., Jelaska, I. (2010a). Structural analysis of knowledge based on principal attributes of the game of basketball. *Physical Culture*, 64(1), 5–25.

Trninić, S., Karalejić, M., Jakovljević, S., Jelaska, I. (2010b). Structural analysis of knowledge based on specific attributes of the game of basketball. *Physical Culture*, 64(2), 22–41.
Vanderburgh, P. M., Katch, F. I., Choenleber, J., Balabinis, C. P., Elliot, R. (1996). Multivariate allometric scaling of men's world indoor rowing champion performance. *Med Sci Sport Exer*, 28, 626–630.
Wilson, G. J., Murphy, A. J., Walshe, A. (1996). The specificity of strength training: The effect of posture. *J Appl Psychol*, 73, 346–352.
Wisløff, U., Castagna, C., Helgerud, J., Jones, R., Hoff, J. (2004). Strong correlation of maximal squat strength with sprint performance and vertical jump height in elite soccer players. *Brit J Sport Med*, 38(3), 285–288.
Witmer, C. A., Davis, S. E., Moir, G. L. (2010). The acute effects of back squats on vertical jump performance in men and women. *Journal of Sports Science and Medicine*, 9, 206–213.
Young, W., Farrow, D. (2006). A review of agility: practical applications for strength and condiditoning. *Strength Cond J*, 28(5), 24–29.
Zatsiorsky, M. V. (1995). *Science and practice of strength training*. Champaign, IL: Human Kinetics.
Ziv, G., Lidor, R. (2010). Vertical jump in female and male basketball players – A review of observational and experimental studies. *Journal of Science and Medicine in Sport*, 13, 332–339.

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GLUTEUS MEDIUS AND THIGH MUSCLES ELECTROMYOGRAPHY DURING LOAD CARRYING WALKING

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ABSTRACT

This study compares the electromyographic (EMG) peak amplitude changes of gluteus medius (Gmed), vastus medialis (VMO), vastus lateralis (VL) and biceps femoris (BF) during load carrying walking due to the increased load. The percentage of maximum isometric voluntary contractions (%MVIC) of both limbs and 3D kinematic of lower limbs were detected on eighteen resistance-trained men (mean age ± *SD*, 31 ± 3.4 years) while carrying loads of 25, 50 and 75% of their body mass (BM). The repeated measurement ANOVA was used to evaluate the differences in muscles %MVIC and 3D kinematics at all load conditions. Significant differences were found for Gmed %MVIC ($F_{3,99} = 19.8$, $p < 0.001$). Gmed activity was significantly different between load carrying walking with 25% of BM (mean ± SD, 20 ± 12%MVIC), 50% of BM (32 ± 17%MVIC) and 75% of BM (45 ± 26%MVIC) condition. Differences were found in hip flexion at Gmed EMG peak ($F_{3,96} = 14$, $p < 0.001$), between 25% of BM (18 ± 11°) and 50% of BM (29 ± 7°). No significant differences were found for thigh muscles, when thigh muscle activity did not exceed 30%MVIC even at 75% of BM condition. Load carrying walking is an exercise which activates Gmed more than thigh muscles. This exercise increases the Gmed activity along with increased loads and it should be regarded as a complex Gmed strengthening exercise. This exercise is recommended for strengthening the Gmed with low activation of VL and VMO.

Keywords: Electromyography; MVIC; Farmer's Walk; strength training; vastus lateralis; vastus medialis

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INTRODUCTION

The performance and safety during strength exercises is in close relationship with individual muscle activity. Malfunction of the gluteus medius (Gmed) has been associated with low back pain (Nadler et al., 2001; Bolgla & Uhl, 2005), hip instability (O'Sullivan et al., 2010;

Noh et al., 2012; Pandy et al., 2010) and other pathologies (Powers, 2003; Kim et al., 2012). Another important issue of muscle involvement is the activation of vastus medialis obligus (VMO) and vastus lateralis (VL) to knee joint stability (Irish et al., 2010), where VMO weakness or activity delay toward VL action is associated with internal knee rotation and anterior cruciate ligament injury (Bennell et al., 2010; Crossley et al., 2001; Van Tiggelen et al., 2009; Cowan et al., 2001). Strong or early accelerated VL activity is associated as a compensation of VMO weakness. This muscle imbalance can be expressed as a VMO/VL EMG ratio (Irish et al., 2010). VMO, VL and Gmed muscles participate in the complex of medio-lateral stabilization at one limb stance (Baffa et al., 2012; Felício et al., 2011; Crossley et al., 2001). If the hip lacks stability during single limb activities, the femur may adduct and internally rotate, which changes the muscle involvement and kinematics in knee joint area (Krause et al., 2009; Reiman et al., 2009; Crossley et al., 2001). Thus the Gmed weakness influences the movements and VMO/VL action in the knee joint, where both muscle group functions are related to each other.

For strength training, it would be optimal to find an exercise which favours the activation of VMO and Gmed during complex movement. Complex exercises could bring a stimulating effect for muscle involvement in more than just one joint and improves inter-muscular coordination. Even more appropriate, would be an exercise which targets Gmed and also stimulates the balance in between VMO and VL. VMO activity during exercises has been evaluated in many studies (Herrington & Pearson, 2006; Cerny, 1995; Stastny et al., 2014), where exercises like lunge or squat with thigh adduction favours the VMO activity (Felício et al., 2011; Irish et al., 2010). On the other hand there are studies, in which this effect on similar exercises was not proven (Baffa et al., 2012). Previous research focused on Gmed (Bolgla & Uhl, 2005; Distefano et al., 2009) determined the most appropriate exercises to strengthen the gluteal muscles according to their role. Most of the previous studies were performed with exercises used in physiotherapy, whose effect summarises the Boren (Boren et al., 2011) and Reiman (Reiman et al., 2012) study. The highest electromyography (EMG) values were during side plank abduction, single limb squat, hip clam, progression and front plank with hip extension, which are exercises usually performed without an external load.

Typical physiotherapeutic exercises are rather isolated and weight bearing, than complex with external loads, where complex exercises are considered to be more effective for strength training in atheletes and the general population. Most studies (Reiman et al., 2012; Herrington & Pearson, 2006; Selkowitz et al., 2013; Boren et al., 2011) have evaluated the exercise in weight bearing conditions, but the issue of muscle action could vary due to the exercise intensity (Siff, 2003; Stastny et al., 2014). For strength training it is important to choose the exercise which has the expected muscle involvement in weight bearing conditions as well as in external load conditions.

A movement with a well identified muscle activation pattern in a weight bearing condition is walking (Ivanenko et al., 2004; Winter et al., 1990; Pandy et al., 2010), where the walking pattern can be used as a complex exercise in strength training. One kind of this application is a load carrying walk called the “Farmer’s Walk”, which is a commonly performed strongman exercise used in a general strongman training session (Winwood et al., 2011). Load carrying walking is also used as condition test for ageing men for its movement simplicity (Holviala et al., 2010). Farmer’s Walk is an exercise which includes lateral hip and knee stability, which is related to the action of Gmed, VMO, VL and BF.

PURPOSE

Complex exercises such as squats, lunges, Farmer's Walk or step ups can be performed with individual techniques variation, where their evaluation needs the exact description of each exercise variety. This exercise variability requires a kinematic evaluation of performed movement, because there is the possibility of muscle involvement changes due to kinematic changes. The aim of this study was to evaluate the kinematic variables and muscle activity caused by increased loads during the Farmer's Walk, to decide if this exercise leads to increasing the VMO or Gmed action along with increased load. The assumption before this experiment was, that increasing the carried load during the Farmer's Walk would activate Gmed and VMO more than VL and BF.

METHODS

Participants

The research group consisted of 18 symptom free individuals (mean ± SD, age 31 ± 3.4 years, body mass 88 ± 8 kg, squat performance 120 ± 20 kg) actually performing the strength training program at the minimal amount of three lower extremity training sessions per week. All participants had at least 5 years of experience with the strength training. Participants were informed about the testing protocol and all aspects of the study when they signed the contract with the study. The testing protocol was approved by the local Committee of Ethics in accordance with the ethical standards of the Helsinki declaration of 1983.

Procedure

The warm up procedure included 5 minutes of cycling and sets of 25 squats in 5 different foot positions following the EMG taping and maximal isometric performance. After isomeric tests, the participants were taped with the 3D markers to performed five trials of 8 m walking Between trials at each loading condition were rest intervals from 30 to 60 s and 2–3 min between loading condition. Short rest interval between trials was used because no loads did reach individual repetition maximum for 8 m, but sufficient rest interval was used between loading conditions (the sets) according to American Society of Exercise Physiology (Brown & Weir, 2001). Participants were instructed to walk carrying dumbbells with shoulder retraction, but with no instruction for lower limbs (preferring natural performance).

Surface EMG activity of Gmed, VMO, VL and BF was measured bilaterally while participants performed four load conditions of walking: walking with just their own body mass (BM), load-carrying walking with 25%, 50% and 75% of BM (25BM, 50BM, 75BM). The subjects carried pairs of dumbbells with the total of prescribed weight on 8 m detection walkway. The dumbbell hand was taped with sticky rubber to avoid slipping. Surface EMG was measured along with 3D kinematics of walking to detect the knee joint and hip joint angles. EMG data was normalized to each participant's peak task maximal isometric voluntary contraction (MVIC), where MVIC was determined by standard positions on

dynamometer IsoMed. This study was done in cross sectional design, where loading conditions were independent variables and muscle activity with kinematics dependent variables.

EMG

Raw EMG signals of all muscles were collected with the Noraxon Myosystem 1400A device (Noraxon; Scottsdale). The signal was recorded by eight leads with 1000 Hz frequency. Two bipolar surface electrodes (adhesive disposable electrode – Kendall, Masfield, MA, USA) were placed with a 10 mm inter-electrode distance. Input impedance was greater than 10 MΩ at 100 Hz. The raw signal was transferred using an analogue signal connection to the 3D system (Vicon data log via MX box). The raw signal was simultaneously operated by the program MyoResearch XP Master Version 1.03.05.

EMG data was band-pass filtered (50–500 Hz), and smoothed using a root mean square followed by a window frame envelope with time constant 200/25 ms. The EMG signal was normalized to the maximum EMG value from isokinetic tests to %MVIC. The maximum amplitude (peak) was chosen to describe the maximal level of muscle activation, where the peak was recognized from 25 ms using the sliding mean method Fig. 2.

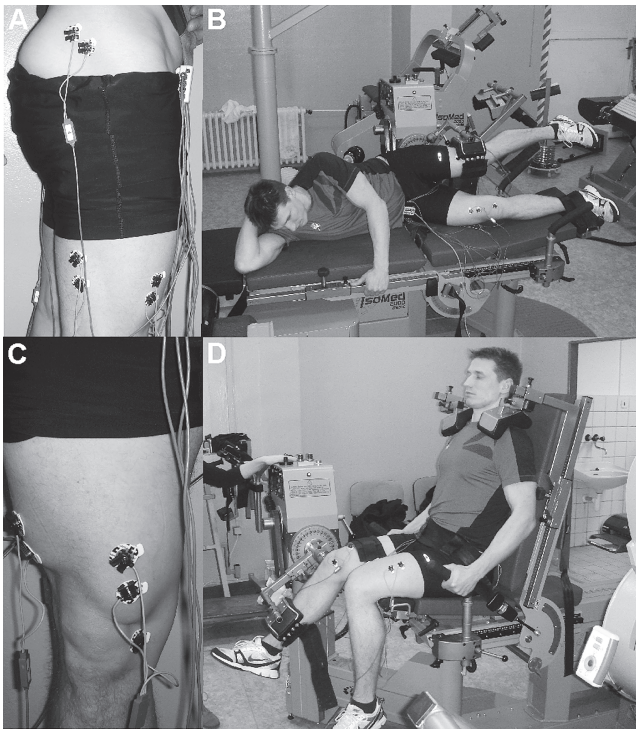

Figure 1. Detail of EMG electrodes placement and body position during maximum voluntary isometric contraction (MVIC). A) Gluteus medius (Gmed), biceps femoral (BF) and vastus lateralis (VL) EMG placement. C) Vastus medialis obligus (VMO) EMG placement. B) A body position during Gmed MVIC. D) A body position during BF, VMO and VL MVIC.

The electrodes for VMO were placed over the distal third of the muscle belly and were oriented 55° to the vertical (Fig. 1). The electrode for VL was placed over the muscle belly in distal third and it was oriented 15° to vertical (Gilleard et al., 1998). Gmed was located by palpating the iliac crest and placing electrodes parallel to the muscle fibres in 33% of the distance between the iliac crest and greater trochanter (Bolgla & Uhl, 2005; Bolgla & Uhl, 2007), which is similar to those used by O'Sullivan (O'Sullivan et al., 2010) for Gmed posterior part (Fig. 1). The electrodes for biceps femoral were placed over the distal third of long head muscle belly Fig. 1. The ground electrode was placed over the tibia bone.

Maximal isometric voluntary contraction measurement

The normalized EMG used "angle specific MVIC" method (Isometric-spec MVIC) (Burden, 2010). Where the subjects performed 5 s isometric contraction two times on dynamometer IsoMed 2000 (D & R Ferstl GmbH, Hemau, Germany). VMO, VL and BF MVIC were performed in a sitting position at 75° of knee flexion. The backrest of dynamometer seat was set to an angle of 75°, the angle in the hip joint was 100°. Participants were fixed by belts in the pelvic and thigh region on tested lower limbs. Adjustable straps and pads were placed at the shoulders and participants held hand grips along the seats Fig. 1. The mechanical axis of the dynamometer was aligned with the knee's axis of rotation utilizing the lateral femoral epicondyle as a bony reference. The distal shin pad of the dynamometer lever arm was attached 2 cm proximal to the medial malleolus at a position of 90° knee flexion by using a strap.

Gmed reference values for MVIC was done two times in standard muscle testing positions for gluteus medius with the measured lower extremity in 15° of hip abduction Fig. 1. The tested leg was fixed in dynamometer by straps and dynamometer kept the testing position of the leg. Before executing the maximal isometric contraction, a full range of motion was performed on the dynamometer. The axis of the dynamometer was aligned with the greater trochanter on the femur, the arm of the dynamometer lever was fixed to the lateral thigh tested limb, 1 cm above the patella.

Kinematics

Kinematic data was recorded at 100 Hz using a six-camera Vicon MX infrared motion analysis system (Oxford Metrics, Oxford, UK). Cameras were spaced around the walking track with two force plates (Kistler Instrumente, Winterthur, Switzerland) in the middle. Force plates were connected to Vicon software via MX box. Participants' pelvises and both legs were fitted with reflective markers (14 mm diameter) secured to anatomical locations by an experienced physiotherapist. Markers were attached on the subject to the skin overlying the following landmarks: anterior superior iliac spine, posterior superior iliac spine, lateral thigh, lateral femoral epicondyles, lateral tibia, lateral malleolus, heels, second metatarsal head.

The gait cycle was computed from heel to heel contact of each lower limb. Heel strike was assessed on the force plate where the vertical force achieved 20 N. This process allows the exact determination of the walking pattern for every individual. From each

attempt, for analyses, one gait cycle of right and left leg were chosen with detected data from EMG, 3D analyses and force plates. For each measured condition 5 fully detected execution of walking patterns were performed for statistical analyses.

Data acquisition

Kinematic and EMG data was collected simultaneously by Vicon Neux software, in the case where the data was corrupted, it was discarded from the data collection. EMG was also discounted if the amplitude did not show periodicity during the following steps. EMG peak amplitude was expressed as %MVIC for Gmed, VMO, VL and BF ($Gmed_{\%MVIC}$, $VMO_{\%MVIC}$, $VL_{\%MVIC}$, $BF_{\%MVIC}$). Kinematic data was normalized for the gait (step) cycle as in Winter study (Winter et al., 1990) separately for both legs and was expressed where peak value occur during percentage of gait cycle or joint position at EMG peak (Fig. 2). Expressed values were: gait cycle at Gmed peak ($Gmed_{GC}$), gait cycle at VMO peak (VMO_{GC}), gait cycle at VL peak (VL_{GC}), gait cycle at BF peak (BF_{GC}), knee flexion at peak value of VMO, VL or BF (VMO_{flx}, VL_{flx}, BF_{flx}) and hip flexion at Gmed peak value ($Gmed_{flx}$).

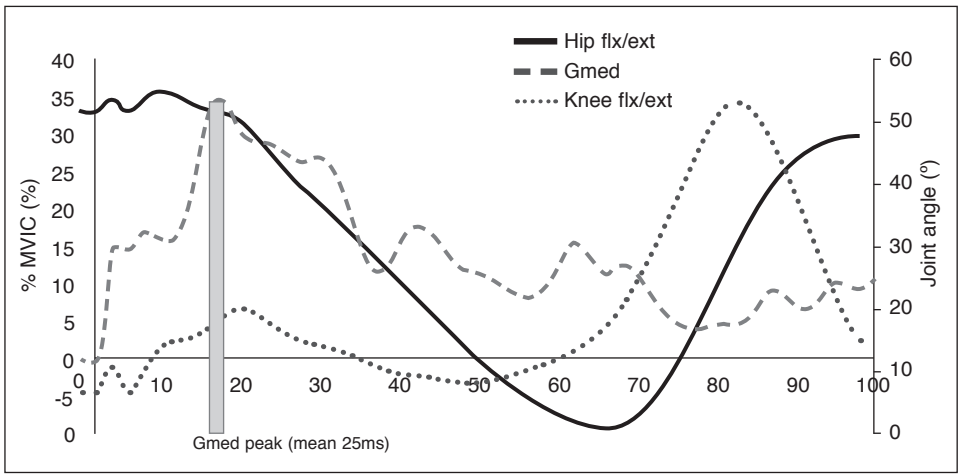

Figure 2. EMG peak value for Gmed and related kinematic data. Gluteus medius (Gmed), maximum voluntary isometric contraction (MVIC), flexion (flx), extension (ext). Gmed peak was counted from 25 ms sliding mean.

Statistical Analyses

The reliability across 3 trials of each individual loading condition was counted by an individual single case intraclass correlation coefficient (ICCs) on confidence interval 0.95 to confirm if EMG measurement is stable within a subject (Portney & Watkins, 1993). A repeated-measure analysis of variance (ANOVA) was used to compare if selected parameters such as $Gmed_{\%MVIC}$, $VMO_{\%MVIC}$, $VL_{\%MVIC}$, $BF_{\%MVIC}$ showed significant differences in measured loading conditions. Tukey post hock test was used to find a setting

of significant differences. STATISTICA version 12 (StatSoft, Inc., Tulsa, OK, USA) software was used for statistical analysis. Statistical significance was set at $p < 0.05$.

RESULTS

The single measured reliability analysis expressed as a ICCs ranged from 0.63 to 0.86 for $Gmed_{\%MVIC}$, which is considered to be between moderate and high level of reliability (Chandler & Brown, 2008; Chinn & Burney, 1987). Standard error of measurement (SEM) for $Gmed_{\%MVIC}$ slightly increased from 1.44 to 4.80, which means that individual differences were increased along with the increased load (Tab. 1). The ICCs for $Gmed_{GC}$, and $Gmed_{flx}$ ranged from 0.40 to 0.90.

Table 1. Test reliability of observed parameters at confidence interval 95%

		Gmed		VM		VL		BF	
		ICCs	SEM	ICCs	SEM	ICCs	SEM	ICCs	SEM
%MVIC	BM	0.86	1.44	0.83	4.77	0.94	3.36	0.70	0.91
	25BM	0.63	2.23	0.89	5.17	0.67	2.33	0.40	0.73
	50BM	0.72	3.02	0.88	5.37	0.73	3.99	0.64	0.87
	75BM	0.84	4.81	0.48	3.13	0.71	1.90	0.81	0.94
%GC	BM	0.90	2.74	0.50	3.78	0.64	2.54	0.58	0.85
	25BM	0.84	2.77	0.44	3.58	0.68	2.42	0.57	0.84
	50BM	0.41	1.58	0.39	2.66	0.75	3.25	0.31	0.64
	75BM	0.64	1.20	0.74	3.11	0.70	1.74	0.59	0.85
Hip flx* Knee flx**	BM	0.78	1.38	0.58	1.49	0.68	1.54	0.25	0.57
	25BM	0.40	1.97	0.48	1.59	0.42	1.31	0.53	0.81
	50BM	0.44	1.25	0.36	1.81	0.37	1.34	0.58	0.85
	75BM	0.66	1.53	0.58	0.96	0.48	1.52	0.63	0.87

Legend: Gmed = gluteus medius; VMO = vastus medialis obliqus; VL = vastus lateralis; BF = biceps femoris; ICCi = individual intraclass correlation coefficient; ICCm = mean intraclass correlation coefficient; SEM = standard error of measurement; BM = body mass; %MVIC = percentage of maximal voluntary isometric contraction; %GC = percentage of gait cycle; flx = flexion; * hip flexion value in Gmed case; ** knee flexion value in VMO, VL, BF case; LC = loading condition

The ICCs for VMO_{flx}, VL_{flx} and BF_{flx} showed low reliability in cases of BF_{flx} (ICCs = 0.36 and VL_{flx} (ICCs = 0.37) at 50BM condition, then for BF_{GC} (ICCs = 0.39) and VM_{GC} (ICCs = 0.31) at the load condition of 50BM, which means that kinematic data at EMG peak were not stable in these cases (Tab. 1). The lowest ICCs was found in VM_{GC} (ICCs = 0.25). The reliability of EMG data was in general more stable than the kinematic data.

Table 2. Basic characteristic for all parameters and loading condition

	Gmed (Mean ± SD)			VMO (Mean ± SD)			VL (Mean ± SD)			BF (Mean ± SD)		
	%MVIC (%)	Flx (°)	%GC (%)	%MVIC (%)	Flx (°)	%GC (%)	%MVIC (%)	Flx (°)	%GC (%)	%MVIC (%)	Flx (°)	%GC (%)
BM	15 ± 8	19 ± 8	23 ± 15	16 ± 16	14 ± 8	23 ± 15	17 ± 18	15 ± 8	25 ± 14	24 ± 26	13 ± 8	40 ± 21
25BM	19 ± 12*	18 ± 11*	14 ± 15	18 ± 10	18 ± 8	29 ± 14	21 ± 13	16 ± 7	21 ± 13	30 ± 28	17 ± 9	44 ± 20
50BM	32 ± 7*	29 ± 7*	11 ± 9	17 ± 10	15 ± 8	21 ± 14	23 ± 22	16 ± 7	23 ± 18	29 ± 29	16 ± 10	39 ± 15
75BM	45 ± 25*	27 ± 8	12 ± 6	17 ± 8	14 ± 10	21 ± 13	21 ± 10	12 ± 8	17 ± 9	30 ± 17	11 ± 5	34 ± 16

Legend: %MVIC = percentage of maximal voluntary isometric contraction; %GC = percentage of gait cycle; flx = flexion; Gmed = gluteus medius; VMO = vastus medialis obliqus; VL = vastus lateralis; BF = biceps femoris; BM = body mass; SD = standard deviation; n = 36; * significant difference for dependent variable

The EMG variability of parameters was high at BM loading condition for $VM_{\%MVIC}$ (mean ± SD, 16 ± 16), $VL_{\%MVIC}$ (17 ± 18) and $BF_{\%MVIC}$ (24 ± 26) (Tab. 2), which was not observed in $Gmed_{\%MVIC}$ (15 ± 8) at unloaded condition. High variability was also found in $BF_{\%MVIC}$ at 25BM (30 ± 28) and 50BM (29 ± 29) see Tab. 2.

Significant differences were found between $Gmed_{\%MVIC}$ ($F_{3,99} = 20$, $p < 0.001$) Fig. 3 and Tab. 3. Gmed activity was significantly greater in load carrying walking with 25BM (mean ± SD, 20 ± 12 %MVIC), 50BM (32 ± 17 %MVIC) and 75BM (45 ± 26 %MVIC) condition Fig. 3. The BM condition (15 ± 8 %MVIC) differs from 25BM condition, but without statistical significance Fig. 3.

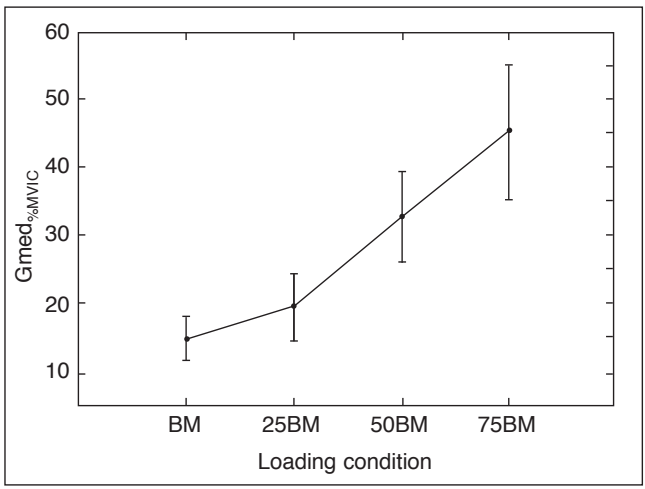

Figure 3. Repeated measures ANOVA results for $Gmed_{\%MVIC}$. Peak Gmed value in MVIC ($Gmed_{\%MVIC}$), percentage of maximal voluntary isometric contraction (%MVIC). Body mass condition (BM), 25% body mass condition (25BM), 50% body mass condition (50BM), 75% body mass condition (75BM). Current effect: $F_{3,99} = 20$, $p < 0001$, 0.95 confidence interval

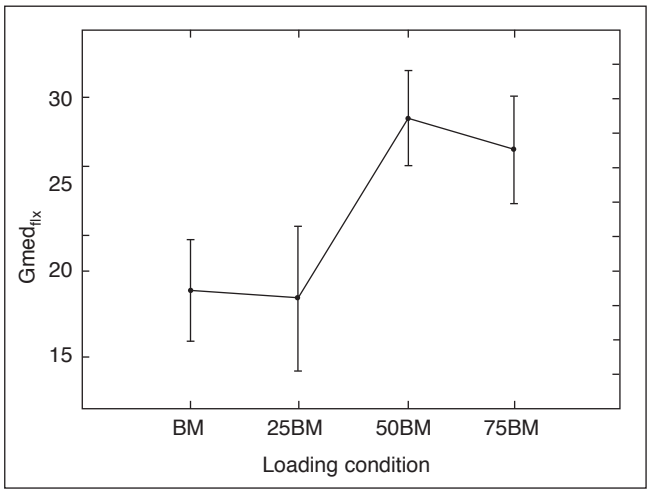

Figure 4. Repeated measures ANOVA result for $Gmed_{flx}$. Hip flexion at Gmed EMG peak value ($Gmed_{flx}$). Body mass condition (BM), 25% body mass condition (25BM), 50% body mass condition (50BM), 75% body mass condition (75BM). Current effect: $F_{3,96} = 14$, $p < 0001$, 0.95 confidence interval

Significant differences were found in $Gmed_{flx}$ ($F_{3,96} = 14$, $p < 0.001$), where post hoc tests show differences between 25BM (mean ± SD, 18 ± 11°) and 50BM (mean ± SD, 29 ± 7°) Fig. 4 and Tab. 3. No significant differences were found for thigh muscles, when thigh muscle activity did not exceed 30% MVIC even at 75BM condition.

Table 3. Repeated measures ANOVA results for observed parameters*

	F	P	HSD	Power α
$Gmed_{\%MVIC}$	19.83	0.0001	11.96	0.91
$BF_{\%MVIC}$	0.55	0.6503	13.87	0.15
$VM_{\%MVIC}$	0.23	0.8745	6.80	0.09
$VL_{\%MVIC}$	0.94	0.425	9.30	0.24
$Gmed_{GC}$	5.76	0.0013	8.50	0.94
BF_{GC}	1.19	0.3187	13.23	0.30
VMO_{GC}	3.20	0.0251	8.30	0.73
VL_{GC}	2.76	0.05	8.84	0.64
$Gmed_{flx}$	14.00	0.0001	5.66	0.87
BF_{flx}	3.54	0.0181	5.45	0.76
VM_{flx}	3.96	0.0370	5.70	0.68
VL_{flx}	2.43	0.07	6.10	0.58

Legend: %MVIC = percentage of maximal voluntary isometric contraction; GC = gait cycle; flx = flexion; F = F value; Gmed = gluteus medius; VMO = vastus medialis obliqus; VL = vastus lateralis; BF = biceps femoris; HSD = honestly significant difference (Tukey)

DISCUSSION

Load carrying walking was found to be an exercise activating the Gmed, where the carried load is increased. This exercise targets the Gmed more than thigh muscles, because thigh muscles do not significantly change the level of activity along with increased load. The potential benefit of load carrying walking, is in strengthening the gluteal muscles, but with marginal effect on VMO strengthening, at least in trained individuals. Gmed increased its activity due to the increased load, but also due to the hip flexion where Gmed peak was observed. Gmed peak activity was reached at a greater degree of hip flexion at 50BM and 75BM (28°, 29°) than BM and 50BM (18°, 19°). This finding is in agreement with previous work (O'Sullivan et al., 2010), where hip flexion/extension corresponds to a higher level of Gmed posterior work.

Load carrying walking did not show as a high level of activation (above 60% MVIC) in weight bearing condition as an exercise such as side lying hip abduction (Distefano et al., 2009), single limb squat (Distefano et al., 2009) or side bridge to neutral spine position (Ekstrom et al., 2007) where Gmed activity was even lower than thigh muscle activity. In the 75BM condition the Gmed activity increased up to 45% MVIC which is comparable activation to the transverse lunge (Distefano et al., 2009), wall squat (Ayotte, 2007), lateral step up (Ekstrom et al., 2007) or unilateral mini squat (Ayotte, 2007) in weigh bearing conditions.

In general the 21–40% MVIC is considered to be a moderate level of activation (Reiman et al., 2012), which was reached already in the 25BM condition. The 40–60% MVIC is considered to be a high level of activation (Reiman et al., 2012), this level was reached at the 75BM condition. Above 40% MVIC is also a minimal activity level needed for strength gain for the Gmed (Ayotte, 2007; Reiman et al., 2012). Although the muscle activation varies with each individual's training level, if this amount is achieved in experienced individuals, there is a presumption of even higher activation in untrained individuals. Beyond that, the external load can be add even more, until the exercise technique is disrupted.

In the case of increasing the carried load to the maximum, it would be appropriate to check if the Gmed activity is not exceeded by tensor fascia lata activity as it was measured in the Clam exercise (McBeth et al., 2012). This aspect of the exercise was not held in this study because of the focus on thigh muscles, but further assessment that load carrying walking is a primary target for Gmed more than tensor fascia lata, as in hip abduction (McBeth et al., 2012), squats or sidesteps (Selkowitz et al., 2013), is needed.

Load carrying walking is a complex exercise, which is used in daily activity where this movement pattern can influence the stability of walking itself. This statement should be used when load carrying walking is applied in the common population. Since this movement is used as the Farmer's Walk event during strongman competitions, and strongman training (Winwood et al., 2011), these results suggest that the Farmer's Walk performance can be improved by strengthening the gluteal muscles rather than the thigh muscles (beyond the grip strength). Application of load carrying walking as a general condition test (Holviala et al., 2010) appears to be reasonable, because the Gmed action influences complex body coordination such as hip to knee stability and low back pathologies. So the relevance of this test is as a complex movement provided by important primal mover and stabilizer.

Kinematics during the step cycle show a similar course of Gmed during all load conditions (Fig. 3), which was the same as in studies focused on the walking pattern itself (Winter et al., 1990; Arendt-Nielsen & Sinkjær, 1991; Pandy & Andriacchi, 2010). A similar course of EMG activity was found compared to previous studies (Winter, 1991; Bird et al., 2003; Ivanenko et al., 2004), where Gmed peak was observed during the landing phase of the step cycle. The timing of Gmed peak was observed during the landing phase of the step cycle. The timing of Gmed peak activation in the gait cycle was slightly accelerated, but without any statistical significance.

A standard testing protocol was used to determine the Gmed MVIC, where body position was similar, as in the previous study (Widler et al., 2009). The difference was in using a standardized dynamometer in which the tested leg is connected to the resistant level by straps, which bring a position of comfort as is recommended (Kramer et al., 1991). The participant referred a high comfort level in dynamometer especially when the preparation movement was performed by testing equipment. This testing comfort could increase the detected Gmed peak value, which could decrease the detected %MVIC.

The limits of this study are in the EMG peak amplitude usage, because there can be qualitative differences to the mean EMG value. Peak EMG value was chosen because the peak task could be a better reference to the strength maximum and also for the ability of the peak task to compare the timing of peak activation. This would be more complicated by using the mean task EMG. Another limit of this study is the EMG response for selected load, which can vary between the individuals due to the genetics profile (Petr et al., 2014) or type of exercise (Čoh & Žvan, 2011).

Result of this study showed that the amount of carried weight changed the relative muscle activity in primal movers, where this change can modified the strengthening effect of exercise. This assessment should be done for every weight bearing exercise which showed to involve muscles such as VMO, Gmed, abdominals and others.

CONCLUSION

Load carrying walking (Farmer's Walk) is an exercise which activates Gmed more than thigh muscles. This exercise increased the Gmed activity along with increased load and it should be regarded as a complex Gmed strengthening exercise. This exercise is recommended for strengthening the gluteal muscles with relatively low activation of VL and VMO. Amount of carried weight changes the relative muscle activity in primal movers, which can modify the strengthening effect of the exercise. Therefore, the recommendations for individual muscles strengthening should include both the selection of exercise and its intensity expressed in amount of relative load.

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REFERENCES

Arendt-Nielsen, L., Sinkjær, T. (1991). Quantification of human dynamic muscle fatigue by electromyography and kinematic profiles. *Journal of Electromyography and Kinesiology*, 1, 1–8.

Ayotte, N. W. (2007). Electromyographical analysis of selected lower extremity muscles during 5 unilateral weight-bearing exercises. *The Journal of orthopaedic and sports physical therapy*, 37, 48–55.

Baffa, A. P., Felicio, L. R., Saad, M. C., Nogueira-Barbosa, M. H., Santos, A. C., Bevilaqua-Grossi, D. (2012). Quantitative MRI of Vastus Medialis, Vastus Lateralis and Gluteus Medius Muscle Workload after Squat Exercise: Comparison Between Squatting with Hip Adduction and Hip Abduction. *Journal of Human Kinetics*, 33, 5–14.

Bennell, K., Duncan, M., Cowan, S., McConnell, J., Hodges, P., Crossley, K. (2010). Effects of vastus medialis oblique retraining versus general quadriceps strengthening on vasti onset. *Med Sci Sports Exerc*, 42, 856–864.

Bird, A. R., Bendrups, A. P., Payne, C. B. (2003). The effect of foot wedging on electromyographic activity in the erector spinae and gluteus medius muscles during walking. *Gait & Posture*, 18, 81–91.

Bolgla, L. A., Uhl, T. L. (2005). Electromyographic analysis of hip rehabilitation exercises in a group of healthy subjects. *J Orthop Sports Phys Ther*, 35, 487–494.

Bolgla, L. A., Uhl, T. L. (2007). Reliability of electromyographic normalization methods for evaluating the hip musculature. *J Electromyogr Kinesiol*, 17, 102–111.

Boren, K., Conrey, C., Le Coguic, J., Paprocki, L., Voight, M., Robinson, T. K. (2011). Electromyographic analysis of gluteus medius and gluteus maximus during rehabilitation exercises. *Int J Sports Phys Ther*, 6, 206–223.

Brown, L. E., Weir, J. (2001). ASEP procedures recommendation I: Accurate assessment of muscular strength and power. *J Exerc Physiol – Online*, 1–21.

Burden, A. (2010). How should we normalize electromyograms obtained from healthy participants? What we have learned from over 25 years of research. *Journal of Electromyography and Kinesiology*, 20, 1023–1035.

Cerny, K. (1995). Vastus Medialis Oblique/Vastus Lateralis Muscle Activity Ratios for Selected Exercises in Persons With and Without Patellofemoral Pain Syndrome. *Physical Therapy*, 75, 672–683.

Cowan, S. M., Bennell, K. L., Hodges, P. W., Crossley, K. M., McConnell, J. (2001). Delayed onset of electromyographic activity of vastus medialis obliquus relative to vastus lateralis in subjects with patellofemoral pain syndrome. *Archives of Physical Medicine and Rehabilitation*, 82, 183–189.

Crossley, K., Bennell, K., Green, S., McConnell, J. (2001). A Systematic Review of Physical Interventions for Patellofemoral Pain Syndrome. *Clinical Journal of Sport Medicine*, 11, 103–110.

Čoh, M., Žvan, M. (2011). Biodynamic diagnostics of the Explosive Power of the Lower Extremities: A Case Study. *AUC Kinanthropologica*, 47(1), 16–25.

Distefano, L. J., Blackburn, J. T., Marshall, S. W., Padua, D. A. (2009). Gluteal muscle activation during common therapeutic exercises. *J Orthop Sports Phys Ther*, 39, 532–540.

Ekstrom, R., Donatelli, R., Carp, K. (2007). Electromyographic analysis of core trunk, hip, and thigh muscles during 9 rehabilitation exercises. *Journal of Orthopaedic and Sports Physical Therapy*, 37, 754–762.

Felício, L. R., Dias, L. A., Silva, A. P. M. C., Oliveira, A. S., Bevilaqua-Grossi, D. (2011). Muscular activity of patella and hip stabilizers of healthy subjects during squat exercises. *Brazilian Journal of Physical Therapy*, 15, 206–211.

Gilleard, W., McConnell, J., Parsons, D. (1998). The Effect of Patellar Taping on the Onset of Vastus Medialis Obliquus and Vastus Lateralis Muscle Activity in Persons With Patellofemoral Pain. *Physical Therapy*, 78, 25–32.

Herrington, L., Pearson, S. (2006). Does Exercise Type Affect Relative Activation Levels of Vastus Medialis Oblique and Vastus Laterialis? *J Sport Rehabil*, 15, 271–279.

Holviala, J., Häkkinen, A., Karavirta, L., Nyman, K., Izquierdo, M., Gorostiaga, E. M., Avela, J., Korhonen, J., Knuutila, V.-P., Kraemer, W. J., Häkkinen, K. (2010). Effects of Combined Strength and Endurance Training on Treadmill Load Carrying Walking Performance in Aging Men. *The Journal of Strength & Conditioning Research*, 24, 1584–1595.

Chandler, T. J., Brown, L. E. (2008). *Conditioning for Strength and Human Performance*. Lippincott Williams & Wilkins.

Chinn, S., Burney, P. G. J. (1987). On Measuring Repeatability of Data from Self-Administered Questionnaires. *International Journal of Epidemiology*, 16, 121–127.

Irish, S. E., Millward, A. J., Wride, J., Haas, B. M., Shum, G.-K. (2010). The effect of closed-kinetic chain exercise and open-kinetic chain exercise on the muscle activity of vastus medialis oblique and vastus lateralis. *Journal of Strength and Conditioning Research*, 24, 1256–1262.

Ivanenko, Y. P., Poppele, R. E., Lacquaniti, F. (2004). Five basic muscle activation patterns account for muscle activity during human locomotion. *The Journal of Physiology*, 556, 267–282.

Kim, J.-H., Chung, Y., Kim, Y., Hwang, S. (2012). Functional electrical stimulation applied to gluteus medius and tibialis anterior corresponding gait cycle for stroke. *Gait & Posture*, 36, 65–67.

Kramer, J. F., Vaz, M. D., Vandervoort, A. A. (1991). Reliability of isometric hip abductor torques during examiner- and belt-resisted tests. *J Gerontol*, 46, 47–51.

Krause, D. A., Jacobs, R. S., Pilger, K. E., Sather, B. R., Sibunka, S. P., Hollman, J. H. (2009). Electromyographic Analysis of the Gluteus Medius in Five Weight-Bearing Exercises. *The Journal of Strength & Conditioning Research*, 23, 2689–2694.

McBeth, J. M., Earl-Boehm, J. E., Cobb, S. C., Huddleston, W. E. (2012). Hip muscle activity during 3 side-lying hip-strengthening exercises in distance runners. *Journal of Athletic Training*, 47, 15–23.

Nadler, S. F., Malanga, G. A., Feinberg, J. H., Prybicien, M., Stitik, T. P., Deprince, M. (2001). Relationship Between Hip Muscle Imbalance and Occurrence of Low Back Pain in Collegiate Athletes: A Prospective Study. *American Journal of Physical Medicine & Rehabilitation*, 80, 572–577.

Noh, K.-H., Kang, M.-H., An, S.-J., Kim, M.-H., Yoo, W.-G., Oh, J.-S. (2012). Effect of Hip Joint Position on Hip Abductor Muscle Activity during Lateral Step-up Exercises. *Journal of Physical Therapy Science*, 24, 1145–1148.

O'Sullivan, K., Smith, S. M., Sainsbury, D. (2010). Electromyographic analysis of the three subdivisions of gluteus medius during weight-bearing exercises. *Sports Med Arthrosc Rehabil Ther Technol*, 2, 17.

Pandy, M. G., Andriacchi, T. P. (2010). Muscle and Joint Function in Human Locomotion. *Annual Review of Biomedical Engineering*, 12, 401–433.

Pandy, M. G., Lin, Y.-C., Kim, H. J. (2010). Muscle coordination of mediolateral balance in normal walking. *Journal of Biomechanics*, 43, 2055–2064.

Petr, M., Šťastný, P., Pecha, O., Šteffl, M., Šeda, O., Kohlíková, E. (2014). PPARA Intron Polymorphism Associated with Power Performance in 30-s Anaerobic Wingate Test. *PLoS ONE*, 9, e107171.

Portney, L., Watkins, M. (1993). *Foundations of Clinical Research*. Applications and Practice Norwalk, Connecticut: Appleton & Lange, 509–516.

Powers, C. M. (2003). The influence of altered lower-extremity kinematics on patellofemoral joint dysfunction: a theoretical perspective. *J Orthop Sports Phys Ther*, 33, 639–646.

Reiman, M. P., Bolgla, L. A., Lorenz, D. (2009). Hip Function's Influence on Knee Dysfunction: A Proximal Link to a Distal Problem. *J Sport Rehabil*, 18, 33–46.

Reiman, M. P., Bolgla, L. A., Loudon, J. K. (2012). A literature review of studies evaluating gluteus maximus and gluteus medius activation during rehabilitation exercises. *Physiotherapy Theory and Practice*, 28, 257–268.

Selkowitz, D. M., Beneck, G. J., Powers, C. M. (2013). Which exercises target the gluteal muscles while minimizing activation of the tensor fascia lata? Electromyographic assessment using fine-wire electrodes. *J Orthop Sports Phys Ther*, 43, 54–64.

Siff, M. C. (2003). *Supertraining*. 6th ed. Supertraining Institute.

Stastny, P., Lehnert, M., Svoboda, Z., Zaatar, A. M., Xaverova, Z. (2014). Knee joint muscles neuromuscular activity during load-carrying walking. *Neuroendocrinol Lett*, 35, 101–107.

Van Tiggelen, D., Cowan, S., Coorevits, P., Duvigneaud, N., Witvrouw, E. (2009). Delayed Vastus Medialis Obliquus to Vastus Lateralis Onset Timing Contributes to the Development of Patellofemoral Pain in Previously Healthy Men: A Prospective Study. *The American Journal of Sports Medicine*, 37, 1099–1105.

Widler, K. S., Glatthorn, J. F., Bizzini, M., Impellizzeri, F. M., Munzinger, U., Leunig, M., Maffiuletti, N. A. (2009). Assessment of Hip Abductor Muscle Strength. A Validity and Reliability Study. *The Journal of Bone & Joint Surgery*, 91, 2666–2672.

Winter, D. A. (1991). *Biomechanics and motor control of human gait: normal, elderly and pathological*. Waterloo, Ontario: Waterloo Biomechanics Press.

Winter, D. A., Patla, A. E., Frank, J. S., Walt, S. E. (1990). Biomechanical Walking Pattern Changes in the Fit and Healthy Elderly. *Physical Therapy*, 70, 340–347.
Winwood, P. W., Keogh, J. W., Harris, N. K. (2011). The Strength and Conditioning Practices of Strongman Competitors. *The Journal of Strength & Conditioning Research*, 25, 3118–3128.

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DIFFERENTIATION OF TEST RESULTS FOR STANDING LONG JUMP IN THE CZECH MALE POPULATION AGED 18–19 YEARS

ŠÁRKA HONSOVÁ

ABSTRACT

There is currently a growing concern over the use of a representative survey, which could be used to develop standards in physical education and sport. The only reference data that can be usually found is that remaining from the 1980s. One of the new incentives could be the customized adjustment of standards, so that a person can compare themselves with the same group of people, not only by age and sex, as applies to most current traditional standards, but so that the group matches in other parameters, in other words, so that the standards are more differentiated. The aim of our research was to explore the differentiation of physical fitness standards in the Czech population, which in the future will be based on data management and analysis via a knowledge base. This system allows data differentiation according to specified criteria and thus the standard will become dynamic, i.e. relevantly adapted to each user. For our initial analysis, we chose the results of the motor test for the standing long jump in the male population aged 18–19 years, who are already adults, and for whom we have the largest database. Besides differentiation based on sex and age, we have also selected additional criteria for body height, body weight, level of physical activity and the region where the tested person works or attends school. The effect of these parameters that has been monitored based on the analysis of variance. Statistically significant differences occurred with the factors for body height (p-value < 0.0001), body weight (p-value < 0.0001) and the level of physical activity (p-value < 0.0001), while on the other hand, there were no significant statistical differences between groups in the regional factor (p = 0.1458). When evaluating the effect size of the variance analysis through the η^2 coefficient, the regional factor shows very little effect ($\eta^2 = 0.0258$), the body height factor and the level of physical activity show a medium effect ($\eta^2 = 0.0715$ and $\eta^2 = 0.0775$) and the body weight factor shows a great effect ($\eta^2 = 0.1473$). Based on these results we consider expanding the number of criteria for the differentiation of standards as effective and appropriate. The analysis of the sorting factors is therefore one of the constituents, which will lead to the successful creation of a knowledge base.

Keywords: analysis of variance; standards; physical fitness; population testing; motor tests

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INTRODUCTION

The Czech Republic previously had a unique tradition of large-scale population surveys, which were particularly developed in the last century, post World War II. The most famous test system was undoubtedly the Tyršův fitness badge, which with the onset of the totalitarian regime in the 1950s was renamed in the USSR style as PPOV and BPPOV (Prepared to work and defend the motherland and Be prepared to work and defend the motherland) (ČSTV, 1975; Novotný, 1961). Test batteries designed in modern way were developed in this country in the early 1970s and were applied in two large-scale nationwide school in 1966 and university in 1965 surveys of young people. The authors of the papers published later are Pávek (1977) and Měkota and Šorm (1972). In the testing of the motor fitness of member of the Czech Union of Physical Education and Sports, which was carried out in two stages in 1972–73 and 1982 and included adults well as senior citizens, a seven items test battery was used. A summarizing report was presented by Kovář (1985).

Nationwide surveys of motor performance were repeated, using modified test batteries, in school population in 1987, in university students in 1986. The test sets are described in the book by Moravec (1990) and in the summarizing paper by Kolář, Měkota and Šorm (1989). In this vast research project were collected data needed for the construction of comprehensive test norms with nationwide validity. Nationwide surveys of motor performance were repeated, using modified test batteries, in school population in 1987, in university students in 1986. The test sets are described in the book by Moravec (1990) and in the summarizing paper by Kolář, Měkota and Šorm (1989). In this vast research project were collected data needed for the construction of comprehensive test norms with nationwide validity. These motor tests were systematically used in physical education classes at Czech universities, serving as diagnostic aids for classification of men and woman students into various categories of physical education classes (Kovář & Měkota, 1995). After the Fall of Communism, this tradition was followed by the test battery – the Unifittest (6–60) (Kovář & Měkota, 1995) and so on (Rychtecký, Tilinger, & Dovalil, 2009; Machačová & Bunc, 2009). It should fill the gap that arose after abolishing the PPOV badge and it should become an integral part of Physical Education lessons (Kovář & Měkota, 1995).

From 1951 up to 2001, nationwide anthropological research was conducted every 10 years, which provided valuable data on secular trends in the Czech population. Unfortunately this tradition was interrupted in 2011 and for the first time since World War II, no research was conducted (SZÚ, 2011). Regarding the post-war period, the Spartakiads (mass gymnastics events) and compulsory military service also provided a considerable opportunity to conduct a population survey. Prior to the last full population survey – the census in 2011, the unwillingness of the population to participate in such a research could clearly be observed. We have therefore lost most of these opportunities to survey the population in a manner that was financially viable with the arrival of democracy and are forced to look for new solutions.

Today's rapidly changing information and communication technologies provide us with a number of interesting tools that can be used in the collection, processing and analysis of data. The basic principle is the development of a knowledge base, which basic characteristic is the Experience Management (EM), which will gradually prevail over the

preset algorithms (Berka, 2003). A knowledge base enables to continuously and physically create and share information with all subject units and constantly optimize processes to ensure the transfer of information between all participants. The first step in creating a knowledge base is the creation of a basic database, which at the first stage comprises data taken from the Unifittest (6–60), and the results are compared with the differentiated standards according to specified criteria. In order to avoid a large number of criteria filtering and to avoid any unnecessary expansion of the database by data with no real use, we decided to find out if the acquired population data, sorted according to the given criteria in the Czech population, actually differs i.e. if it makes sense to differentiate the standards according to these criteria.

OBJECTIVE

The aim of this particular study was to determine whether the male population aged 18–19 years, differ in the motor test results in the standing long jump depending on body height, body weight, the region in which the person works or studies and the level of physical activity and therefore if it is useful to differentiate the standards according to these criteria.

METHODS

The sample consisted of 430 men aged 18–19 years (221 eighteen year olds, 209 nineteen year olds) from nine regions in the Czech Republic (1 = Prague, 2 = South Bohemian Region, 3 = South Moravian Region, 4 = Karlovy Vary Region, 6 = Liberec Region, 7 = Moravian-Silesian Region, 8 = Olomouc Region, 9 = Pardubice Region, 10 = Pilsen Region) with a mean body height of 180.3 ± 7.4 cm and a mean body weight of 72.9 ± 10.3 kg. The data from the rest of missing regions were not available, so the selection based on availability (Hendl, 2012) was used.

The sample was not taken at random, but taking into account the size and normal frequency of data distribution from a standing long jump test – see Table 2, where for our testing purposes and the selected methods, the data are considered to be satisfactory.

For basic data analysis, taking into account the size of the contingent table and by combining all the factors, we have used a one-way analysis of variance by testing each factor separately. However, to avoid any interaction of the factors, we also conducted a multi-factor analysis of variance with interactions without repetition. We assumed that each factor level cannot acquire more repeating permutations.

The dependent variable consisted of motor test results from the standing long jump, with selected factors – body height, body weight, the region in which the tested person works or studies and the level of physical activity. For the body height and body weight, intervals of 5 cm and 5 kg were created as ratio variables. The level of physical activity was categorized into nine groups according to the Compass questionnaire (Rychtecký, 2006) (1 = competitive, organized, intense physical activity, where the frequency is greater than 120 times a year; 9 = no sports or physical activity). However, in our data,

only five of these groups are represented. Frequencies in different groups according to the factors are listed in Table 1. The combined factors relative to the size of the contingent table are not given. The difference in each level of the statistically significant factors was not analysed in this first phase; for our purposes, we are satisfied in determining whether at least two factor levels differ, i.e. it will make sense to count on the factor as a filtering criterion. In order to verify the assumption of homoscedasticity of each factor (verification of the hypothesis of equal variances in normal distribution), we did not use the traditional Bartlett's test, because it is very sensitive to the violation of the assumption of normality and although the normality of our data was not simply rejected, we used the Fligner-Killeen test, which is not so sensitive, but is able to verify the homoscedasticity at a sufficient level (Neubauer, 2011).

In order to verify the results of the variance analysis, we had to further determine the effect size of the variance analysis through the η^2 coefficient, which meets all its variants (Hayes, 2009). By multiplying the η^2 coefficient by one hundred, the result is the percentage of the explained variance of the dependent variable of the factor used. According to Cohen (1988) $\eta^2 \geq 0.0099$ means little effect, $\eta^2 \geq 0.0588$ means moderate effect and $\eta^2 \geq 0.1379$ means a great effect.

Data normality was tested using NCSS 2007 software, other analysis was conducted using R Project (R-2.15.3) software.

Table 1. Frequencies in individual groups classified by factors

Body weight	No. of PT	Body height	No. of PT	Level of physical activity	No. of PT	CZ Region	No. of PT
50	9	160	12	1	32	1	40
55	21	165	20	2	35	2	57
60	60	170	54	3	57	3	25
65	81	175	102	4	44	4	14
70	94	180	123	9	262	6	28
75	65	185	74			7	66
80	46	190	38			8	39
85	17	195	7			9	125
90	19					10	36
95	10						
100	8						
sum	430	sum	430	sum	430	sum	430

PT = people tested

RESULTS

The actual data analysis was preceded by verification of the preconditions for using the analysis of variance.

Table 2. Normality test of frequency distribution

Normality Test Section of jump Test Name	Test Value	Prob Level	10% Critical Value	5% Critical Value	Decision 5%
Shapiro-Wilk W	0.964851	0.219599			Cannot reject normality
Kolmogorov-Smirnov	0.0916		0.124	0.135	Cannot reject normality

The normality of the frequency distribution was tested using a wide range of tests offered by NCSS 2007 software; Table 2 shows the results of frequently used Shapiro-Wilk W and Kolmogorov-Smirnov tests. All tests consistently show that normality cannot be rejected.

The homoscedasticity of the monitored factors was tested using the Fligner-Killen test; the results are shown in Table 3.

Table 3. Fligner-Killen homogeneity of variance test

Fligner-Killeen homogeneity of variance test	chi-squared	df	p-value
Standing long jump × region	12.1586	8	0.1443
Standing long jump × body height	9.2715	7	0.2337
Standing long jump × body weight	9.4172	10	0.493
Standing long jump × level of physical activity	8.9788	4	0.06163

All p-values are greater than 0.05 i.e. at 5% level of significance so it can be stated that the variances in the different groups classified by different factors do not differ.

The distribution of motor test results for the standing long jump into groups by factors is shown in the boxplots in Figures 1–4.

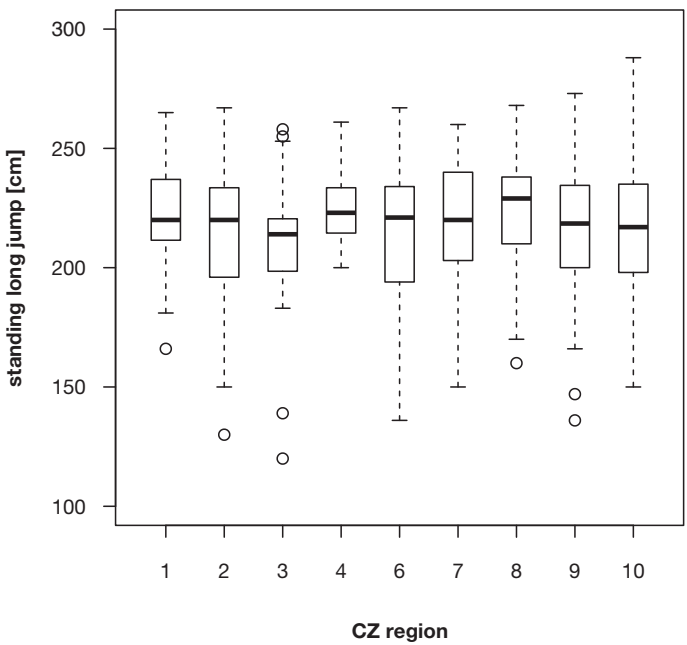

Figure 1. Standing long jump by region

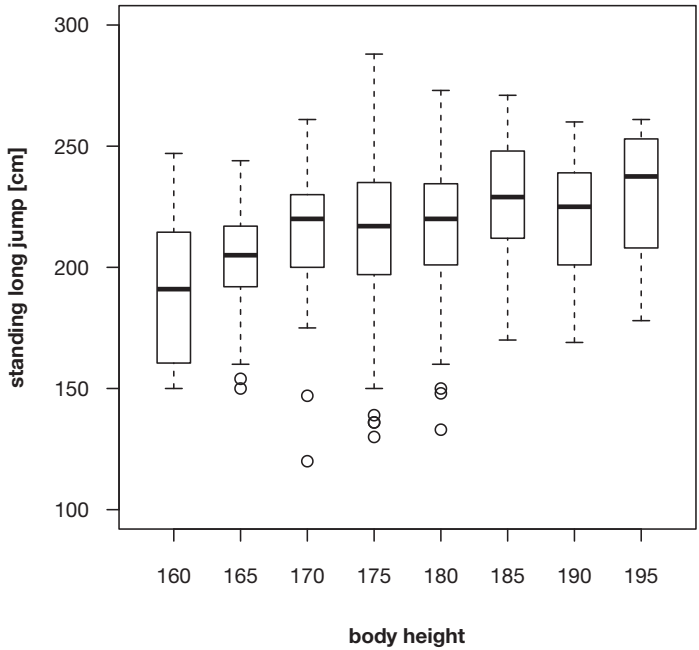

Figure 2. Standing long jump by body height

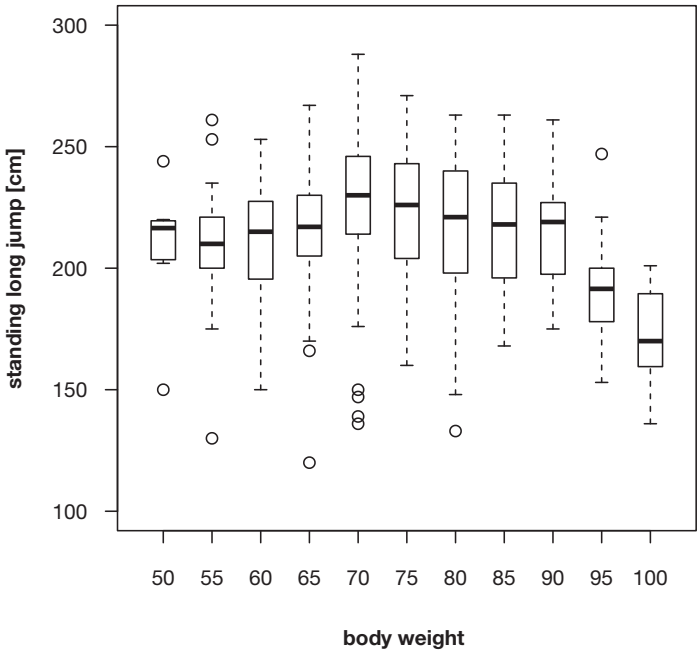

Figure 3. Standing long jump by body weight

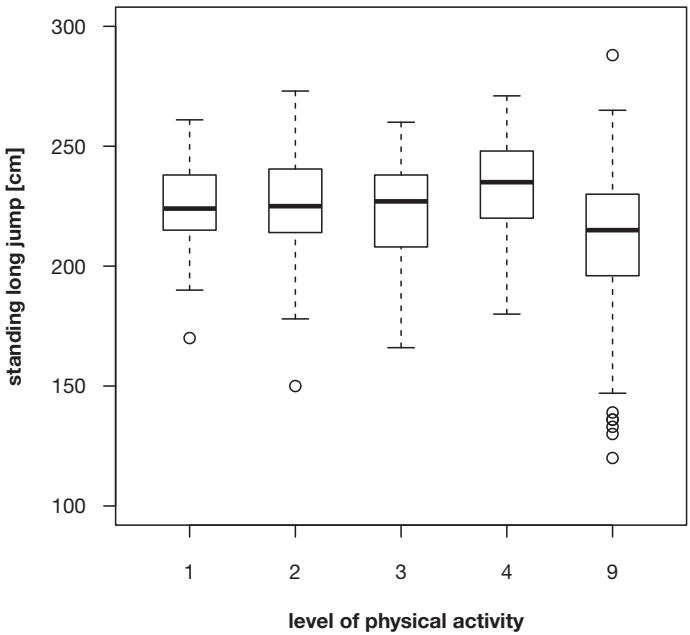

Figure 4. Standing long jump by the level of physical activity

For the regional factor in Figure 1, the greatest evenness of the mid values for all groups is apparent. For the body height factor in Figure 2 and the body weight factor in Figure 3, the large intergroup variance is immediately apparent. For the body weight, we can see that the best results are achieved by individuals from the 77–84 kg group; on the other hand, the results plummet for weight over 94 kg.

For the body height it is obvious that the intergroup variance is great in extreme groups, on the other hand for medium size groups, the intergroup variance is small. For the level of the physical activity factor in Figure 4, the individual groups have fairly balanced medium values and variances; the only difference applies to the last group – number 9, which includes individuals with the lowest levels of physical activity.

Table 4 shows the results of a one-way analysis of variance.

Table 4. Results of a one-factor analysis of variance

	Df	Sum Sq	Mean Sq	F value	Pr (>F)
Region	8	10911	1364	1.5265	0.1458
Residuals	14	376150	893		
Body height	1	17958	17958	20.824	<0.0001 ***
Residuals	428	369103	862		
Body weight	10	44456	4446	5.4369	<0.0001 ***
Residuals	419	342605	818		

	Df	Sum Sq	Mean Sq	F value	Pr (>F)
Level of physical activity	4	28965	7241	8.5942	<0.0001 ***
Residuals	425	358095	843		

Pr (>F) = the p-value associated with the F statistic
*** p-value ≤ 0.001

The already apparent finding from the boxplots was once again established, i.e. that statistically significant differences exist among the factors for body height, body weight and the level of physical activity at a significance level of less than 0.001. On the other hand, the statistically significant differences for the factor region between groups were not established.

Table 5. Results of the multi-factor analysis of variance with interactions without repeating

	Df	Sum Sq	Mean Sq	F value	Pr (>F)
Body height	1	17958	17958	25.5835	<0.0001 ***
Body weight	10	39468	3947	5.6227	<0.0001 ***
Region	8	10919	1365	1.9443	0.0562 °
Level of physical activity	4	24033	6008	8.5595	<0.0001 ***
Body height – Body weight	10	9853	985	1.4036	0.182
Body height – Region	8	6785	848	1.2083	0.29659
Body weight – Region	62	57020	920	1.3102	0.0886 °
Body height – Level of physical activity	4	253	63	0.0899	0.98551
Body weight – Level of physical activity	26	9804	377	0.5372	0.96822
Region – Level of physical activity	28	9133	326	0.4647	0.99057
Body height – Body weight – Region	32	32429	1013	1.4437	0.07136 °
Body height – Body weight – Level of physical activity	16	16274	1017	1.449	0.12409
Body height – Region – Level of physical activity	20	10552	528	0.7517	0.76767
Body weight – Region – Level of physical activity	24	19704	821	1.1696	0.27588
Body height – Body weight – Level of physical activity	1	37	37	0.0524	0.819
Residuals	175	122840	702		

Pr (>F) = the p-value associated with the F statistic
*** p-value ≤ 0.001; ° p-value ≤ 0.1

The results of the multi-factor (specifically four-factor) analysis of variance with interactions without repetitions are shown in Table 5. Even with multiple classifications, the individual factors appear to have the same results, i.e. statistically significant

differences between the groups of factors are body height, body weight and the level of physical activity. Compared to the one-way analysis, a 5% significance level also showed differences in the regional factor. Differences which can be attributed to the interaction of factors: body weight – region and body height – body weight – region are also at the same level of significance. For the results of a multi-factor analysis of variance we must take into account the fact that some groups of combined factors were not represented at all and many of these had a low frequency of people tested.

The results of the variance analysis are also in line with the established size of the effect through the η^2 coefficient. The coefficient values for statistically significant factors are shown in Table 6.

Table 6. Results of the effect size determination through the η^2 coefficient

Factors	
Region	0.0258
Body height	0.0715
Body weight	0.1472
Level of physical activity	0.0775
Body weight – Region	0.1473
Body height – Body weight – Region	0.0838

The regional factor shows according to Cohen interpretation (1988) very little effect, the body height factor and the level of physical activity show a medium effect and the body weight factor shows a great effect. The combined body height, body weight and regional factors show the medium effect size and the combined body weight and regional factors show a great effect size.

DISCUSSION

The data analysis conducted suggests that the current adult population, although in our research the sample is only represented by the 18–19 years old male category, is on the level of the explosively-power capabilities of the lower extremities differentiated according to three of the four factors selected. We have only analyzed the results of the test – standing long jump out of the entire spectrum of motor tests that are included in the various test systems, because the largest amount of data available to us is from the adult population. Based on the results, we can assume that even in the case of other motor tests, which are included in the battery of tests aimed at physical fitness, the results would be similar. Although numerous research analyses addressing physical fitness and focusing on a specific factor (medical disability, the elderly population, biological age of children, obesity etc.) already exist (Brahler, 2004; Ka Yee Wong, 2006; Miyatake, Miyachi, Tabata, & Numata, 2012; Rikli & Jones, 1999), obtaining population data from the healthy adult population appears to be a significant problem, and not just in the Czech Republic. Baumgartner, Jackson, Mahar, and Rowe (2007) suggested that the sample size

should be several hundred with scores collected over several years. Morrow, Jackson, Disch, and Mood (2005) stated that the sample size should be at least 200 per gender (group). But the sample in the present study unfortunately doesn't meet the sample size criteria for each group, because our factors have lots of groups and it was impossible for us to obtain 200 people per group. Strand, Hjelm, Shoepe, and Fajardo (2014) also differed standards according physical activity factor in their study of individuals aged 19 to 20 and like us they came to the following conclusion: arithmetic differences were seen for all levels of physical activity (e.g. never, rarely, 1–2 times/week, etc.). The study of Condon and Cremin (2013) examined relationships between height, gender, weight and lower limb muscle power to balance performance, but correlations were in most groups nonsignificant. On the other hand balance test evaluating coordination abilities depend on other factors than our explosively-power capabilities.

Published standards of widely used Unifittest 6–60 test batteries (Kovář & Měkota, 1995), Eurofit (Pekka & Tuxworth, 1997) and Fitnessgram (Suchomel, 2003) for one thing, no longer correspond to the current population and are only differentiated by age and sex, which is not suitable for the sporting population, which is always compared with those standards as above average nor the handicapped population, which in different ways is then below average. This is confirmed by other studies. Baker, Heath, Smith, and Oden (2011), Gjonbalaj, Gllareva, Gjinovci, and Miftari (2015) and of Purashwani, Datta, and Purashwani (2010) have shown that we cannot compare physically active population (students of sports schools and table tennis players) with the standards of the general population and it is necessary to draw up special norms for these groups. In accordance with our findings turns out that especially the level of physical activity is very important factor.

The issue of standards of test batteries was, for example, addressed by Sharon Plowman (1992), who compared the standards of the most frequently used test batteries in the USA and concluded that the percentile standards, which may have a very different rating of the same performance under different test batteries are particularly problematic, and that they must be revised. However, the creation of updated plus differentiated standards, poses substantial challenges to the amount of data required and to the effective management and analysis of this data. The current trend in this regard are information databases, and which have been established in many fields for the purpose of managing and administering data analysis (Adams, 2010). The analysis of the sorting factors presented in this article is therefore one of the constituents, which, we hope, will lead to the successful creation of a knowledge base.

CONCLUSION

We have demonstrated in our constituent study, based on the results of the analysis of variance of the motor test in the standing long jump, that the male population aged 18–19 years shows different results depending on body height, body weight and the level of physical activity and it is therefore advisable to differentiate according to these criteria, in particular for the newly designed standards. We were unable to demonstrate to a sufficient degree, the differences in results depending on the region in which the tested person works or studies.

The current standards can well rank only mean individuals. In practice, differentiated standards make a better comparison possible, because person can compare himself with similar individual, like himself.

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REFERENCES

Adams, T. B. (2010). DataBase: Research and Evaluation Results. *American Journal of Health Promotion*, 25(2), 147–151.

Baker, U. C., Heath, E. M., Smith, D. R., Oden, G. L. (2011). Development of Wingate Anaerobic Test Norms for Highly-Trained Women. *Journal of Exercise Physiology Online*, 14(2), 68–79.

Baumgartner, T. A., Jackson, A. S., Mahar, M. T., Rowe, D. A. (2007). *Measurement for evaluation in physical education and exercise science*. Boston: McGraw-Hill.

Berka, P. (2003). *Dobývání znalostí z databází* [Knowledge Discovery in Databases]. Prague: Academia.

Brahler, C. J. (2004). QTc Is Associated with Obesity and Physical Activity Level for African American Females. *Journal of Exercise Physiology Online*, 7(2), 16–24.

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hove: Lawrence Erlbaum Associates.

Condon, C., Cremin, K. (2014). Static Balance Norms in Children. *Physiotherapy Research International*, 19(1), 1–7.

ČSTV [Czechoslovak Union of Physical Education and Sport] (1975). *Metodické pokyny k plnění ideově výchovné části Odznaku zdatnosti Připraven k práci a obraně vlasti (BPPOV a PPOV)* [Methodical guidelines to perform ideological education part of Fitness badge Ready for work and homeland defense]. Prague: Olympia.

Gjonbalaj, M., Gllareva, I., Gjinovci, B., Miftari, F. (2015). The status of students of the Faculty of Physical Education and Sport in comparison with standard parameters of the Illinois agility test. *Sport Mont*, 13(43–45), 225–228.

Hayes, A. F. (2009). *Statistical Methods for Communication Science*. New Jersey: Lawrence Erlbaum Associates.

Hendl, J. (2012). *Přehled statistických metod. Analýza a metaanalýza dat* [Summary of statistical methods. Data analysis and meta-analysis]. Prague: Portál.

Ka Yee Wong, A. (2006). Gross Motor Skills Performance of Hong Kong Chinese Children. *Journal of Physical Education & Recreation*, 12(2), 23–29.

Kolář, V., Měkota, K., Šorm, G. (1989). Pohybová výkonnost a tělesný rozvoj studujících 1. ročníku vysokých škol ČSSR 1986 [Motor performance and physical development of students in the first year of the Czechoslovak university 1986]. In: *Sborník Tělesná kultura*. Olomouc: Palacký University Olomouc.

Kovář, R. (1985). *Testy a normy základní pohybové výkonnosti* [Tests and standards of basic motor performance]. Prague: ČÚV ČSTV.

Kovář, R., Měkota, K., et al. (1995). *Unifittest (6–60): test and norms of motor performance and physical fitness in youth and in adult age.* Olomouc: Palacký University Olomouc.

Machačová, K., Bunc, V. (2009). Methods of functional status evaluation and available instruments appropriate for older adults: A systematic Review. *AUC Kinanthropologica*, 45(2), 43–54.

Měkota, K., Šorm, G. (1972). Physical efficiency of Czechoslovak students in their first year at universities and colleges. *Tělovýchovný sborník*, *supplementum 2*. Prague: SPN.

Miyatake, N., Miyachi, M., Tabata, I., Numata, T. (2012). Evaluation of anthropometric parameters and physical fitness in elderly Japanese. *Environmental Health & Preventive Medicine*, 17(1), 62–68.

Moravec, R. (1990). *Telesný, funkčný rozvoj a pohybová výkonnosť 7–18-ročnej mládeže v ČSFR* [Physical, functional development and motor performance of 7–18 years old youth from ČSFR]. Bratislava: Šport.
Morrow, J. R., Jackson, A. W., Disch, J. D., Mood, D. P. (2005). *Measurement and evaluation in human performance*. Champaign, IL: Human Kinetics.
Mozumdar, A., Liguori, G., Baumgartner, T. A. (2010). Additional Revised Push-Up Test Norms for College Students. *Measurement in Physical Education & Exercise Science*, 14(1), 61–66.
Neubauer, J. (2011). *Analýza rozptylu.* Prednáška Statistika II – Ekonometrie [Analysis of Variance. Lecture of Statistics II – Econometry]. Retrieved from http://k101.unob.cz/~neubauer/pdf/analyza_rozptylu.pdf.
Novotný, J. (1961). *Kdy, kde, jak soutěžit o odznak zdatnosti. Připraven k práci a obraně vlasti* [When, where, how to compete on fitness badge Ready for work and defense of the homeland]. Prague: STN.
Pávek, F. (1977). *Tělesná výkonnost 7–19leté mládeže ČSSR* [Physical performance of 7–19 years old youth from ČSSR]. Prague: SPN.
Pekka, O., Tuxworth, B. (1997). *Eurofit pro dospělé: hodnocení zdravotních komponent tělesné zdatnosti* [Eurofit for adults: Assessment of health-related fitness] (R. Kovář, Trans.). Prague: Karolinum, Rada Evropy.
Plowman, S. A. (1992). Criterion Referenced Standards for Neuromuscular Physical Fitness Tests: An Analysis. *Pediatric Exercise Science*, 4(1), 10–19.
Purashwani, P., Datta, A. K., Purashwani, M. (2010). Construction of Norms for Skill Test Table Tennis Players. *International Journal of Table Tennis Sciences*, 11(6), 93–98.
Rikli, R. E., Jones, C. J. (1999). Functional fitness normative scores for community-residing older adults, ages 60–94. *Journal of Aging & Physical Activity*, 7(2), 162–181.
Rychtecký, A. (2006). *Monitorování účasti mládeže ve sportu a pohybové aktivitě v České republice* [Monitoring of youth participation in sport and physical activity in the Czech Republic]. Prague: Charles University in Prague.
Rychtecký, A., Tilinger, P., Dovalil, J. (2009). Physical performance related to the participation in sport and physical activities and changes in the last thirteen years in Czech youth. *AUC Kinanthropologica*, 45(2), 15–32.
Strand, S. L., Hjelm, J., Shoepe, T. C., Fajardo, M. A. (2014). Norms for an Isometric Muscle Endurance Test. *Journal of Human Kinetics*, 40(4), 93–102.
Suchomel, A. (2003). Současné přístupy k hodnocení tělesné zdatnosti u dětí a mládeže (FITNESSGRAM) [Current approaches to evaluation of physical fitness among children and youth (FITNESSGRAM)]. Česká kinantropologie, 7(1), 81–89.
SZÚ (Producer). (2011). *Celostátní antropologické výzkumy (CAV)* [National anthropological researches (CAV)]. Státní zdravotní ústav. Retrieved from http://www.szu.cz/publikace/data/celostatni-antropologicke-vyzkumy-cav.

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