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EMPATHY AND BURNOUT AMONG PHYSICIANS PROVIDING REANIMATOLOGICAL AND SURGICAL TREATMENT

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ABSTRACT

Background. Among scientific publications it is observed that in medicine the aspect of interpersonal connection is underestimated while providing medical help (Steinhausen et al., 2014), and not enough attention is being allocated to the effect of a physician's empathy in the treatment process (Hojat et al., 2002a). The lack of scientific publications shows that this topic is under-researched and relevant. Thus, the purpose of the study was to determine relationships between empathy and burnout among practicing physicians.

Methods. A total of 185 practicing physicians who provide reanimatological and surgical treatment participated in the research. A questionnaire was designed for the study, consisting of the Jefferson Scale of Physician Empathy (Hojat, 2016), Copenhagen Burnout Inventory (Kristensen Borritz, Villadsen, & Christensen, 2005).

Results. Research revealed that the expressiveness of empathy between doctors is not related to sex, age, work experience and speciality ($p > .05$). Also, it was found that younger physicians experienced more work-related burnout ($p = .04$). the study showed that there was no statistically significant relationship between empathy and burnout among physicians ($p > .05$).

Conclusions. Research showed that physician's empathy was not related to demographic factors. Findings revealed that younger doctors experienced more work-related burnout than the older ones. Finally, connection between empathy and burnout was not found.

Keywords: empathy, personal burnout, work-related burnout, patient-related burnout, physician.

INTRODUCTION

The term of empathy was first used in 1759. Adam Smith was the first to use the said term describing it as sympathy when another person is in plight or joy when somebody experiences success. In general, Smith conceptualized that empathy is an emotion, which is characteristic of all people and arises when one person sees another in emotional situations (Davis, 1994). Empathy is divided into cognitive and emotional components. Cognitive component involves accurate perception of the situation of another person, whereas emotional component is the existence of the person's connection with others and emotional reaction to experiences of other people (Davis, 1983, quoted in Regher, Goldberg, & Hughes, 2002). In medicine, empathy is distinguished as one of the most significant factors in patient's care, which promotes prosocial behaviour and helps to create high quality health care services (Ahrweiler, Neumann, Goldblatt, Hahn, & Scheffer, 2014).

In the scientific literature, it is observed that in medicine the aspect of interhuman connection in delivering medical treatment is still underestimated (Steinhausen et al., 2014) and insufficient attention is being paid to empathy of physicians and empathy associations with other psychological or professional factors. The lack of such studies prevents medical schools from helping their students to achieve the most optimal level of empathy, which is necessary for practical work. (Hojat et al., 2002b).

Meanwhile professional burnout was first mentioned in the scientific literature by Freudenberger (1974) who defined it as tiredness, mistakes, energy and strength loss or as the state of running out of inner resources because of unsatisfied wishes and needs (Ozkula & Durukan, 2017). The said state develops because of long term interpersonal stressors at work (Maslach & Leiter, 2016). Work-related burnout syndrome consists of three components, such as exhaustion, depersonalization or cynicism and low sense of achievement (Lathrop, 2017).

In the scientific literature, it is indicated that one fifth of physicians suffer from clinical burnout or are at risk of experiencing it (Van der Ploeg et al., 2003). It has been determined that physicians who are at lower risk of professional burnout are more optimistic, communicate more with patients and are more inclined to help them, which contributes to improved patient health care (Scheepers, Boerebach, Arah, Heineman, & Lombarts, 2015).

Studies show that so far it is not clear how job related factors, such as big work load, which causes work-related burnout, working environment, the chosen specialization, encounter with critical events, etc. impact empathy of a physician (Pedersen, 2009). It is also being observed that medical professionals feel insufficient attention to their psychological health (Venytė, 2008), more than half of medical personnel constantly experience emotional stress at work (Zdanavičienė, 2013). We were not able to find studies about empathy and professional burnout among Lithuanian physicians; therefore it may be assumed that a study determining correlation between empathy and professional burnout would be useful pursuing the improvement of psychological health of physicians, looking for better patient-doctor connection and thus better quality of medical treatment.

The object of the present study was correlation between empathy and professional burnout.

The **aim** of the study was to determine peculiarities of correlation between empathy and professional burnout among Lithuanian physicians providing reanimatological and surgical treatment.

The objectives of the study:

1. Examine expression of empathy among physicians;
2. Determine expressiveness of professional burnout among physicians;
3. Examine peculiarities of correlation between empathy and professional burnout.

METHODS

On June 6, 2017, Bioethics Committee of the Lithuanian University of Health Sciences issued permission (No. BEC-SP(M)-135) to perform the study. Subjects were surveyed from October 6, 2017 till February 2, 2018. The survey was conducted in various conferences related to professions of the subjects. In the survey, 263 questionnaires were distributed, 159 filled in questionnaires were received, and the frequency of response was 60.46%. In surveys of this type, response frequency greater than 60% is considered acceptable (Van der Ploeg et al., 2003). On the other hand, relatively low response frequency indicates that a little bit less than half of the subjects refused to participate in the survey. It may be assumed that for some subjects, the analysed topic was personally sensitive and it may be supposed that professional burnout experienced by them is expressed at a higher level.

Based on the provided treatment specializations, physicians were divided into two groups: reanimatological treatment (anesthesiology – reanimatology ant other, $n = 81$) and surgical treatment (surgeons, trauma surgeons and other, $n = 100$). Surgeons, trauma surgeons, and other medical professionals who perform invasive procedures were assigned to the group of physicians providing surgical treatment. Meanwhile anesthesiologists – reanimatologists and physicians of other specializations related to emergency conditions mostly provide urgent reanimatological treatment.

The survey covered 185 physicians, the majority of which were anesthesiologists – reanimatologists and surgeons. The sample of the survey is non-probabilistic, convenient. Respondents by gender were distributed almost equally (see Table 1).

Table 1. **Descriptive statistics of subjects by gender and specialization**

		Percent	*n*
Gender	Male	40	74
	Female	59.5	110
	Not specified	0.5	1
Specialization	Reanimatological treatment	4.8	81
	Surgical treatment	54	100
	Not specified	2.2	4

The age of respondents varied from young to middle age physicians, also with respect to practice experiences, there were experienced physicians as

well as those who have recently started career (see Table 2). It is important to note that two respondents did not specify their age and three respondents did not specify their practice experiences.

The data of the present article comprise a part of a greater study. In the study, a questionnaire consisting of Jefferson Scale of Physician Empathy, Copenhagen Burnout Inventory and demographical issues (gender, age, practice experiences, and specialization) were used.

To determine empathy of physicians, Jefferson Scale of Physician Empathy (version 4.0) was used (©Thomas Jefferson University, 2001; Hojat, 2016). The said scale consists of three factors:

- ***Perspective Taking*** or consideration of the patient's perspective by the physician. As maintained in studies, the said component is one of the core ingredients of cognitive empathy (Davis, 1996), which allows to develop emphatic connection between the physician and the patient (Jackson, Rainville, & Decety, 2006);
- ***Compassionate care*** reflects the ability of physicians to understand experiences of the patient and feel his or her emotions during treatment;
- ***Standing in the Patient's Shoes***, which indicates physician's ability to understand the patient and his or her train of thoughts.

Studies have shown that the scale is related to other empathy measuring instruments such as Interpersonal Reactivity Index (Hojat, 2016). After having determined the internal reliability of the instrument ,it was obtained that the scale was appropriate for use – its Cronbach α was .76, minimal possible score was 20, maximal score was 140.

To determine professional burnout of physicians, Copenhagen Burnout Inventory was used (Kristensen et al., 2005). This instrument consists of:

- ***Personal Burnout*** (6 items), which reflects the level of long-term physical and psychological fatigue that an individual experiences;
- ***Work-Related Burnout*** (7 items), which indicates the level of long-term physical and psychological fatigue that an individual perceives as related to his or her work or a consequence of work;
- ***Client-Related Burnout*** (6 items), which reflects the level of long-term physical and psychological fatigue, that an individual perceives as a consequence of relation with clients (Kristensen et al., 2005).

The questionnaire has not been used in Lithuania; therefore a double translation into Lithuanian was performed. After having determined the internal reliability of the questionnaire subscales we found that the questionnaire was appropriate for use. Cronbach α of Personal Burnout scale was .85, Cronbach α of Work-Related Burnout scale was .83, and Cronbach α of Client-Related Burnout scale was .8. The minimal score of personal and patient-related burnout was 6, maximal score was 30, while work-related burnout minimal score was 7 and maximal score was 35.

Values of quantitative magnitudes that satisfy the condition of normality were described by providing the average value and standard deviation. Rank magnitudes that do not meet this condition were described by providing median, inter-quarter interval, the average value, and standard deviation. Discrete values were described by providing the frequency of values and percent of relative frequency.

Distribution normality was verified using Shapiro-Wilk criterion when the sample contained 50 members and using Kolmogorov-Smirnov criterion when the sample contained more than 50 members. To determine the distribution of scores

Table 2. **Descriptive age and practice experiences statistics by gender**

		Average	Standard deviation	Minimum	Maximum
Age (years)	Overall	41.43	11.77	24	72
	Male	41.95	12.09	24	63
	Female	41.1	11.59	24	72
Practice experiences (years)	Overall	15.93	12.13	0.17	43
	Male	16.43	12.07	0.17	38
	Female	15.59	12.21	0.17	43

of two independent samples, Student-*T* test was used when samples met the normality criterion and Mann-Whitney test when samples did not meet the said criterion. The determined level of significance was $p \leq .05$.

To determine correlation among psychological constructs by specialization, age and practice experiences of physicians, the said indicators were divided into three groups based on subject distribution in the sample. By age, physicians were divided into younger (up to 32 years, n = 53), middle aged (from 33 to 44 years, n = 55), and senior (from 45 years on, n = 75). By practice experiences, physicians were divided into having little experience (up to 6 years, n = 60), with average experience (from 7 to 20 years, n = 52), and experienced (from 21 years on, n = 70).

The study data were processed using IBM SPSS Statistics and Microsoft Excel 2010 software.

RESULTS

Empathy expression among physicians. To determine empathy expression among physicians, empathy scale score distribution was assessed. It was determined that empathy scale score distribution did not meet the normality criterion (see Table 3). Comparison of empathy average of Lithuanian physicians with the average of empathy of physicians in those countries where empathy scores were measured using Jefferson Scale of Physician Empathy shows that the score of Lithuanian medical professionals was lower than that of Polish (113; *SE* = 1.33), American (120; *SE* = 0.45) (Shariat, Eshtad, & Ansari, 2010), Italian (115.1; *SE* = 0.91) (Di Lillo, Cicchetti, Lo Scalzo, Taroni, & Hojat, 2009), Japanese (104.3; *SE* = 0.65) (Kataoka, Koide, Ochi, Hojat, & Gonnella, 2009), and Iranian (110; *SE* = 0.94) (Shariat et al., 2010) physicians. It was also determined that the said difference was statistically significant ($p < .001$).

When determining empathy expression among physicians, subjects were divided into less emphatic and more emphatic physicians based on the sample median. It may be observed that subjects between these samples were distributed evenly (see Table 4). When assessing physician empathy differences by gender, age, practice experiences, and specialization, significant differences were not determined ($p > .05$).

Peculiarities of the experienced professional burnout. To determine the expression of professional burnout among practicing physicians, score distribution in each subscale was determined. Considering that subscale scores are continuous values, their distribution was determined by the criterion of normality. It was determined that the subscale of patient-related burnout met the criterion of normality (see Table 5).

	p value	Average	Standard deviation	Median	Inter-quarter interval	Standard error
Empathy	.03	95.57	13.81	95.34	85–106	1.02

Table 3. **Descriptive statistics of Jefferson Scale of Physician Empathy**

		n (per cent)
Empathy	**Less emphatic (< 95.34)**	91 (49.2)
	More emphatic (> 95.35)	91 (49.2)
	Did not respond	3 (1.6)

Table 4. **Distribution of expression of Jefferson Scale of Physician Empathy among subjects**

	p value	Average	Standard deviation	Median	Inter-quarter interval	Standard error
Personal burnout	.036	2.84	0.66	2.83	2.33–3.33	0.05
Work-related burnout	< .001	2.52	0.68	2.43	2–3	0.05
Patient-related burnout	.1	2.55	0.73	2.5	2–3.13	0.05

Table 5. **Descriptive statistics of question+naire scales of Copenhagen Burnout Inventory**

Taking into account subscale medians, the sample of subjects was divided into physicians who experienced less of professional burnout and those who experienced more of professional burnout. It was obtained that the majority of subjects experienced more expressed level of personal burnout (see Table 6).

When determining correlation of professional burnout with demographic parameters of physicians it was obtained that younger physicians experienced statistically significantly greater work-related burnout than older physicians (see Table 7). Statistically significant differences by gender, practice experiences, and specialization were not determined ($p > .05$).

Empathy correlation with professional burnout. To determine professional burnout correlation with empathy of physicians considering that not all distributions were distributed by the normal distribution, Spearman correlation coefficient was applied. It was obtained that components of professional burnout were not associated with the empathy of physicians (see Table 8).

Table 6. **Distribution of Copenhagen Burnout Inventory Subscale expression among subjects**

	Expression of professional burnout	*n* (per cent)
Personal burnout	Experience less (< 2.83)	64 (34.6)
	Experience more (> 2.84)	116 (62.7)
	Did not respond	5 (2.7)
Work-related burnout	Experience less (< 2.43)	99 (53.5)
	Experience more (> 2.44)	81 (43.8)
	Did not respond	5 (2.7)
Patient-related burnout	Experience less (< 2.5)	91 (49.2)
	Experience more (> 2.51)	89 (48.1)
	Did not respond	5 (2.7)

Table 7. **Statistical and practical impact Values of Copenhagen Burnout Inventory Subscales by age**

		p value	Mean ranks
Personal burnout	Younger	.19	90.75
	Middle aged		98.46
	Older		81.75
Work-related burnout	Younger	***.04***	99.5
	Middle aged		95.12
	Older		77.76
Patient-related burnout	Younger	.48	95.68
	Middle aged		90.04
	Older		84.48

Table 8. **Correlation matrix of Empathy and Professional Burnout**

	Empathy	Personal burnout	Work-related burnout	Patient- related burnout
SCALE/ SUBSCALE		**Copenhagen Burnout Inventory Scale**		
Empathy	1			
Personal burnout	–.02	1		
Work-related burnout	–.08	***.76****	1	
Patient-related burnout	–.14	***.63****	***.79****	1

Note. *$p \leq .05$, **$p \leq .001$. Spearman non-parametric correlation coefficient was applied.

DISCUSSION

The study has revealed that empathy of physicians, their personal and patient-related burnout do not correlate with such demographic indicators as gender, age, practice experiences, and specialization. On the other hand, it has been obtained that younger physicians experience more work-related burnout, but expression of this professional burnout component did not differ statistically significantly by gender, practice experiences, and specialization. It has been determined that professional burnout is not associated with empathy.

It has been determined that expression of empathy of Lithuanian physicians was statistically significantly lower than that of medical professionals of other countries. Empathy scores presented in articles vary from 104.3 (*SE* = 0.65; Japan) (Kataoka et al., 2009) to 120 (*SE* = 0.45; U.S.A.) (Shariat et al., 2010). It has been observed that empathy scores in eastern countries are lower as compared with the western countries. However, significant differences among countries may be explained not just by cultural differences and, therefore, different traditions of medicine. It may be observed that in some countries empathy of physicians is being paid less attention. In Japan and Iran, the work of physicians is oriented towards science, and they rarely maintain contact with patients (Shariat et al., 2010). Such regularities allow assuming that Lithuanian physicians do not have sufficient knowledge about the importance of empathy or they are not inclined to maintain connection with patients, which may be related both to medical training programs and health care situation in the country. However, it should not be ignored that only physicians who provide reanimatological and surgical care were surveyed while in studies it is noted that physicians of the said specialization tend to have the lowest empathy (Hojat et al., 2002 a).

Empathy correlation with gender has not been completely determined in scientific studies – some studies maintain that females are more emphatic than males (Hojat et al., 2001; Hojat et al., 2002 a; Shariat et al., 2010). Results of the present study contradict to the above mentioned data – it was determined that empathy was not associated with gender. As to the empathy correlation with age and practice experiences, scientific articles observe that practice experiences are determined as a factor that has impact on empathy despite the age of a physician. Physicians with greater practice experiences are more emphatic than those who have less experience (Shariat et al., 2010). Results of the present study in part contradict to the literature data – it was determined that empathy did not correlate with age or practice experiences. It may be assumed that the ability to emphatically respond to the patient is not developed while working and maybe this communication aspect should be developed during medical studies.

Meanwhile, in the scientific literature it is observed that there is a lack of studies analysing correlation between empathy and medical profession. On the other hand, the current studies establish correlation between empathy of physicians and specialization – those who have chosen people oriented specializations, such as general practitioners, pediatricians or psychiatrists are more emphatic than physicians who have chosen technology oriented specializations, such as anesthesiologists, surgeons or radiologists (Hojat et al., 2001; Hojat et al., 2002 a). In the present study, no correlation between empathy and specialization has been determined. On the other hand, it is significant to note that only physicians providing reanimatological and surgical treatment were surveyed. Both specializations, as specified in the scientific literature, are technology oriented, and these doctors have less frequent contact with patients (Hojat et al., 2001). Also, both specializations are similar in the nature of work; therefore correlation with specialization could not be determined.

As to the professional burnout correlation with demographical characteristics, no unanimous conclusion could be found in the literature. Some studies maintain that females experience more professional burnout than males (Maslach et al., 2001), whereas other studies determine that gender does not correlate with work-related burnout (Gasiūnienė, 2013; Ozkula & Durukan, 2017). Results of the present study supplement the latter scientific literature – both female and male physicians experience the same professional burnout. In articles, the said tendency is attempted to be explained based on the effects of world healthcare policy changes in recent years (Ozkula & Durukan, 2017). It may also be assumed that the said tendency is related to the workload – in

medicine, both females and males are exposed to the same workload, therefore they experience the same expression of professional burnout independent of their gender.

Meanwhile in the scientific literature a clear tendency is established that practice experiences and age correlate with professional burnout – work-related burnout syndrome is more clearly expressed among younger and less experienced employees (Maslach et al., 2001; Ozkula & Durukan, 2017; Potter, 2006). The data of the present study supplement the insights of scientific literature. It has been established that younger physicians experience more work-related burnout. On the other hand, none of the professional burnout components was associated with practice experiences. In the scientific literature, the tendency of professional burnout association with practicing experiences is interpreted cautiously taking into account the fact that employees who experience more work-related burnout are inclined to leave the job or to requalify, therefore individuals who from the beginning experienced less work-related burnout syndrome stay on the job (Maslach et al., 2001). On the other hand, the fact that younger physicians experience more work-related burnout than older ones may be explained by the lack of professional experience – quite often young physicians are new on the job, they have not encountered more complicated situations, therefore they experience more stress and anxiety about the quality of their work, which all combined may stipulate more expressed work-related burnout.

In the studies it has been established that empathy and professional burnout are negatively correlated – physic with high empathy experience less professional burnout (Yuguero, Marsal, Esquerda, & Soler-Gonzalez, 2017). On the other hand, in other studies it is emphasized that the necessity of being empathic stimulates professional burnout (Maslach et al., 2001). Results of the present study contradict to the literature data. It has been established that professional burnout is not associated with empathy. Therefore, it may be assumed that professional burnout is more associated with the character of work than with such personality factors of physicians as empathy.

The present study, like many others, has some **limitations**. Among the said limitations are time and cultural differences that limit the possibility to compare the obtained results in the study with the data of foreign researchers. On the other hand, such studies in Lithuania are not numerous, moreover, we could not find studies that would explore professional burnout association with empathy of physicians, and therefore the obtained results significantly supplement the available data. The other possible limitation of the present study is the fact that multi-dimensional analysis was not performed.

Equal distribution of both genders in the study may be viewed as an **advantage**. Considering relatively equal distribution of females and males in the study, it may be maintained that the obtained data reflect tendencies in both genders. Also, as an advantage, it is important to mention that the present study allows clearer understanding of the job specificity of physicians, emotional experiences that arise at work and consequences of the said experiences. It would be expedient to analyse the current differences of empathy of physicians in further studies and to determine factors that cause the said differences. Studies on this subject would contribute to the improvement of emotional and psychological state of physicians and would ensure rendering medical services of higher quality.

CONCLUSIONS

1. Sizes of groups of less expressed and more expressed empathy were similar. The empathy of Lithuanian physicians was less expressed than that of medical professionals from other countries. Empathy of physicians who provide reanimatological and surgical treatment was not associated with such demographic indicators as gender, age, practice experiences, and specialization;
2. Among physicians who provide reanimatological and surgical treatment, personal burnout was more clearly expressed, whereas group sizes of physicians experiencing greater and lesser work-related and patient-related burnout were similar. Younger physicians experienced more work-related burnout than older physicians. Correlation of this construct with other demographic parameters was not determined. Personal and patient-related burnout were not associated with demographic characteristics of physicians;
3. Empathy was not associated with professional burnout of physicians who provide reanimatological and surgical treatment.

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RESIDUAL HEAT STRESS IMPROVES SPATIAL ROTATION FUNCTION, BUT DOES NOT MODIFY ATTENTION

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ABSTRACT

Background. We aimed to evaluate the effect on cognitive performance (spatial rotation ability, and working memory) after recovery from heat stress when body temperature naturally decreases to initial level.

Methods. Whole body hyperthermia was induced with Finnish sauna bathing. Before (PRE) and 90 min after (POST) heat stress (EXP)/ rest (CON) participants assessed their own overall motivation, level of sleepiness and mood. Also Switching task with a combination of the Manikin (Man) and the Mathematical Processing (Math) test was performed.

Results. Level of sleepiness significantly ($p < .05$) increased 90 min after sauna from 1.88 ± 0.30 (EXP PRE) to 3.44 ± 0.45 (EXP POST), but did not change significantly in CON (PRE 2.81 ± 0.53, POST 2.88 ± 0.30). Participants felt more fatigue ($p < .05$) during the POST measurements in both trials (CON 3.88 ± 0.79 and EXP 5.88 ± 1.03) compared with before values (CON 2.75 ± 0.66 and EXP 2.44 ± 0.87); 90 min after sauna fatigue was significantly higher ($p < .05$) in EXP compared with CON. During the EXP POST (1.49 ± 0.12 s) measurements response time in Man task significantly decreased ($p < .05$) compared with PRE (1.66 ± 0.16 s), and throughput significantly ($p < .05$) increased 90 min after sauna (EXP POST 42.09 ± 3.28) compared with before values (EXP PRE 38.96 ± 3.31). No other changes were found in Man ant Math task performance.

*Conclusion***.** Residual heat stress increases the level of sleepiness and induces higher feeling of fatigue, but that does not impair attention and concentration. Moreover, residual heat stress improves spatial rotation function.

Keywords: heat stress, attention, working memory, fatigue, and sleepiness.

INTRODUCTION

Sauna bathing may have therapeutic values (Hannuksela & Ellahham, 2001) and is used for improving beauty and health, or for recovery after exercise (Scoon, Hopkins, Mayhew, & Cotter, 2007). The effects of heat is mediated via the sympathetic nervous system (Vuori, 1988), and increased internal body temperature is described as a physiological stress (hyperthermia) (Moran, Shitzer, & Pandolf, 1998), which worsens the function of the cognitive system. Brain temperature increases in parallel with body temperature during heat stress (Nybo, 2012). That may reduce cerebral blood flow due to hypocapnia and following cerebral vasoconstriction (Nelson et al., 2011), as well as dehydration (Trangmar et al., 2014), impair brain metabolism (Nybo, Møller, Volianitis, Nielsen, & Secher, 2002); and neurophysiological properties (Shibasaki, Namba, Oshiro, Crandall, & Nakata, 2016; Shibasaki, Namba, Oshiro, Kakigi, & Nakata, 2017; Yu, Hill, & McCormick, 2012). Restricted brain blood flow (Shibasaki et al., 2016, 2017) and body liquids loss greater than 2% (Gopinathan, Pichan, & Sharma, 1988) could reduce mental performance. Studies with functional imaging techniques demonstrate that during intense emotional states (for example stress) neural activity in some cognitive-processing areas could be suppressed (Drevets & Raichle, 1998).

Some studies suggest that the conduction velocity of the ascending somatosensory input (Nakata, Oshiro, Namba, & Shibasaki, 2015) and reaction time (Shibasaki et al., 2016) is accelerated under increased body temperature or may reduce neural activity in particular brain regions (Shibasaki et al., 2017). Stressors activate the hypothalamo-pituitary-adrenocortical and the sympatho-adrenal medullary axis, and increase in concentration of cortisol, adrenaline and noradrenaline is observing (McMorris et al., 2006; Minton, 1994). Glucocorticoids cross blood-brain barrier and inflict the cognitive function sustained by the hippocampus and frontal lobes, the two brain regions containing the largest concentration of glucocorticoid receptors (Lupien, Maheu, Tu, Fiocco, & Schramek, 2007).

Less is known about residual heat stress effect on cognitive function when body temperature naturally recovery till normothermia. A study with a whole body cooling after heat stress (skin temperature elevation Δ 4.66 ± 0.63°C, esophageal temperature Δ 1.30 ± 0.24°C) involved decrease in error rate (versus heat stress condition) (Shibasaki et al., 2017). (Shibasaki et al., 2016) determined shorter reaction time, but not changed error rate compares with before when whole body cooling after heat stress (esophageal temperature Δ 2.0°C) was induced. Also cerebral perfusion was eliminated (one of the important factor influencing changes in cognitive performance) in Shibasaki et al. (2016, 2017) studies using face/head cooling. McMorris et al. (2006) determined random movement generation score was significantly poorer comparing pre and post-recovery results (heat stress increased core temperature 1.10 ± 0.11°C, body core temperature returned to pre heat values during recovery), but no differences in choice reaction time, verbal and spatial recall scores were found, and their participants were not dehydrated. Dehydration results in the increase in the level of plasma cortisol with or without heat stress (Hoffman et al., 1994) and decreases cognitive performance in general (Cian, Barraud, Melin, & Raphel, 2001). High level of cortisol is an indicator of anxiety and could inhibit cognition (McMorris et al., 2006).

In this study, we aimed to evaluate the effect on cognitive performance (such as spatial rotation ability, attention, concentration and working memory) after recovery from heat stress when body temperature naturally decreases to initial level. Most of the studies examined changes of cognitive function under heat stress (Hocking, Silberstein, Lau, Stough, & Roberts, 2001; McMorris et al., 2006; Racinais, Gaoua, & Grantham, 2008; Razmjou, 1996; Shibasaki et al., 2017) or using different cooling methods after heating (McMorris et al., 2006; Shibasaki et al., 2017). However, we do not use any cool/cold stimuli, which are described as comfortable and increasing alertness (in combination with elevated body temperature (Cabanac, 1971; Nakamura et al., 2008). Medial and orbital regions of prefrontal cortex are connected with the hypothalamus and other limbic structures (Webster, 1982), so psychological perception of recovery might be more important than the physiological one (McMorris et al., 2006). Since more complicated tasks are more vulnerable to stressors (Hocking et al., 2001), we expect that with altered brain homeostasis during heat stress (Shibasaki et al., 2016, 2017), reduced cortical activity after heat exposure (Nybo et al., 2002, Cernych, Satas, & Brazaitis, 2018) will induce fatigue, impair attention and concentration, and as a result disturbed spatial rotation ability and working memory.

METHODS

Subjects. Sixteen healthy male volunteers (Table 1) participated in the study. They were considered healthy; with no history of psychiatric or neurological disorder, did not consume any psychotropic substances or other drugs; were physically active, but with no excessive sport activities (< 3 times per week); had normal or corrected-to-normal visual activity. Participants were not acclimated to heat. They were asked to avoid intense physical activity for a minimum of 48 h, any food and drink (except water) within 4 h before testing, and to avoid any eating or drinking during both study trials. The experimental

Table 1. **Physical characteristics of the participants**

	Male (n = 16)
Age (y)	24 ± 1
Height (m)	84.27 ± 0.96
Mass (kg)	184 ± 0.52
BMI (kg·m^{-2})	24.73 ± 0.20
Body fat (%)	15.74 ± 1.25

Note. Values are shown as the mean ± SEM.

procedures were approved by the Lithuanian University of Health Sciences Kaunas Region Biomedical Research Ethics Committee.

Experimental protocol. The experiment was designed to investigate post-sauna residual effects on directed attention and executive function in addition to the abilities evaluated by the individual tests (i.e., visuo-spatial skills and mathematical computation). The subjects were familiarized with the procedure 1 week before the trial and practiced switching task three times on three different days. In an experimental (EXP) trial, on arrival at the laboratory each subject was asked to rest in a semi recumbent posture for 20 min in a thermally neutral ambient temperature (Ta 23 °C). Rectal temperature (T_{re}), stabilized heart rate (HR) and subjective ratings were recorded. After resting measurements, the participants seated at a table with a computer and were asked to fill motivation, sleepiness and mood scales and to perform switching task. Upon competition of the task, the subjects were asked to enter a sauna. Sauna (T_a 80-90oC, rh 20%) bathing consisted of four sets (first one 15 min, next three sets 10 min, with 15 rest between each set with the subject in a semirecumbent posture at T_a 23°C).

Before the end of the fourth sauna set, the participants' T_{re}, HR and subjective ratings were recorded. After sauna bathing, participants took a warm shower and rested in Ta 23°C for 90 min until T_{re} and HR recovered till preheating level. 90 min after sauna bathing participants were asked to fill in motivation, sleepiness and mood scales and to perform switching task. In the control (CON) case, instead of sauna the subject spent time in thermal neutral environment. The order of trials for each participant was random.

Measurements of core body temperature and cardiovascular responses. The T_{re} was measured using a rectal thermocouple (Rectal Probe, Ellab, Hvidovre, Denmark; accuracy ± 0.01°C), which was inserted by each participant 12 cm past the anal sphincter. Consecutive 5 s average HR was recorder (S-625X, Polar Electro, Kempele, Finland). Physiological strain index (PSI) was calculated using equation

$$PSI = 5\ (T_{ret} - T_{re0}) \times (39.5 - T_{re0})^{-1} + 5\ (HR_t - HR_0) \times (180 - HR_0)^{-1}$$

The T_{re0} and HR_0 measurements were taken before sauna; T_{ret} and HR_t measurements were taken before leaving the sauna (Moran et al., 1998), where PSI range from 1 (no heat stress) to 10 (very high heat stress) within the limits of the following values: $36.5 \leq T_{re} \leq 39.5$°C and $60 \leq HR \leq 180$ beats min^{-1}.

Subjective ratings. The method was described by Ha, Tokura, Tanaka, and Holmer (1996) and adapted by Cernych et al. (2017) was used to evaluate subjective ratings for thermal sensations, shivering/sweating and thermal comfort. Thermal sensation ratings ranged from 1 (very cold) to 9 (very hot), with 5 being neutral. Shivering/sweating ratings ranged from 1 (heavily sweating) to 7 (vigorous shivering), with 4 being neutral. Thermal comfort ratings ranged from 1 (comfortable) to 5 (especially uncomfortable). Subjective ratings were recorded in the end of sauna bathing to evaluate sauna induced subjective level of stress.

Scales. Participants assessed their own overall motivation rating using the scale from 0 (not at all) to 4 (extremely). Level of sleepiness was evaluated using scale from 1 (vigor, viable, awake) to 8 (like sleeping). Mood was assessed using the Brunel mood scale (BRUMS), which contains 24 simple mood descriptors. Participants indicated whether they experienced such feelings on a 5-point scale (0 – not at all, 4 – extremely). The 24 items comprised the following 6 subscales: anger, confusion, depression, fatigue, tension and vigor, subscale score in range from 0 to 16.

Cognitive domain. Switching task was used from Automated Neuropsychological Assessment Metrics (ANAM4™). The task is a combination of the Manikin (Man) test and the Mathematical Processing (Math) test. The man (Manikin part) is holding a ball in one hand and a cube in the other hand, and a ball or a cube is displayed at the bottom of the screen. The man is standing upright or upside down and either facing toward the user or facing away. The user is instructed to determine which of the man's hands is holding the object displayed at the bottom of the screen and to press one designated "W" to indicate the left hand and "D" to indicate the right hand.

During Mathematical Processing task, an arithmetic problem involving three single-digit numbers and two operators is displayed (e.g., "5 – 2 + 3 ="). The user presses "J" buttons to indicate whether the answer to the problem is less than five or "I" button when answer is greater than five. One problem from each test appears on the display. The problems appear simultaneously side-by-side,

and the participant is directed by means of a red arrow at the bottom of the screen to respond to the problem on the left or on the right. Responses are entered using the keyboard as in the individual tests, with the left hand used for the Manikin and the right hand used for Mathematical Processing. In a variation of the test, only one type of problem is presented on each display and the user responds as appropriate for the given test. For each task accuracy (in %), response time (RT, in s) for correct response and throughput were assessed. Throughput was calculated using an equation:

Throughput = [NumCorr / ((NumCorr + NumInc) * MeanRT + NumLapse * Timeout)],

where NumCorr – number of correct responses, NumInc – number of incorrect responses, MeanRT – mean response time for all items (correct and incorrect), NumLapse – number of trials where no response was made in the allotted time, Timeout – allotted time.

Statistical analysis. The data were tested for normal distribution using the Kolmogorov–Smirnov test, and all were found to be normally distributed. The data are presented as mean and standard deviation (SD). A two-way analysis ANOVA (General Linear Model) was used to determine the effects of residual effects of sauna bathing on cognitive performance (before vs 90 min after) as within-subject factor of two levels and trial (CON vs EXP) as within-subject factor of two levels. If significant effects were found, Tukey's post-hoc adjustment was used for multiple comparisons within each repeated-measure ANOVA. A dependent-sample t-test was used to localize the time point difference. Nonparametric related samples test was applied to evaluate changes in motivation, level of sleepiness and mood.

RESULTS

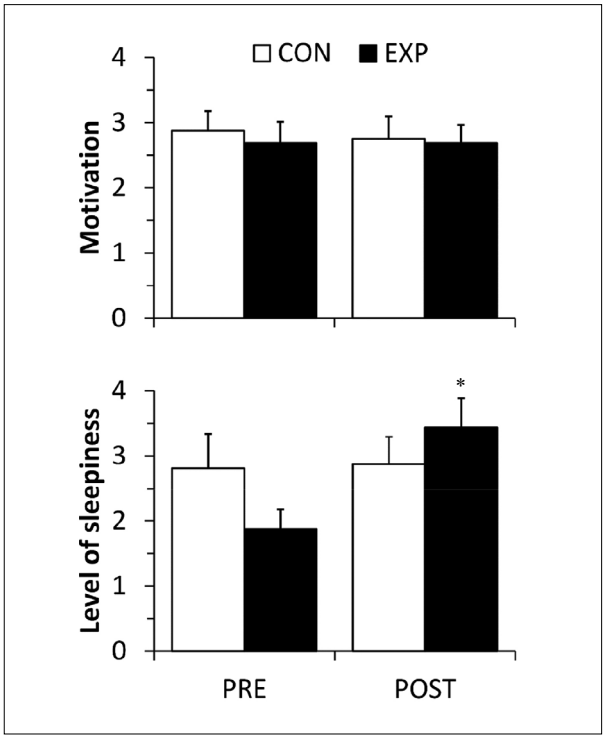
Before leaving the sauna participants experienced between moderate and high stress (Table 2), felt between hot and very hot, were between moderate and heavily sweating and felt uncomfortable. Overall motivation did not change before and after sauna, as well as in CON. Level of sleepiness significantly ($p < .05$) increased 90 min after sauna from 1.88 ± 0.30 (EXP PRE) to 3.44 ± 0.45 (EXP POST), but did not change significantly in CON (PRE 2.81 ± 0.53, POST 2.88 ± 0.30, Figure 1).

Table 2. **Physiological strain index (PSI) and subjective ratings at the end of sauna bathing (before leaving the sauna)**

	Male (n = 16)
PSI	6.45 ± 1.47
Thermal sensation	8.38 ± 0.18
Sweating	1.97 ± 0.19
Thermal comfort	3.00 ± 0.29

Note. Values are shown as the mean ± S.

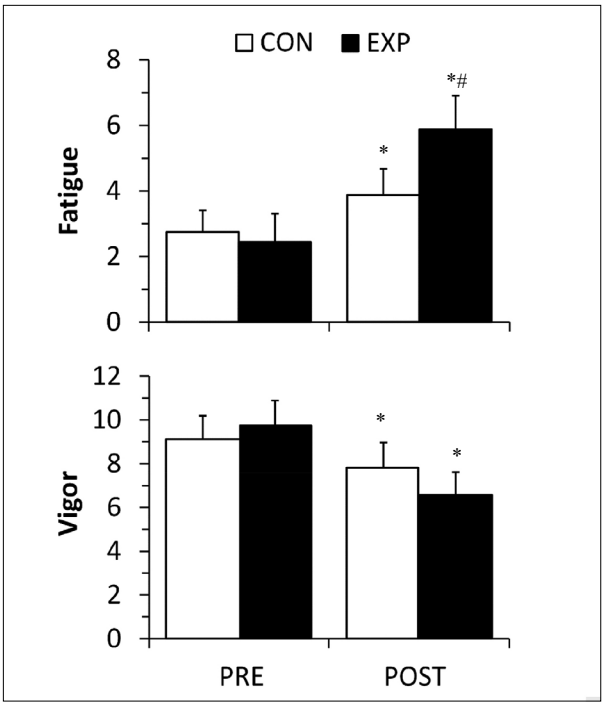
Figure 1. **Subjective evaluation of motivation and level of sleepiness before (PRE) and 90 min after (POST) sauna (EXP)/ rest (CON)**



Notes. Values are shown as the Mean ± *SD*. *$p < .05$ compared with values before.

Anger (CON PRE 0.13 ± 0.34, CON POST 0.21 ± 0.40, EXP PRE 0.06 ± 0.25, EXP POST 0.12 ± 0.33), confusion (CON PRE 0.38 ± 0.72, CON POST 0.19 ± 0.39, EXP PRE 0.06 ± 0.25, EXP POST 0.02 ± 0.08), depression (0 in all cases) and tension (CON PRE 0.19 ± 0.40, CON POST 0.19 ± 0.54, EXP PRE 0.31 ± 0.70, EXP POST 0.13 ± 0.34) did not change significantly comparing before values and those 90 min after in both trials (CON and EXP). Participants felt more fatigue ($p < .05$) during the POST measurements in both trials (CON 3.88 ± 0.79 and EXP 5.88 ± 1.03) compared with before values (CON 2.75 ± 0.66 and EXP 2.44 ± 0.87); 90 min after sauna fatigue was

Figure 2. **Subjective evaluation of fatigue and vigor before (PRE) and 90 min after (POST) sauna (EXP)/ rest (CON)**



Notes. Values are shown as the Mean ± *SD*. *$p < .05$ compared with values before, #$p < .05$ compared with CON.

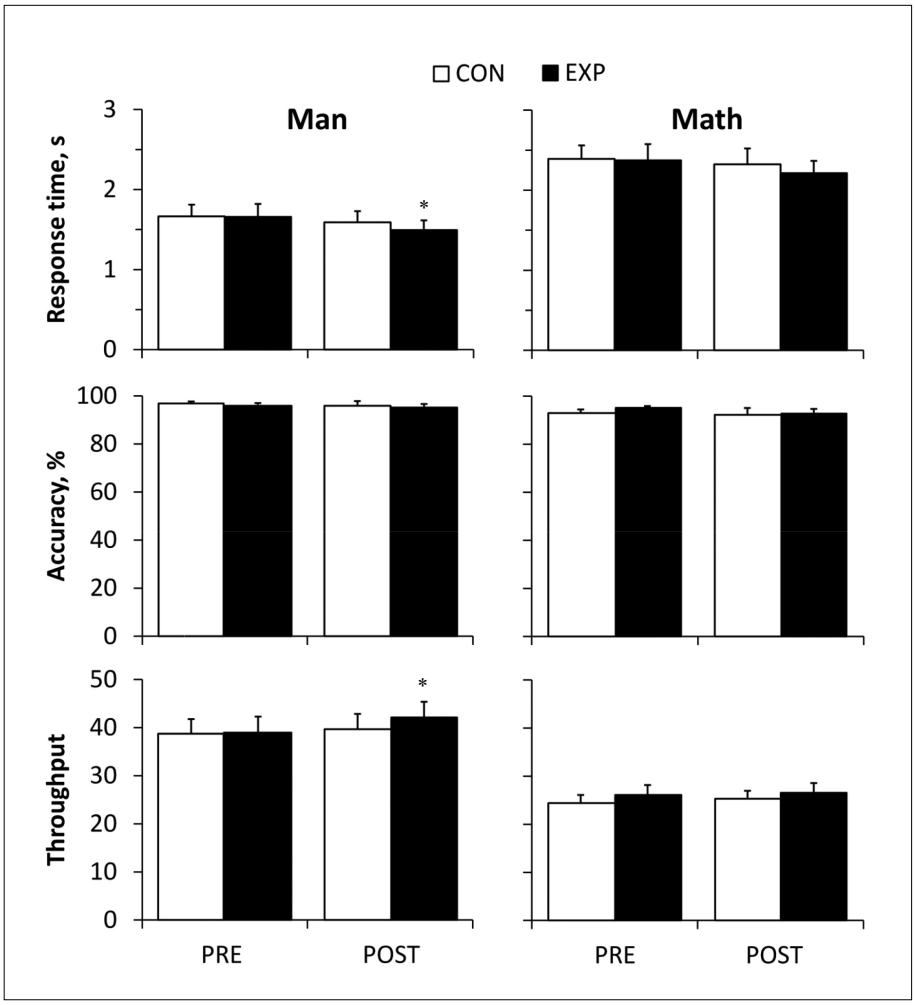
significantly higher ($p < .05$) in EXP compared with CON (Figure 2).

No changes in CON were found in both tasks (Man and Math; RT, accuracy and throughput), also no changes in Math task (RT, accuracy and throughput) in EXP were found comparing PRE and POST measurements (Figure 3). During the EXP POST (1.49 ± 0.12 s) measurements, RT in Man task significantly decreased ($p < .05$) compared with PRE (1.66 ± 0.16 s), and throughput significantly ($p < .05$) increased 90 min after sauna (EXP POST 42.09 ± 3.28) compared with before (EXP PRE 38.96 ± 3.31). No significant changes in accuracy were found in EXP Man task.

DISCUSSION

Functional neuroimaging studies show the potential to elucidate neural mechanism underlying the complex interaction between emotion and cognition, when brain regions involved in performing

Figure 3. **The manikin (Man) and the Mathematical Processing (Math) test mean response time (s), mean percentage (accuracy, %) and throughput of correct responses before (PRE) and 90 min after (POST) sauna (EXP)/ rest (CON)**



Notes. Values are shown as the Mean ± *SD*. *$p < .05$ compared with values before.

some memory or visuospatial tasks become activated, brain regions involved in emotional processing become less active (Drevets & Raichle, 1998). Passive heat exposure which perturbs deep body (and brain) temperature could impair vigilance (Hancock, 1986), damage pre-attentive processing in central nervous system level for a long time (Sun, Li, Min, & Qingjun, 2011), decrease working memory capacity as a result of frontal lobe activity dysfunction in hyperthermia conditions (Racinais et al., 2008). Still the present study shows that post heat recovery induced higher level of sleepiness and higher subjective rating of fatigue feeling, but performance of Math task stays in similar level and results (RT and throughput) of Man task even improve 90 min after heat exposure.

A general consensus that heat exposure is modifying cognition, but the level of performance changes is dependent on the severity of heat strain and the complexity of the task (Hocking et al., 2001). Hyperthermia can improve cognitive performance if the increase in temperature does not disturb homeostasis (Hancock, 1986) and improvement could be due to an activation of the thermoregulatory mechanisms and general physiological arousal (Teichner, 1966). Cognitive function can be improved by moderate exercise (Kamijo et al., 2004; Lambourne, & Tomporowski, 2010). It seems like moderate stress could have positive effect on cognition.

McMorris et al. (2006) showed decreased vigour with no significant changes in reaction time, verbal recall and spatial recall scores after post-recovery. No changes in cognitive performance accompanied with no changes in adrenaline, noradrenaline and serotonin. Only decrease in cortisol was evaluated, but that probably due to cortisol circadian rhythm (McMorris et al., 2006). It seem like rehydrated participant were almost fully recovered in 90 min after heat exposure. As mentioned before, dehydration has significant influence on level of plasma cortisol (Hoffman et al., 1994). Cancelation of this factor might have significant influence on results. In another study participants with recovered cerebral perfusion after heat exposure showed shorter reaction time in auditory oddball task (Shibasaki et al., 2016). Rasmussen, Stie, Nybo, & Nielsen (2004) concluded that reduced alertness during hyperthermia was unrelated with decreased cerebral blood flow. Thus, one of the reasons for improved reaction time could be cold stimuli. When body temperature is high, cold or cool stimuli to the body surface are perceived as being comfortable and increase alertness (Cabanac, 1971; Nakamura et al., 2008). Also participant in Shibasaki et al.s' (2016) study were dehydrated as in the present study. Cortisol could modify mood and cognition (McMorris et al., 2006). The level of cortisol reaches its peak 30 min after stress and remains elevated 1h after (Skurvydas et al., 2017), in combination with dehydration, and it is possible that 90 min it still remains elevated. Despite higher fatigue and sleepiness levels, moderately elevated level of cortisol can have positive effect on cognition. Whereas 90 min after heats stress termination participants partly recovered from stress, due to slow cortisol recovery till baseline (Skurvydas et al., 2017) and dehydration (Hoffman et al., 1994), so cortisol level probably remains elevated, but not to the peak value. Moderate elevation of stress hormone could improve cognitive performance.

Changes in brain temperature may alter neuronal activity, brain metabolism, and cerebral blood flow (Wang et al., 2014). Even small temperature gradients may directly modulate presynaptic and postsynaptic events (Fuxe et al., 2005). Studies with mammals showed an approximately 1oC gradient exists between the cooler cortical region and warmer basal regions (Hayward & Baker, 1969; Serota & Gerard, 1938), also regional differences in the increase in brain temperature during dynamic exercise were observed (Wang et al., 2014). The left presubiculum, retrosplenial complex, and parietal-occipital sulcus coded location identity (Vass & Epstein, 2013). Working memory activates the fronto-parietal brain regions, including the prefrontal, cingulate, and parietal cortices (Chai, Abd Hamid, & Abdullah, 2018). Performing Man and Math tasks different brain regions are activated. However in brain exist regional temperature differences (Hayward & Baker, 1969; Serota & Gerard, 1938), and blood-brain barrier, so permeability, is temperature dependent (Kiyatkin, 2005) we speculatively assume, that hyperthermia differently influence spatial rotation ability and working memory pathways.

CONCLUSION

Residual heat stress increases the level of sleepiness and induces higher feeling of fatigue, but that does not impair attention and concentration. Moreover, residual heat stress improves spatial rotation function.

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ATHLETES' INVOLVEMENT IN DECISION MAKING FOR GOOD GOVERNANCE IN SPORT

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ABSTRACT

Background. Governance is a key component of the effective organization management (Yeh & Taylor, 2008). Therefore, more and more researchers focus on good governance issues. The Initiative – Action for Good Governance in International Sports Organizations (AGGIS) set down guidelines for good governance, incorporating democratization processes. One of the growing good governance and its democratization concerns is involvement of stakeholders, in this case – athletes. Although governance decisions usually affect athletes directly, they have relatively low decision making power (Thibault, Kihl, & Babiak, 2010). The aim of this research was to highlight and discuss the importance of athletes' involvement in decision-making.

Methods. Literature analysis was used to study athletes' role in organizational decision making and its evolvement in recent years. Theoretical framework allowed creating a survey with a purpose to assess the current situation in national sports federations.

Results and conclusions. Literature analysis revealed increasing democratization within sport organizations, which affects greater involvement of athletes in decision making. Theoretical framework allowed making recommendations for sports organizations so that they could become more athlete-centred. Although increasing democratization resulted in greater athletes' involvement in decisions making, some issues still remain unresolved.

Keywords: sport, good governance, athletes' involvement, decision making.

INTRODUCTION

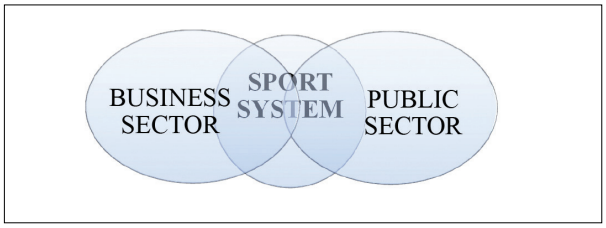
Sport is an international product and service that influences businesses on a global scale. Sport has evolved as an important economic activity and wealth creator as it functions at the individual, organizational, and national levels of a country (Goldman & Johns, 2009). For sports business, possibility to manage its organizations globally is important since sport itself and the related activities are often based on uncertain business future. As a business, it needs to focus more on the diverse nature of the international market in order to develop better management strategies (Ratten, 2011). Sport is no longer defined only as a physical activity, leisure or activity for health improvement; instead it is recognized as a rightful business. Therefore, it is no wonder that within a short period of time, much attention has been devoted to sports management topics as an academic field (Mathner & Martin, 2012).

Sports industry is a wide system with a lot of relations and responsibilities due to which it has to be managed professionally. As international and national sports federations are the most important characters in sports business, for them to be productive they have to become more formalized, in other words – professionalized. Professionalization within the context of sports management can be described as a transformation from amateur management to more institutionalized by hiring staff with substantial competences (Nagel, Schlesinger, Bayle, & Giauque, 2015). Professionalization, according to Bayle and Robinson (2007), can be divided into three sections: professionalization of activities, professionalization

of individuals and professionalization of structures and processes. Summing up, it can be assumed that professionalization embraces all areas of the organization including governance, board structures and its role.

The growth in the commercialization and professionalization of sports industry increased the interest in sports governance. One of the main reasons why sports governance receives comparatively much academic attention is its significant impact on a whole sports system (Ferkins & Shilbury, 2015). According to Chappelet (2017), a common agreement has been adopted that sports organizations should incorporate both "business world" – corporate governance and "public sector" – democratic governance. Visible links between sectors are demonstrated in Figure 1.

Figure 1. **Interactions between sports sector, business sector and public sector (Chappelet, 2017)**



These days, sports organizations face pressure to be profitable, provide high quality services and final product, maintain and increase the interest of consumers, be role models and do all this with limited time and financial resources (Parnell, Spracklen, & Millward, 2017). Rising external and internal requirements and recommendations in a complex business-public environment implied the necessity for the improved governance of sport.

In sports case, governance defines how the power inside the organization is distributed: who makes decisions, who can contribute to decision making, how decisions are communicated to the other parts (Goede & Neuwirth, 2014). Originally, governance functions monitor and give overall directions of the organization. As governance professionalize, those basic responsibilities convert into a full set of functions which are usually seen in business and public organizations (Shilbury & Ferkins, 2015).

The term "governance" can have many meanings, however the concept of improved governance or "good governance" is even more difficult to define, measure and accomplish (Geeraert, 2017). Goede and Neuwirth, (2014) define good governance as a governing process guided by certain values and principles. Uncertainty of the term influenced academics and governing bodies to set guidelines for good governance, consequently, more than 30 guidelines were proposed in the last decades (Chappelet, 2017).

Actions for good governance in international sports organizations (AGGIS, 2013) is one of the most discussed initiatives, the purpose of which

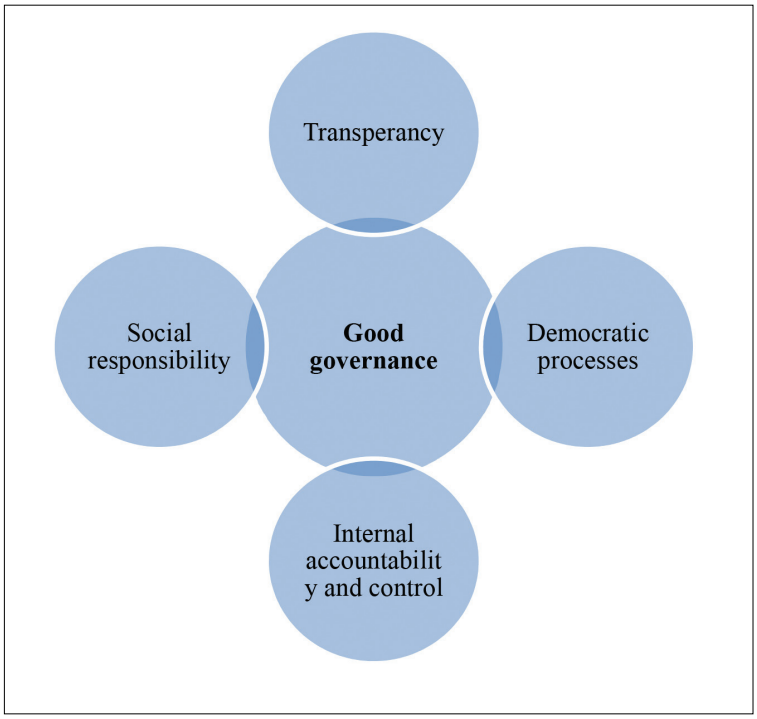


Figure 2. **Classified indicators of good governance (Geeraert, 2017)**

was to identify and highlight the problems of sports governance, yet, at the same time find solutions for those issues. As a result, the sports governance observer was established (Geeraert, 2015). Accordingly, indicators and guidelines for good governance were formed and classified into four sections (Geeraert, 2017) (Figure 2).

A recent study within international sports federations revealed some major issues relevant to contemporary sports governance. One of the issues was related to accountability and transparency in funding management. Other issues included lack of independent ethics committees, insufficient athlete involvement in decision making and unidentified term limits for executive bodies. All those issues could be connected into one key problem – lack of democratic processes (Geeraert, Alm, & Groll, 2014). Referring to the previously discussed concept of good governance, it can be assumed that democracy is a primal and the most important step for further implementation of principles and the lack of it would affect others elements.

In sport organizations, democratic processes usually encompass elements seen in Figure 3.

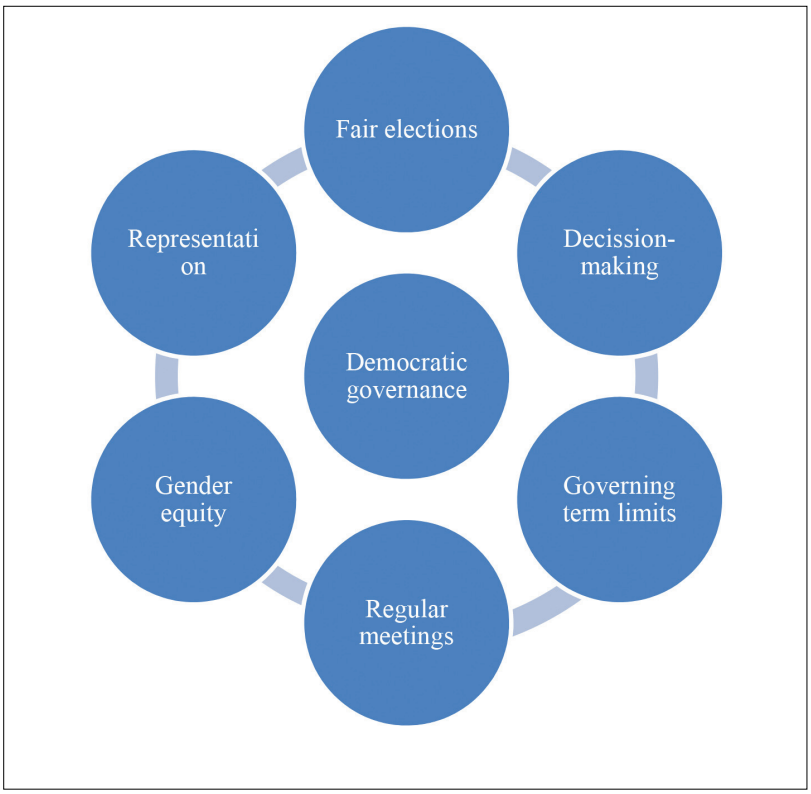
Sharvani (2011) sugests that principles of good governance related to democratic processes include:

- Recognition of the stakeholders' role.
- Equal treatment of all stakeholders and recognition of their rights.
- Accountability and transparency.
- Clearly defined board responsibilities.

Same authors also claimed that participation of stakeholders in the governing processes and decision making is an essential foundation of democracy. Good governance should take into consideration different stakeholder groups and their interests. The main point of this is that it should be done not only because it is obligation, instead good governance should be able to understand the benefits to organization due to stakeholders' involvement. The main challenge here is the changing environment (professionalization and globalization), which complicates determination and classification of stakeholders (Senaux, 2008). The best and easiest way to identify organizations' stakeholders is using stakeholder theory, which is a powerful tool for sports managers to understand, systemically group and effectively communicate with different stakeholders (Friedman, Parent, & Mason, 2004).

Usually stakeholders are classified into internal and external. Internal stakeholders are those who have direct interaction with organizational managers, and external are those who have not (Freeman, 2010). Generally, according to their

Figure 3. **Elements of democratic governance (Alm, 2013)**



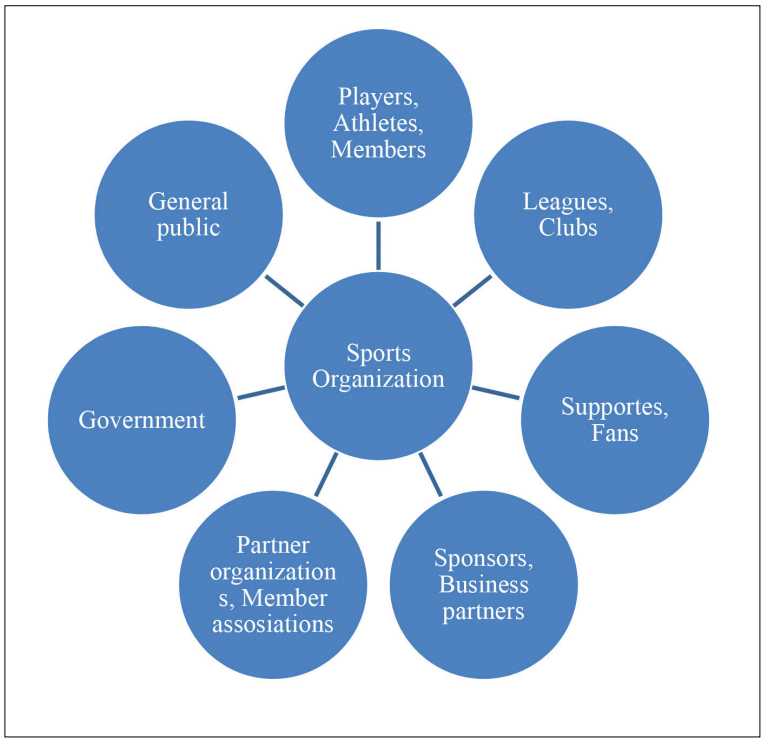


Figure 4. **Key stakeholders of the sports organization (Alm, 2013)**

importance, stakeholders are classified into primary and secondary. A primary stakeholder could be defined as vital for the organization and without which cooperation in the organization simply could not be possible. Meanwhile, secondary stakeholders are those who can affect or be affected by the organization but they are not vital for the organization for its survival (Kristiansen, Strittmatter & Skirstad, 2016). Going deeper, stakeholders can be of three types: latent, expectant and definitive. Latent stakeholders' interests and power to organization are low; therefore they are not so important and noticeable, while expectant stakeholders have strong interests in organization's issues but lack importance and power which lead to more attention from managers. Finally, definitive stakeholders are the most interested and active; they require a lot of attention and are the most important (Ferkins & Shilbury, 2015) for the organization. Stakeholder theory and the specific environment which surrounds a sports organization suggest the further stakeholders' determination (Figure 4).

It can be agreed that stakeholders' involvement directly affects the welfare of the organization and yet in practice, application of stakeholder theory can face the following challenges:

- Dilemma for which stakeholders group the system should be designed.
- It is difficult for stakeholders to understand the organization's system and it discourages them from engagement (Ferkins & Shilbury, 2015).
- Focusing on one or few stakeholders' groups can negatively impact relationships with other groups (Hassan & O'Boyle, 2017).
- Limited resources cause difficulties for managers and directors in trying to reconcile the different interests of stakeholders (Senaux, 2008).
- Need to include variety of stakeholders causes coordination issues (Smith-Swan & Parent, 2013).
- Some stakeholders may be harmful and cause destabilizing effect to the entire organization (Kuźbik, 2017).

Nevertheless, Post, Preston and Sachs (2002) argue that managing stakeholders, who are closest to the organization, should give common benefits both to the organization and to the stakeholders while managing interest groups and general public should consist of conflict avoidance, harm reduction or creation of benefits.

An important stakeholders' group, which are highly interested, directly affects and is affected by the organization – athletes who can and should be emphasized (Thibault et al., 2010). Sports rules and regulations directly affect athletes' professional and sometimes personal lives, however traditional hierarchic sports governance rarely solves sports policy questions in consultation with athletes

and almost never in co-operation with athletes (Houlihan, 2004).

Usually sports governance could be defined as a hierarchical pyramid structure which operates at international, national and local levels. At the top of the pyramid, there are international sports federations, a step below – national sports federations and at the lowest basis – clubs and athletes. In this structure, only units closest to international sports federations have legal power and control, while those at the bottom lack power and control. As a consequence, for many years sports governance lack influence and involvement of athletes in decision making processes (Geeraert, 2015).

As many complaints regarding athletes' involvement were received, development of athletes' rights was noticed by sports organizations (Thibault et al., 2010). However, most governing bodies give athletes voice through limited membership, forum or athlete committee / commission. In this way, athletes are structurally provided with some kind of involvement but are safely isolated and buffered from any major decision making power. Although some sports organizations have institutionalized athlete participation and representation, the majority of organizations have not granted formal decision making power for athletes (Alm, 2013). Therefore athletes have a voice but do not have a vote.

Greater athletes' involvement in decision making processes is undoubtedly necessary and could be beneficial not only for athletes but also for the entire organization and this evidence is:

- Athletes inclusion in governing processes makes policies more effective as individuals whose opinion is heard tend to accept governance decision as their own.
- Athletes could provide specialized knowledge and understanding concerning specific issue which leads to more effective problem solving mechanism (Koppenjan & Klijn, 2004).
- If participation in policy process is legitimate, athletes' inclusion decreases the possibility of legal issues and conflicts (Sørensen & Torfing, 2009).

Growing demand of athletes' greater involvement triggered discussions and created conditions for athlete-centred system development within Canadian sports organizations. The main idea of athlete-centred system is that a sports system exists because and for athletes, therefore the main focus in the development of policies, programs, and procedures should be on involving them in ongoing decision making process. Athlete-centred sports system is not only ensuring support, resources, good training, couching or facilities; it is also about formal athletes' involvement in decision making and policy formation (Kihl, Kikulis, & Thibault, 2007).

METHODS

Literature analysis was used to study athletes' role in organizational decision making and its evolvement in recent years. Theoretical framework was used in creating a survey with a purpose to assess the current situation in Lithuanian national sports federations.

RESULTS AND DISCUSSION

As sport is considered a multidisciplinary subject, scientists from different disciplines, including finance, marketing, law, psychology, sociology, ethics and management, are interested in this field from their perspective. Sports management themes vary from consumer's behaviour to economic impact, from marketing implementation to organizational culture (Nite & Bernard, 2017). Conclusion can be drawn that sports management is a vast field of subjects which can apply all traditional management principles.

Since it is agreed that sports industry is a wide system with a lot of relations and responsibilities, it has to be managed professionally. As international and national sports federations are the most important characters in sports business, for them to be productive they have to become more formalized, in others words – professionalized. Professionalization within the context of sports management can be described as a transformation from amateur management to more institutionalized one by hiring staff with substantial competences (Nagel et al., 2015). Professionalization embraces all areas of the organization including its governance, role and board structures.

The concept of good governance is so vast, intangible and flexible that there is no certain way or principle how to become good, instead there is vast amount of recommendations which helps organizations to improve and it only depends on organizational will.

On the other hand, some authors argue that the term good governance is not useful and does not give tangible benefits. Chappelet (2017) suggests that instead of "good governance" the term "better governance" should be used. He argues that organizations are too different to be guided in the same way and principles, which suit one organization, could be worthless to others. So, instead of blindly following good governance guidelines, organizations should try to be better, in that way it is easier to measure improvement.

CONCLUSION

Katwala (2000) argued that international sport could be declared as the worst governed body in the world and as the main issues he distinguished those related to legitimacy and efficiency. Although much has been done in sports industry since this declaration, some issues considering sports governance still remain the same.

In recent years there was a noticeable increase of interest in the concept of good governance. Uncertainty of the term led researchers and governing bodies to set guidelines for sports organizations in order to become well governed. Guidelines for good governance include transparency, democratic processes, internal accountability and control as well as social responsibility. One of the main challenges faced by sports organizations is the lack of democratic processes. Democratic processes usually include fair elections, open discussions, fair participation in decision making, where all related parties are heard. The main issues in democratic processes are related with stakeholders' representation and involvement. Since athletes could be defined as a key stakeholder who is directly affected by the governance decisions, their role in governance and decision making processes should be reconsidered. Based on the literature review, further research with the aim to assess the current situation in Lithuanian sports federations should be carried out. Further research will be helpful in creating guidelines for federations in order to become more athlete-centred.

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THE MANAGEMENT OF TURF TOE – A SYSTEMATIC REVIEW

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ABSTRACT

Background. Turf toe is used to describe an injury occurring at the plantar aspect of the metatarsophalangeal-sesamoid complex of the hallux. Typically seen in athletes, it occurs due to hyperdorsiflexion and axial loading of the hallux metatarsophalangeal joint with the foot fixed in equinus. The injury causes pain and joint instability, missed athletic activity and potentially end careers. Turf toe can be managed conservatively or operatively, with controversy regarding the indications for operative intervention. This study aims to conduct a systematic review to determine whether and in what circumstances operative intervention is superior to conservative management of turf toe in adults.

Methods. A systematic review of the literature was performed using PubMed, Embase, Cochrane and Scopus databases. The search terms used were "turf toe", "first metatarsophalangeal joint injury", "conservative", "nonoperative", and "operative". All articles published in English reporting on the management of turf toe were reviewed. The primary outcome measure was the time to return to pre-injury activity with the secondary outcome of the time to symptom resolution.

Results. Seven studies met the inclusion criteria. Three patients were successfully managed conservatively returning to athletic activity, on average at 12 weeks. Seventeen patients underwent surgical intervention with an average return to athletic activity at 18 weeks.

Conclusion. Operative intervention was shown to give a successful outcome in patients with grade three turf toe injuries or those who have failed conservative management. However, there is insufficient evidence to determine whether operative intervention is superior to conservative management.

Keywords: turf toe, first metatarsophalangeal joint injury, conservative, nonoperative, and operative.

INTRODUCTION

Turf toe is an umbrella term used to describe an injury occurring at the plantar aspect of the metatarsophalangeal-sesamoid complex of the hallux. Bowers and Martin (1976) first coined the term in 1976 in response to injuries of the hallux seen in American Football players playing on artificial turf. Since then, increasing attention has been given to the hallux metatarsophalangeal joint injuries. Clanton and Ford (1994) identified the foot as the third most common time loss injury amongst university athletes, of which the hallux metatarsophalangeal joint was a significant proportion. The incidence of turf toe is difficult to assess with the injury often unreported. When Bowers and Martin (1976) first described the injury they noted turf toe occurring 5.4 times per season in a group of 500 collegiate American Football players and similar results were found by Coker, Arnold, and Weber (1978) in a second group of collegiate American football players. Within professional American football players, Rodeo et al. (1990) reported an incidence of 45% in 1990 with 83% of injuries occurring on artificial turf. The current belief is that this has decreased with a recent retrospective 5-year analysis of collegiate American football players (George, Harris, Dragoo, & Hunt, 2014) reporting an incidence of 0.062 per 1000 athlete exposures.

Anatomy and biomechanics of the hallux metatarsophalangeal joint. The hallux metatarsophalangeal joint is a condyloid joint which permits movement as a hinge joint and also allows sliding movements. On toe off, during normal gait, dorsiflexion occurs at the hallux metatarsophalangeal joint. This initial 20 degrees of dorsiflexion occurs as the head of the metatarsal pivots around the proximal phalanx. To dorsiflex beyond this the hallux metatarsal is required to slide backwards from the articular surface of the phalanx which allows the final 60 degrees of normal active dorsiflexion (Joseph, 1954).

The hallux metatarsophalangeal joint has minimal bony stability secondary to the proximal phalanx's shallow articular cavity in which the head of the metatarsal lies. The majority of the joints stability therefore comes from the capsule, ligaments and surrounding tendons. Fan shaped medial and lateral collateral ligaments travel between the first metatarsal and proximal phalanx and provide valgus and varus stability. These are essential structures for athletes when they are rapidly changing directions while sprinting. This is seen in American football when undertaking a "cut move" most commonly performed by running backs and wide receivers (McCormick & Anderson, 2009). The plantar plate is a fibrous thickening of the plantar capsule which courses from a relatively weak attachment of the metatarsal head to a strong attachment to the proximal phalanx. Along with these structures the joint is dynamically stabilised by the flexor hallucis brevis and its associated sesamoids, adductor hallucis and abductor hallucis tendons (Lohrer, 2001).

During normal gait the capsular ligamentous complex of the hallux metatarsophalangeal joint withstands 60% of body weight (Stokes, Hutton, Stott, & Lowe, 1979). This increases up to 300% of body weight in normal athletic activity, and 800% of body weight when undertaking a running jump (Nigg et al., 1986). It is therefore clear that a strong metatarsophalangeal-sesamoid complex of the hallux is essential when undertaking athletic activity, and any injury of this joint will significantly impact performance ability.

Mechanism of turf toe injury. The mechanism of injury is a summation of the amount of energy imparted to the structure (in this case the great toe) and the extent and direction of abnormal range of force at the time of the force (VanPelt, Saxena, & Allen, 2012). The most common mechanism of injury is a combination of hyperdorsiflexion and axial loading of the hallux metatarsophalangeal joint with the foot fixed in equinus (McCormick & Anderson, 2010). As a result of this, a compressive force is applied to the base of the proximal phalanx and dorsal aspect of the articular surface of the hallux metatarsal, which can lead to intra-articular injury. A distraction force occurs at the capsule ligamentous plantar complex which can result in a range of pathologies including sprain or strain, partial or complete plantar plate tear and sesamoid fracture. A complete disruption of the plantar structures can even lead to dorsal dislocation of the joint (Van Pelt et al., 2012).

Variations of the classical mechanism can occur, but this is dependent upon the point of the force and position of the hallux (McCromick & Anderson, 2009). Watson, Anderson, and Davis (2000) described a valgus force which resulted in a more significant injury to the medial plantar capsular ligamentous sesamoid complex. This mechanism was also described by Douglas, Davidson, Robinson, and Bedi (1997) in which a footballer experienced this injury due to a slide tackle from the side. In cases of injury to the medial complex, there is a resultant contracture of the lateral complex leading to a traumatic hallux valgus and bunion deformity McCormick and Anderson 2009. A varus force resulting in injury has been reported in rare instances, which leads to injury of the lateral complex structures and a hallux varus deformity (Mullis & Miller 1980).

Risk factors. A flexible shoe in combination with a hard artificial surface was believed to be the source of turf toe injury when first postulated By Bowers in 1976. Bowers (1976) noted that traditional American football boot contained a metal plate making it rigid, in comparison to more modern football boots which were flexible. This increased flexibility provided little support to the hallux metatarsophalangeal joint, thus providing a greater risk of injury (Prieskorn, Graves, & Smith 1993). Artificial surfaces (turf), from which the condition gets its name, have been shown to increase risk, despite the development of third generation artificial turf. Artificial turf consists of a layer of synthetic fibres with or without a layer of infill. Traditionally sand was used infill but other options include silicone or rubber. No research has currently investigated the rate of turf toe on the current 4th generation artificial surfaces, which is characteristically softer and more shock absorbent

than the third. However, it should be noted that the condition is not exclusive to artificial surfaces and has been reported to occur on natural grass too (Mullis & Miller 1980). George et al undertook a retrospective review of 5 seasons of collegiate American football and noted the turf toe injury was more likely to occur during games when compared to practice. Along with this, the position of the player affected their risk with running backs and quarterbacks more likely to suffer turf toe injury (George et al., 2014).

Presentation and clinical assessment. The presentation of turf toe requires a high index of suspicion in all patients presenting with pain or swelling of the hallux metatarsophalangeal joint. On observing the hallux, it should be observed for swelling, bruising or malalignment. Bruising on the plantar surface should raise suspicion of disruption of the plantar capsular ligamentous sesamoid complex, with the possibility of a sesamoid fracture (VanPelt et al., 2012) The joint and surrounding structures should be palpated, with tenderness over the dorsal aspect of the base of the proximal phalanx raising the suspicion of intra-articular injury (McCormick & Anderson, 2010).

The stability of the joint should be assessed by providing a dorsal and plantar stress for the plantar and dorsal complexes along with a varus and valgus stress for the collateral ligaments (McCormick & Anderson, 2010). Comparing the assessment with the non-injured side can be helpful in evaluating any change in stability. Active and passive range of motion and power should be assessed to ensure the integrity of flexor and extensor tendons. A reduced strength in active flexion suggests a disruption of the plantar plate. Neurovascular compromise is rare and is only seen in non-reduced dislocations of the hallux metatarsophalangeal joint (VanPelt et al., 2012).

Imaging. If there is a clinical suspicion of turf toe injury, weightbearing anteroposterior lateral and sesamoid axial view radiographs should be undertaken. These are often normal; however, a small avulsion fracture of the proximal phalanx or sesamoid fracture may be seen suggestive of plantar plate disruption (McCormick & Anderson, 2010). Comparison radiographs of the other foot are useful to compare position of the sesamoids. Prieskorn et al. (1993) have demonstrated that patients who have a complete plantar plate rupture have proximal migration of the sesamoids.

Fluoroscopic imaging can be used to provide a dynamic assessment of the metatarsophalangeal joint and sesamoid complex. Lack of distal sesamoid movement with hallux dorsiflexion is suggestive of plantar plate rupture (Lohrer, 2001). Magnetic resonance imaging (MRI) should be used in all grade 2 and grade 3 turf toe injuries to identify osseous, articular or soft tissue injury, aiding in grading and treatment of turf toe injury.

Classification. Multiple researchers have attempted to classify turf toe injuries. Clanton and Ford (1994) originally described a system based on clinical assessment and Anderson modified this with the addition of radiograph and MRI findings (Table1).

Table 1. **Anderson turf toe classification system**

Grade	Pathology	Clinical	Radiographs	MRI
1	Strain of the capsule without loss of continuity	Normal range of motion, no visible ecchymosis, and the patient can bear weight.	Normal	Intact soft tissue complex with surrounding oedema
2	Partial tear of the plantar plate and capsule	Painful motion and difficulty weight bearing	Normal	Soft tissue oedema and high signal intensity that does not extend through the full thickness of the plantar plate
3	Complete tear with loss of continuity of plantar plate and capsule	Associated injuries including sesamoid fracture, diastasis of bipartite sesamoids, dorsal metatarsal articular impaction, and proximal sesamoid migration	May show avulsion fracture of the proximal phalanx, sesamoid fracture, proximally migrated sesamoid, metatarsophalangeal joint dislocation	High signal intensity completely traversing the plantar capsulo-ligameontous complex and sesamoid and chondral injury

Current Standings. Turf toe injury causes major issues in foot function with significant clinical features, which leads to substantial time away from athletic activities for athletes. Clanton, Butler, and Eggert (1986) found that, despite treatment, 50% of those suffering turf toe injury have persistent symptoms at 5 years. The impact of the loss of a professional athlete from his team is significant. It has been shown that injuries such as turf toe have a significant influence on the performance of a team. An eleven-year prospective study showed that injuries had a significant influence on professional football teams in both domestic and continental football tournaments (Hägglund et al., 2013). For the athlete, time away from athletic activity has significant financial implications with loss of performance bonuses. With a severe turf toe injury, it is likely that a substantial amount of training will be missed, therefore inhibiting performance of the individual and the team, and there is even the potential for this injury to end their career (Bouchette, 1985; Florio, 2015).

Despite the potential severity of the injury, management of turf toe does not have any clear evidence based guidelines at present. Current management of grade 1 and 2 injuries is conservative with initial rest, ice, compression and elevation. Following this, a period of rest is required with support of the hallux metatarsophalangeal joint, whether this be taping or a walking boot (Prieskorn, Graves, & Smith, 1993). There remains much controversy over the management of grade 3 turf toe injuries and the indications for operative intervention. The current indications identified for surgical intervention are:

- large capsular avulsion with unstable joint,
- diastasis or retraction of sesamoids,
- vertical instability,
- traumatic hallux valgus deformity,
- chondral injury,
- intra-articular loose body,
- sesamoid fracture,
- failed conservative treatment.

These are based on level 5 evidence and expert opinion, but as yet no systematic review has ever been undertaken.

METHODS

Search strategy and selection criteria. A systematic review of the literature was performed using the PubMed, Embase, Cochrane and Scopus databases. They were searched from inception to 30th November 2016, English language articles only. The search terms used were "turf toe", "first metatarsophalangeal joint injury", "conservative", "nonoperative", and "operative". Relevant articles were also identified by cross-referencing the citation lists of included articles. Due to the expectation that there were likely to be few randomised controlled trials, all study designs were included. Articles were included if they met the criteria of: published in English, contained original data, and reported on a nonoperative or operative management strategy for turf toe. Articles were excluded if they solely reported on: under 18's, management of isolated sesamoid fractures or no outcomes reported. The primary outcome measure was the time to return to pre-injury activity with the secondary outcome of the time to symptom resolution.

Data extraction and data items. The initial search produced a total of 409 articles. Duplicates were then removed and three further articles were identified through cross-referencing the citation list of relevant articles, giving a total of 260 articles. A single non blind author independently screened all articles from the search; initially titles and abstracts were screened for eligibility. Following this process 201 articles were excluded. After the initial screening, full articles were reviewed, where available, by the same non blind author and a reason provided if articles were excluded (Appendix 1). For included studies, the same author extracted data using a data extraction sheet which was developed based on the Cochrane consumers' data extraction template (Appendix 2). Data items extracted from the included articles were:

- study design,
- sample size,
- participant age,
- participant gender,
- grade of turf toe injury,
- time from injury to treatment initiation,
- type of treatment,
- time to return to pre-injury activity,
- time to resolution of symptom,
- length of follow up.

No changes were made to the search strategy, selection criteria, data extraction and data items following the initial design proposed.

Data analysis. Due to the fact only 7 studies were included, four case series and 3 case reports, with a small number of participants, a meta-analysis was not undertaken. Data was analysed

using qualitative analyses and descriptive statistics. Time to return to pre-injury activity was measured in weeks and was converted from months and days where necessary. This was also the case for the secondary outcome of time to resolution of symptoms.

RESULTS

Study selection. A total of 7 studies met the inclusion criteria of this systematic review. The databases of PubMed, Embase, Cochrane and Scopus provided a total of 409 articles with a further 3 arising from the references of these articles. Of these studies 260 remained following removal of duplicates. These 260 articles were screened and 201 articles were removed as they clearly did not address the systematic review hypothesis. 59 articles had their full text articles reviewed in detail, where available. 52 of these articles failed to meet the inclusion criteria as described and were therefore excluded. The reason for each individual studies exclusion can be seen in Appendix 2. Seven studies met the inclusion criteria and were therefore included in this review. There were no unpublished relevant studies obtained for this systematic review. Figure 2 shows the PRIMSA flow diagram for this review.

Study Characteristics. Methods. There were no randomized control trials on the management of turf toe. All 7 studies are retrospective case studies (4) or case reports (3) published in English (Table 2). Each study was at a single centre. The studies identified patients with turf toe through clinical or radiological (MRI) diagnosis and describe the management of their patient population and outcomes. The duration of follow up was highly variable between studies ranging from 6 months to 10 years.

Participants. The studies included in this review had a total of 48 participants. The participants were all adults (age over 18) with a turf toe injury. Across the studies there was no limitation of whether this was an acute or chronic presentation of turf toe injury.

Intervention. The interventions the patients received consisted of conservative or operative intervention. Conservative intervention varied across the studies but all included an initial period of rest. This was then followed by supporting the injury with a range of techniques, including but not limited to: taping, toe spika, walking boot and a

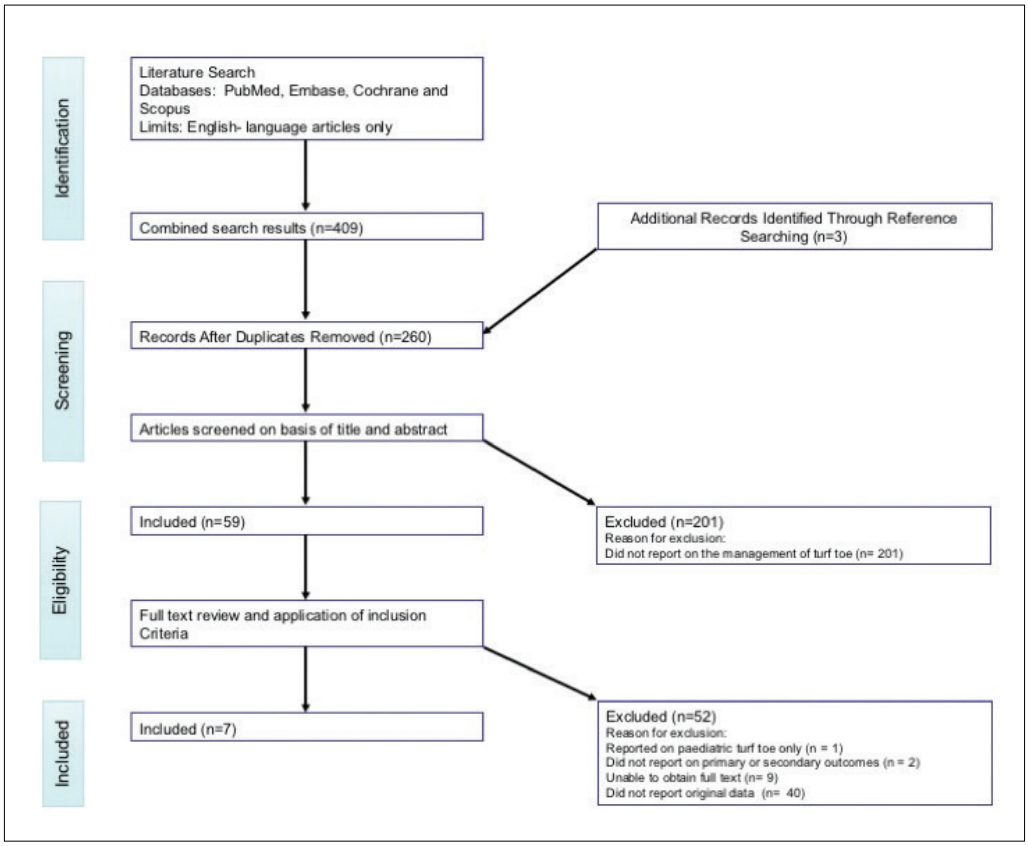

Figure. **PRIMSA flow diagram**

Table 2. **Summary table of included studies evaluating the management of turf toe Injury**

Author	Study design	Number of participants	Participant age range	Initial type of management	Outcomes reported	Length of follow up
Anderson et al.	Case Series	19	18–33	10 Conservative 9 Operative	Primary and Secondary outcomes reported in those who underwent operative intervention	1–10 years
Coker et al.	Case Series	18 (only 8 reported on)	N/A	5 conservative 3 operative	Primary and secondary outcomes	N/A
Drakos et al.	Case Series	3	19–21	1 Conservative 2 Operative	Primary outcome	6 Months
Faltus et al.	Case Series	5	18–22	2 Conservative 3 Operative	Primary and secondary outcomes	N/A
Lohrer et al.	Case Report	1	26	Conservative	Primary outcome	6 Months
Roche et al.	Case Report	1	31	Operative	Primary outcome	2 years 6 months
Sahin et al.	Case Report	1	19	Conservative	Primary and secondary outcomes	10 months

cast. For those undergoing operative intervention there was again a variety of procedures performed, as there is no single described procedure or approach recognised for managing turf toe.

Outcomes. Primary – in all studies the primary outcome of time to return to athletic activity was reported. Two studies failed to report this in all their participants. Anderson et al reported this outcome in the 9 participants who underwent operative intervention but not for those undergoing conservative management. Coker et al reported the primary outcome in 8 of the 18 participants but did not report this in the other 10 of his case series.

Secondary – the secondary outcome of time to resolution of symptoms was rarely reported on across the studies. Many studies coincided resolution of symptoms with increasing athletic activity, this therefore being recognised as the same. However, other studies with long term follow up patients noted that patients had resumed athletic activity despite on-going symptoms from the turf toe injury.

Risk of bias within studies. To assess the risk of bias within the included studies, a risk of bias assessment was conducted using the Cochrane collaboration of risk of bias tool. This was undertaken by a single non blind author. All seven studies were shown to have a high risk of bias in multiple areas. All studies were shown to have a high risk of selection, performance and detection bias. The reason for the high risk in bias across the studies is related to study design, consisting of case series and case reports. All studies suffered from a lack of randomisation, concealment and blinding.

Conservative management of turf toe. The systematic review revealed a total of 20 participants who underwent conservative management initially. Of this group, 4 were deemed to have failed conservative management and subsequently underwent surgical intervention. The duration of conservative management the patients received before it was deemed to have failed was not consistently reported across the studies. Only 3 studies reported on the time to return to pre-injury activity in their conservatively managed participants. This consisted of three participants who had the primary outcome reported of the average time to return to pre-injury activity, which was 12 weeks (range 3–24 weeks). No studies reported on the average time to symptom resolution in those who underwent conservative management.

Operative management of turf toe. The grade of injury for those who underwent operative intervention included:

- Two grade 2 injuries which failed conservative management.
- Fifteen grade 3 injuries in which it was the primary treatment.
- One grade 3 injury which failed conservative management.

The time to return to pre-injury activity was clearly reported in 6 of the studies. In this group the average time to return to pre-injury activity

was 18.16 weeks (ranging from 15–24 weeks, Appendix 3). The exact operative procedure of these participants was highly variable. There was variation reported in surgical approach: medial, lateral or both. There was also variation in the operative technique, which comprised of including direct suture repair of the plantar plate, sesamoidectomies, abductor hallucis transfer to restore the plantar plate, and the use of a Kirschner wire to hold the toe in plantar flexion to relax the soft tissue repair.

Few studies reported on the average time to resolution of symptoms, with some studies such as Roche and Calder (2014) and Sahin, Atici, Bilgen, and Bilgen (2004), stating that symptoms were resolved at the time of resolution of pre injury activity. Anderson et al reported that 2 of the 9 patients who underwent operative intervention had ongoing symptoms within a follow up period of 1–10 years. One patient had joint stability but reported suffering persistent pain upon toe-off. The second developed severe progressive degenerative joint disease. Along with this, Coker et al. (1978) reported two cases of ongoing symptoms despite intervention.

Only one case was reported where the patient was unable to resume pre-injury athletic activity. In this case, an American football player suffered a turf toe injury and sesamoid fracture. This was managed conservatively for 5 months prior to operative intervention. Unfortunately, the participant was unable to resume pre-injury athletic activity and after a 5 year follow up he was unable to perform the toe off phase which enabled him to run secondary to this injury.

DISCUSSION

Turf toe injury is a significant cause of missed athletic activity for both the amateur and professional athlete causing significant morbidity and can lead to the end of an athlete's career (Bouchette, 1985; Drakos et al., 2015). Since the condition was first described in 1976 there has been ongoing debate as to when operative intervention is superior to conservative management. This systematic review has evaluated the outcomes of patients who underwent either conservative or operative intervention, and also identified those who underwent operative as a result of failed conservative intervention.

Overall, the review highlighted that the current evidence is far from robust. This makes the identification of definitive surgical indications, and a direct comparison of the outcomes of patients, who undergo conservative or operative intervention for turf toe very difficult. Interestingly, no evidence was found for the management of grade 1 turf toe injuries, and there was limited evidence on the conservative management of grade 2 injuries. The current professional opinion is that these should be managed conservatively. The reasons for the lack of evidence could be that the injury is often missed or overlooked leading to difficulty in identifying cases. Secondly, given that grade 1 and grade 2 turf toe tends to be managed conservatively, the lack of evidence could suggest that there is little controversy over their management.

Conservative management. In the cases where grade 2 injuries were reported to have been managed conservatively, the time to return to pre injury had a large range, from 3–24 weeks. This wide range highlights that despite the presence of a classification system, there is significant variety in the severity of the injury within each grade. The time to return to pre injury activity will also depend on the patients demands, such as the activity undertaken and the level (amateur or professional) they are performing at.

There was significant variation in what conservative management of turf toe involved. Drakos et al. (2015) proposed an initial period of 5 weeks nonweightbearing in cast immobilisation before a period of partial weightbearing in a walking boot and then an athletic shoe with a carbon or steel insert to limit dorsiflexion. In comparison to this Faltus et al. (2014) proposed a shorter period (2.5 weeks) of nonweightbearing in a walking boot with the hallux metatarsophalangeal joint being taped. After this a period of partial weightbearing for a week and full weightbearing at 4 weeks with the use of a carbon orthotic. Participants were then able to progress to jogging, agility drills and non-contact sporting activities once symptoms had decreased at 6 weeks (Faltus et al., 2014). The focus of the rehabilitation programme was that of improving the strength and proprioception of the injured area and surrounding structures before progressing to full activity (Faltus et al., 2014). This significant variation in practice highlights that there is no current standard for conservative management and is likely to vary significantly in clinical practice.

Operative management. A total of 18 participants underwent operative intervention for turf toe injury with the most common indication being a grade 3 injury (Appendix 3). No grade 1 injuries underwent operative intervention, and two grade 2 injury that had failed conservative management underwent operative intervention. Only one grade 3 injury was found to have been managed conservatively; this was unsuccessful and subsequently underwent surgery Across the studies there was significant variability in the operative procedure undertaken. The approaches described included medial, lateral or a dual approach. The technique of repair of the plantar plate also showed significant variability: which comprised of including direct suture repair of the plantar plate, sesamoidectomies, abductor hallucis transfer to restore the plantar plate, and the use of a Kirschner wire to hold the toe in plantar flexion to relax the soft tissue repair. There have been no studies that have compared the surgical approach or surgical technique of turf toe.

The current widely cited indications for surgery are based on expert opinion rather than evidence. This systematic review highlights that there is insufficient evidence to determine in which circumstances operative intervention is superior to conservative management. However, it does show that for grade 3 injuries, and for those turf toe injuries that failed conservative management, undergoing operative intervention has successful outcomes. Therefore, we recommend that operative intervention should be considered in all cases of grade 3 turf toe and in all cases where conservative management has failed. The strength of this recommendation is based on very low quality evidence as per its' GRADE score.

While failed conservative management is a proposed indication for surgery, it is not clearly defined as what a failure of conservative management is. Sahin et al. (2004) defined this as on-going pain and instability despite 6 months of conservative management. Whereas Lohrer (2001) defined this as persisting symptoms after 3 weeks of conservative management. The lack of a standardised conservative management regime makes it difficult to define when conservative management has failed, due to the significant variability. Therefore, a case by case assessment of patients' needs should be undertaken when offering operative intervention for patients who have on-going clinical features.

The average time to return to pre-injury athletic activity in those undergoing operative intervention for turf toe injuries was found to be just over 18 weeks. This is an important finding to note as it allows us to guide both professional individual athletes and those performing in team sports of the expected recovery time, which may aid decision making on timing for surgery. While the majority of cases managed operatively had a successful outcome, it should also be noted that Coker et al. (1978) described a case in which a running back in American Football was unable to return to athletic activity following operative intervention. He subsequently was unable to run when reviewed 5 years post-operatively. This case highlights that operative intervention is not a guarantee of successful outcome and all patients should be counselled about this prior to surgery. Furthermore, the level of performance following operative repair of turf toe injury can be questioned. While the review shows that patients can return to athletic activity, there is no detail as to how they performed competitively following the injury, and how much of a phased return was necessary.

Limitations of the included studies. The risk of bias of studies included in this systematic review is generally high throughout. Given the study designs, case series and case reports there was no randomisation or concealment of the participant's treatment giving a significant risk of selection bias. Along with this no blinding took place in any of the studies leading to the potential of detection bias. Reporting bias is likely to be have been significant in two of the studies included in this review, Anderson (2002) and Coker et al. (1978). Anderson (2002) fails to report on all turf toe injuries that were managed conservatively. Coker et al. (1978) describes a case series of 18 cases but only provides limited outcomes for 8 of these cases. No set outcomes are provided across all the cases and no method is described as to how these cases were chosen or followed up.

Clanton and Ford (1994) noted in their study that at 5 years follow up 50% of those who suffered a turf toe injury remained symptomatic. This statistic highlights a limitation of the studies included in the review. The length of follow up ranged from 6 months to 10 years. In these studies,

once participants had returned to pre-injury athletic activity they were often no longer followed up, therefore it is possible that symptoms may have recurred at a later date but not been reported. The studies included in this review considered time to return to preinjury athletic activity as the same as symptom resolution. However, George et al. (2014) noted that turf toe injury is more likely to occur in a match than practice and it can therefore be hypothesised that turf toe is more likely to become symptomatic during a game situation. It is likely that these studies failed to report participants long term outcomes of turf toe. The lack of long term follow up will also fail to demonstrate turf toe recurrence

Areas of proposed further study. The lack of high quality evidence within this review highlights the need for further research. There is currently no standardisation for the conservative management of turf toe with significant variability in current practice. Further research to define the treatment goals, optimal immobilisation technique and weightbearing status progression would be beneficial.

A randomised control trial comparing the outcomes of conservative vs operative management for grade 3 turf toe injury would also give further insight into which method if more effective for more severe injuries. This is a controversial area within this review identifying successful outcomes of those undergoing surgery for grade 3 turf toe. However, operative intervention may be unnecessary unless it gives a significant treatment benefit over conservative management given that there are risks of surgery.

CONCLUSION

This systematic review has shown that there is insufficient evidence to determine the circumstances in which operative intervention is superior to conservative management. However operative intervention for turf toe has shown to give a successful outcome to patients with a grade three turf toe injury and those who have suffered a grade two turf toe injury who have failed a trail of conservative management.

Disclosure. This work was presented at the 3rd international Conference on Sports Medicine and Fitness, Barcelona, Spain and the abstract of this paper was presented at the international sports medicine and sports science conference. The poster abstract was published in poster abstracts in BJSM http://bjsm.bmj.com/content/51/Suppl_2/A7.3

Appendix 1. **Reasons for article exclusion**

First author	Year	Title	Reason for exclusion
Ainhoa	2015	A variant neglected type IIIA dorsal dislocation of the first metatarsophalangeal joint a case report	No original data on turf toe injury
Ando	2002	Irreducible dorsal subluxation of the first metatarsophalangeal joint: A case report	No original data on turf toe injury
Albers	2003	Rehabilitation and taping techniques in the athlete: hallux and first ray problems	No original data on turf toe injury
Blakeslee	1996	Traumatic injuries of the first ray	Unable to Access Full Text
Bouche	2013	First metatarsophalangeal joint sesamoidopathy	No original data on turf toe injury
Bowers	1976	Turf Toe: A shoe surface related football injury	No original data on the management of turf toe injury
Brophy	2009	Effect of turf toe on foot contact pressure in professional American Football players	No original data on the management of turf toe injury
Breen	2010	An Unusual Injury to the First Metatarsophalangeal Joint	No original data on turf toe injury

Appendix 1 (continued)

First author	Year	Title	Reason for exclusion
Caio Nery	2017	MR Imaging of the Plantar PlateHow to classify plantar plate injuries: parameters from history and physical examinationHow to classify plantar plate injuries: parameters from history and physical examinationHow to classify plantar plate injuries: parameters from history andHow to classify plantar plate injuries: parameters from history and physical examination How to classify plantar plate injuries: parameters from history and physical examination How to classify plantar plate injuries: parameters from history and physical examination How to classify plantar plate injuries: parameters from history and physical examination How to classify plantar plate injuries: parameters from history and physical examination	No original data on the management turf toe injury
Carmont	2004	Clutch foot stress fracture: another complication of commuting?How to classify plantar plate injuries: parameters from history and physical examination	No original data on the management of turf toe injury
Chou	2000	Disorders of the first metatarsophalangeal joint: diagnosis of great-toe pain	No original data on turf toe injury
Churchill	1998	Managing injuries of the great toe	No original data on turf toe injury
Clanton	1994	Turf toe injury	Unable to Access Full Text
Coughlin	2010	Turf toe: soft tissue and osteocartilaginous injury to the first metatarsophalangeal joint	No original data on turf toe injury
Coughlin	2005	Athletic injury to the first metatarsal phalangeal joint	Unable to Access Full Text
de Palma	1991	„Slow“ fractures of the metatarsi	Article not in English
Doty	2013	Turf toe repair: a technical note.	Does not report on primary or secondary outcome
George	2014	Incidence and risk factors for turf toe injuries in intercollegiate football: data from the national collegiate athletic association injury surveillance system	Does not report on primary or secondary outcome
Glasco	1998	Conservative evaluation and intervention of a sport-related injury: Turf toe	Original data only in paediatric population
Gorbachova	2015	Midfoot and Forefoot Injuries.	Does not report on primary or secondary outcome
Graves	1991	Posttraumatic proximal migration of the first metatarsophalangeal joint sesamoids: a report of four cases	Unable to Access Full Text
Hall	1992	A new type of dislocation of the first metatarsophalangeal joint: a case report.	No original data on turf toe injury
Hockenbury	1999	Forefoot problems in athletes	No original data on turf toe injury
Hong	2016	Management of sports injuries of the foot and ankle	No original data on turf toe injury
Hsu	2016	Foot and Ankle Injuries in American Football.	No original data on turf toe injury
Hussain	1999	Dislocation of the first metatarsophalangeal joint with fracture of fibular sesamoid. A case report	Does not report on primary or secondary outcome
Hunt	2010	Management of forefoot injuries in the athlete	No original data on turf toe injury
Isefuku	2004	Traumatic dislocation of the first metatarsophalangeal joint with tibial sesamoid fracture: a case report.	Does not report on primary or secondary outcome

Appendix 1 (continued)

First author	Year	Title	Reason for exclusion
Jastifer	2015	Exposure via sequential release of the metatarsophalangeal joint for plantar plate repair through a dorsal approach without an intraarticular osteotomy	No original data on turf toe injury
Javed	2016	Salvage of a complex first metatarso-phalangeal joint injury and synchronous reconstruction of medial collateral ligament and soft tissue with a distally based medial plantar artery flap.	Does not report on primary or secondary outcome
Kadakia	2011	Current concepts review: traumatic disorders of the first metatarsophalangeal joint and sesamoid complex.	No original data on turf toe injury
Kaplan	2011	Incidence and variance of foot and ankle injuries in elite college football players.	Does not report on primary or secondary outcome
Killian	1997	Dorsal dislocation of the first metatarsophalangeal joint	No original data on turf toe injury
Lee	2011	Hallux, sesamoid, and first metatarsal injuries	No original data on turf toe injury
Lui	2008	Stabilization of first metatarsophalangeal instability with plantar plate tenodesis	Does not report on primary or secondary outcome
Mares	2016	Management of Athletic Turf Toe Using Biologics	Does not report on primary or secondary outcome
Maskill	2006	First ray injuries	No original data on turf toe injury
Mason	2015	Turf Toe and Disorders of the Sesamoid Complex	No original data on turf toe injury
Mata	1998	Dorsal dislocation of the first metatarso-phalangeal joint - A case report	No original data on turf toe injury
McCormick	2010	Turf Toe Anatomy, Diagnosis, and Treatment	No original data on turf toe injury
McCormick	2010	Rehabilitation following turf toe injury and plantar plate repair	No original data on turf toe injury
McCormick	2009	The great toe: failed turf toe, chronic turf toe, and complicated sesamoid injuries	No original data on turf toe injury
McCormick	2013	Surgical correction of the recalcitrant turf toe	Unable to Access Full Text
Nabarro	1995	Dorsal dislocation of the metatarsophalangeal joint of the great toe: a case report	Does not report on primary or secondary outcome
Nicholson	2012	Surgical management of turf toe injuries	No original data on turf toe injury
Ozyurek	2013	The eyes won't see what the mind doesn't think of"--Confucius re: "how many joints does the 5th toe have? A review of 606 patients of 655 foot radiographs	No original data on turf toe injury
Schein	2015	Turf toe and sesamoiditis: What the radiologist needs to know	Does not report on primary or secondary outcome
Tosun	2008	Traumatic dislocation of the first metatarsophalangeal joint with entrapment of the flexor hallucis longus tendon.	No original data on turf toe injury
Trikha	2013	Multiple floating metatarsals: a unique injury.	No original data on turf toe injury
Vanore	2005	Diagnosis and treatment of first metatarsophalangeal joint disorders. Section 5: Traumatic disorders.	No original data on turf toe injury
Watson	2005	Periarticular injuries to the hallux metatarsophalangeal joint in athletes.	No original data on turf toe injury
Wilson	2005	Radiologic case study. First metarsophalangeal plantar plate injury (turf toe).	Does not report on primary or secondary outcome

Appendix 2**. Data extraction template**

Publication Details
First author
Year of publication
Study Details
Study design
Sample size
Participant age range
Participant gender
Grade of turf toe injury
Time from injury to treatment initiation
Type of treatment
Time to return to athletic activity
Time to resolution of symptom
Length of follow up

Appendix 3. **Results table summarising the included studies interventions and outcomes for the management of turf toe**

Author	**Number of participants**	**Intended treatment group**		**Actual treatment**		**Average time to return to preinjury activity**		**Average time to resolution of symptoms**		**Length of follow up**
		Conservative	**Operative**	**Conservative**	**Operative**	**Conservative**	**Operative**	**Conservative**	**Operative**	
Anderson et al.	19	10	9	10	9	N/A	No clear time but 7 returned to full athletic activity	N/A	2 of the patients had ongoing symptoms at 10 years	1–10 years
Coker et al.	18 (only 8 reported on)	5	3	4	3 (1X failed conservative management and underwent surgery)	3 weeks (outcome reported for 1 participant)	12 weeks (outcome reported on 2 participants)	N/A	In two cases they had ongoing symptoms despite treatment	N/A
Drakos et al.	3	1	2	1	2	24 weeks	24 weeks	N/A	N/A	6 Months
Faltus et al.	5	2	3	1	4	8 weeks	15 Weeks	N/A	N/A	N/A
Lohrer et al.	1	1	0	0	1	N/A	24 Weeks	N/A	N/A	6 Months
Roche et al.	1	0	1	0	1	N/A	22 Weeks	N/A	N/A	2 years 6 months
Sahin et al.	1	1	0	0	1	N/A	12 Weeks	N/A	N/A	10 months

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VALIDITY AND RELIABILITY OF A LITHUANIAN PHYSICAL EDUCATION TEACHERS' SELF-EFFICACY SCALE TOWARD INCLUSION OF STUDENTS WITH AUTISM SPECTRUM DISORDERS

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ABSTRACT

Background. Teacher's perceptions of Self-efficacy (SE) have been suggested as an important factor in the successful inclusion of students with special educational needs. The purposes of this study were (a) to investigate the validity and reliability of the instrument of physical education teachers' self-efficacy toward the inclusion of students with Autism Spectrum Disorders (PESEISD-A), using a Lithuanian physical education (PE) teachers' sample, and (b) to assess relationships between SE scale and subscales.

Methods. The English version of the instrument was translated into Lithuanian using the back-translation technique. The participants were 368 PE teachers working in Lithuanian schools (152 males and 216 females), aged between 24 and 65 years (M = 47.09; SD = 9.06). The content and construct validity of the instrument were supported.

Results. The results of the factor analysis indicated a one-factor solution for the scale's SE. Cronbach's alpha reliability of SE scale and all other subscales was high ($\alpha > .93$). Test-retest correlation analysis showed a satisfactory coefficient. In this study, positive and significant relationships between SE scale, mastery experience, vicarious experience, social persuasion, physiological state, behaviour, and perceived challenges subscales were determined ($p < .01$).

Conclusions. The Lithuanian version of the PESEISD-A appears to be a valid and reliable instrument, enabling future research on Lithuanian PE teachers.

Keywords: professional development, special education needs, self-efficacy theory, source of self-efficacy.

INTRODUCTION

During the last 25 years Lithuania has adopted a number of legal acts that oblige general education schools to implement the provisions of inclusive education. The consolidated text of the Law on Education of the Republic of Lithuania (Parliament of the Republic of Lithuania, 1991) of 2017 provides that the aim of the education of students with special educational needs (SEN) is to help the students to study according to their capacities, to get education and qualification, and to have their skills and potential recognized and developed. SEN was defined in Lithuania as the need for support and services in the process of education arising from the student's specific capacities, congenital or acquired disorders, and adverse effects from environmental agents (Parliament of the Republic of Lithuania, 1991). In Lithuanian general education schools, 11.92% of children aged 6–21 have SEN; 10.46% attend regular classes in mainstream schools, 0.34% of the children attend

special education classes, and 1.12% of the children are educated in special schools or special education centres (Official Statistics Portal, 2018).

Some of the most rapidly growing populations of SEN are those with Autism Spectrum Disorder (ASD). The number of students with ASD included in mainstream classes has been steadily increasing over the last five years from 191 in 2013-2014 to 402 2017-2018 (Education Management Information System, 2018). Students with ASD have substantial impairments in social interaction and communication, which can challenge the general education teachers (Beamer and Yun, 2014). PE appears to be one of the most favourable disciplines, where values necessary for the effective development of inclusive education may be developed and maintained (Grenier, Dyson, & Yeaton, 2005; Hutzler, 2007; André, Deneuve, & Louvet, 2011; Klavina et al., 2014; Polvi & Telama, 2000; Hutzler, 2003; Tubić, & Đorđić, 2012; Qi, Wang, & Ha, 2016). In this regard Zhang and Griffin (2007) have argued that encouraging students with ASD to interact with their peers should be considered a very important part of their physical education (PE) participation, and include basic social behaviours – such as taking turns in an activity, greeting peers, joining an activity, entering a game, sharing equipment, changing activities, or participating in an activity. Evidence is accumulating in support of including students with ASD in general physical education (GPE) classes and among the major research foci are factors affecting teachers' beliefs and behaviours (Beamer & Yun, 2014; Buns, 2010; Morgan, 2013; Taliaferro & Pilkington Harris, 2014; Yada & Savolainen, 2017) or teachers' attitudes (*Campos, 2013;* Cassady, 2011; Combs, Elliott, & Whipple, 2010; Hodge & Jansma, 1999; Humphrey, & Symes, 2013; Hutzler & Levi, 2008; *Tant, & Watelain, 2016;* Unianu, 2012). Meanwhile, not specific to PE teachers surveys performed in Lithuania indicated that the inclusion practice is challenged with barriers such as inadequate teacher training and lack of competence, lack of support, large class sizes, not enough preparation time due to administrative demands, and inadequate psychological training and support when working with children with SEN (Kiušaitė & Dubauskaitė, 2010; Paukštienė & Ustilaitė, 2012). These barriers are quite similar to those reported in other countries specifically for PE teachers (Baloun, Kudláček, Sklenaříková, Ješina, & Migdauová, 2016; Block, Hutzler, Barak, & Klavina. 2013; Block, Kwon, & Healy, 2016; Griggs & Medcalf, 2015; Jerlinder, Danermark, & Gill, 2010; Jeong & Block, 2011; Ko & Boswell, 2013; Kudláček, Baloun, & Ješina, 2018; Tindall, Culhane, & Foley, 2016). In a GPE class, the teacher has to create the environment for all, where personal weaknesses and disadvantages are not highlighted, where a student feels safe and as an equally important member of the community, and where measures are found to turn personal weaknesses and disadvantages into benefits and advantages in certain situations (Booth & Ainscow, 2011; Ko & Boswell, 2013). This can be achieved only by a teacher who is confident and who relies on the knowledge and its practical application at work (Block, Taliaferro, Harris, & Krause, 2010; Griggs & Medcalf, 2015). In order to create such an environment, the teacher must not only have knowledge but also have confidence in her/his skills and in the capability to apply this knowledge in various specific situations (Bandura, 1977, 1997). The way the teacher adapts the task, modifies the goal, applies educational methods and handles difficult situations depends on his or her level of situation and task-specific confidence. This has been labelled by Bandura (1994, 1997) as self-efficacy (SE), which is the confidence a person has in his or her own capability to produce desired levels of performance, relying on the knowledge and skill he or she possesses as compared to a social reference group. SE is a future-oriented belief about the level of competence a person expects he or she will display in a given situation (Tschannen-Moran & Mcmaster, 2009). SE and goals are widely touted as two of the more important constructs in psychology and management (Vancouver, Thompson, & Williams, 2001). Teachers' SE is their confidence and belief in being able to cater to the varied needs of all students in an inclusive school setting (Bandura, 1986, 2006; Block et al., 2010). Therefore, SE beliefs determine how environmental opportunities and impediments are perceived and affect the choice of activities, how much effort is expended on an activity, and how long people will persevere when confronting obstacles (Bandura, 2006). SE is the major unit in Bandura's (1986) Social Cognitive Learning Theory about the effect of an individual's interaction with others on his/her actions and behaviour and on the environment. SE theory, applied in the educational context, has sparked a rich line of research into how teachers' SE beliefs

are related to their actions and to the outcomes they achieve (Tschannen-Moran & Woolfolk Hoy, 2007). Furthermore, individual studies have found that teachers' SE is one of the strongest predictors of their attitudes towards inclusion (Block et al., 2010; Ilić-Stošović, Nikolić, & Popadić, 2015; Karani, & Skordilis, 2016). Stajkovic and Luthans' (1998) meta-analytical findings support a highly significant positive correlation between SE and work-related performance. Yada and Savolainen (2017) conclude that one way of changing teachers' attitudes is to improve their SE for inclusive practices and the results of their study indicate that more attention should be paid to teachers' lack of confidence regarding the inclusive practice. Fisher's (2017) study confirms the theoretical model's relationship between teacher perception of SE and teacher attitudes towards inclusion. A meta-analysis by Klassen and Tze (2014), consisting of 43 studies representing 9216 participants, demonstrated that teachers' perceived SE was related to increased persistence in working with challenging students; SE was shown to influence teachers' instructional practices, enthusiasm, commitment, and teaching behaviours. Given the pivotal role of SE beliefs in understanding human behaviour, it is important to understand how these beliefs are formed. Bandura (1977, 1986) suggested that SE beliefs are acquired and modified through four primary sources of information: mastery experiences, vicarious experiences, verbal/social persuasion, and physiological states. Also personal accomplishments (successes or failure) have the potential to exert the great influence on SE (Lent & Hackett, 2009). The success of psychological interventions can be enhanced by arranging experiences designed to strengthen SE beliefs for specific behaviours in specific problematic and challenging situations (Maddux, 2009). When people see themselves coping effectively with difficult situations, their sense of mastery is likely to be heightened (Maddux, 2009).

Given the current need for a supportive role of PE teachers toward inclusion, the exploration of PE teachers' SE and its links with demographics, the sources of SE, self-reported behaviours, and perceived challenges is needed for a better understanding of the pathways leading to enhancing students' with SEN inclusion. In order to facilitate this goal in Lithuania, an instrument that measures PE teachers' SE toward inclusion is needed, and its validity must be tested with a sample of local PE teachers. A number of instruments have been created for the evaluation of general teachers' SE (Ilić-Stošović et al., 2015; Karbasi, & Samani, 2016; Klassen & Tze, 2014; Tschannen-Moran, Woolfolk Hoy, & Hoy, 1998; Tschannen-Moran, & Woolfolk Hoy, 2001; Sarı, Çeliköz, & Seçer, 2009). According to the unique PE school framework, several specific instruments have been developed in this domain; SE in teaching PE under inclusive conditions (SEIPE) (Hutzler, Zach, & Gafni, 2005) and the Physical Education Teaching Efficacy Scale (PETES) (Humphries, Hebert, Daigle, & Martin, 2012) are generic instruments, while the Physical Educators' SE Toward Including Students with Disabilities-Autism (PESEISD-A, VERSION 8.2) (Beamer, & Yun, 2014; Morgan, 2013; Li, Wang, Block, Sum, & Wu, 2018; Taliaferro, 2010; Taliaferro, & Pilkington Harris, 2014; Taliaferro, Hammond, & Wyant, 2015) was designed to deal with one type of disability – that is ASD. The instrument consists of SE scale and six subscales (mastery experience, vicarious experience, social persuasion, behaviour, physiological states and challenges). Another instrument that was developed is situation- and disability-specific, and therefore may be useful for a variety of disability conditions and situations encountered during PE: the Situation Specific SE Instrument for Physical Education Teacher scale (SE-PETE-D) designed by Block and colleagues (2013). The SE-PETE-D has been adopted by both European and American scholars (Baloun et al., 2016; Eden & Hutzler, 2015; Jovanović et al., 2014; Hutzler & Shama, 2017; Kudláček, Baloun, & Ješina, 2018; Reina, Hemmelmayr, & Sierra-Marroquin, 2016; Taliaferro, Hammond, & Wyant, 2015; Tekidou et al., 2015; Tindall et al., 2016).

This study top related with PE teachers' SE belief toward inclusion students with ASD, therefore we chose to validate PESEISD-A instrument. This instrument not only allows to identify PE teachers' SE toward including students with ASD but also to better understand the problems that cause the biggest difficulties for PE teachers to include pupils with ASD in a mainstream PE class, and understand the predictors that influence their SE and behaviour. The purpose of this study was (a) to investigate the validity and reliability of the instrument physical education teachers' self-efficacy toward the inclusion of students with Autism Spectrum Disorders (PESEISD-A), using a Lithuanian PE teachers' sample, and (b) to assess relationships between self-efficacy scale and subscales.

METHODS

Participants. Our sample included a total of 368 PE teachers from 30 municipalities who participated in the survey. Teachers' recruitment was conducted in January- March, 2017, using two modalities: (a) circulating the questionnaire by means of Email (Web-based), and (b) distributing a paper-based questionnaire to meetings with PE teachers in schools. Invitation letters to participate in the survey were sent to the Education Departments of all Lithuanian municipalities (n = 60). Twenty-eight Education Departments of Lithuanian municipalities returned confirmation letters indicating their agreement to cooperate and to send the survey information to the Emails of PE teachers in the department, and to encourage them to participate in the survey. According to the data from the year 2016 of the Lithuanian Centre of Information Technologies in Education, there were 1645 PE teachers working in these municipalities. However, only 49 PE teachers filled in the electronic survey, and additional 287 questionnaires were filled in during the meetings of PE teachers'. In order to fulfil the test-retest analysis, 22 PE teachers from 12 schools located in two municipalities were additionally tested. The recruitment of these PE teachers was conducted using the distribution of a paper-based questionnaire.

The research design for implementing the study was approved by the Committee of Ethics of social science at the Lithuanian Sport University and from the Education Departments in the participating municipalities (No. SMTEK-09). The participants of the survey received and signed an informed consent form prior to filling in the questionnaires.

Instrument. Lithuanian version of instrument Physical Educators' Self-Efficacy toward Including Students with Disabilities – Autism (PESEISD-A; Taliaferro, Block, Harris, & Krauske, 2011) was used for this study. The PESEISD-A was comprised of the SE scale and six subscales: mastery experience, vicarious experience, social persuasion, behaviour, physiological state and challenges. Demographic questions were included at the end of the instrument. Prior to filling in the questionnaires the interviewees were given the description of a person with ASD.

Self-efficacy. The scale is designed to evaluate PE teachers' SE in mainstreaming pupils with ASD in a general PE class and is called the Self-efficacy (SE) scale (10 questions). For the SE scale, participants were asked to rate their degree of confidence in their ability to perform each of ten tasks when including students with ASD in GPE classes: modify equipment, modify activities, create a safe environment, promote social interactions with peers, manage behaviours, modify instructions, assess motor sills, modify rules to games, collaborate effectively with other teachers/ professionals, and motivate students. Prior to filling in the questionnaires the interviewees were given the description of a person with ASD. Statements of the SE scale are scored in the range from 0 to 10, with a score of 0 indicating the respondent (cannot do at all), a score of 5 indicating the respondent (moderately can do), and a score of 10 indicating the respondent is highly certain they can do).

Mastery experience. The first subscale is designed to evaluate PE teachers' mastery experiences, and is called the Mastery Experience (ME) subscale (10 questions). For the ME subscale, respondents rated the level of success they experienced in doing the same 10 identified tasks on a 5-point Likert scale of "not at all successful (Less than 15% of the time)" to "very successful (More than 85% of the time)", with the added option of "I do not have any experience doing this".

Vicarious experience. The second subscale is called the Vicarious Experience (VE) subscale (10 questions). For the VE subscale, respondents rated the level of success of other PE teachers they observed at performing the same ten identified tasks when including a child with ASD. Response choices were on a 5 point Likert scale ranging from "not at all successful (Less than 15% of the time" to "very successful (More than 85% of the time)", with the added option of indicating that they have not seen others perform the task.

Social persuasion. The third subscale is Social Persuasion (SP) subscale (10 questions) asked respondents to rate what others (teachers, parents, colleagues, supervisors, principals) have told them about their capabilities to include students with ASD in PE on a 5-point Likert scale of "not at all capable" to "very capable".

Behaviour. The fourth subscale is called the Behaviour (BEH) subscale (10 questions). For the BEH subscale, respondents rated how frequently they performed the ten identified teaching tasks on a 5-point Likert scale from "never" to "always",

Physiological state. The fifth subscale is called the Physiological State (PS) subscale (2 questions). The PS subscale asked participants to

respond to two questions regarding how including a student with ASD in their PE class makes them feel (stressed or nervous). Responses were on a five point scale ranging from "definitely false" to "definitely true". Responses were reverse coded from one to five so that a higher score ("definitely false") reflected a more favourable reaction.

Perceived challenges. The sixth subscale – the Perceived Challenges (PCH) subscale– asked participants to rate the extent to which each of 11 situations made it difficult to meaningfully include a student with ASD into their GPE program. The eleven situations included: "I am not sure how to modify activities", "I do not have time to make modifications", "I do not have appropriate equipment", "I have large class sizes", "there are multiple classes in the gym", "the students' skill level is very different than their peers", "I have no aid or support to help", "I do not have information about the student", "I have limited training on autism, the student has behavior problems, and the student has problems staying on task". Responses were on a 5-point Likert scale of "not at all an issue" to "very much an issue". Responses were coded from one to five such that the higher score indicated a higher degree of perceived challenge.

Demographic factors. In the instrument end, it covers demographic issues (age, gender, professional and personal experience of working with persons with ASD, etc.).

Scoring. The responses of on interviewee to the SE scale, ME, VE, SP, BEH, PS and PCH subscales statements were summed up and the average was calculated. A response of these subscales "I do not have any experience doing this" (ME), "I have not seen other PE teachers doing this" (VE), and "I have not been told anything about my capabilities" (SP) was coded as a zero. For example, if an individual responded "I do not have any experience doing this" (ME) to two items on the scale, their scores were summed and then divided by 8 (Taliaferro, 2010). The resulting score indicated the average success of the participants' mastery experiences. Respondents who answered "I do not have any experience doing this" across all 10 items were given a total score of 0 (Taliaferro, 2010). This did not reflect that the participant failed to respond to the subscale items. Instead, this indicated that the participant had no experience with the items in this subscale and was, therefore, unable to make a judgment regarding their level of success (Taliaferro, 2010).

Translation. The English version of the PESEISD-A (Taliaferro et al., 2011) instrument was translated into Lithuanian using the back translation technique described by Brislin (1986). This technique of translation requires four independent bilingual translators. Translator 1 and Translator 2 independently translated the original English version of the PESEISD-A questionnaire into Lithuanian. After comparing the translations, the translated instrument was forwarded to the other two bilingual translators who translated the instrument back into English. Finally, the retranslated version was compared with the original version by one of the authors of the original version for the final approval. In addition an expert review was performed. Two Lithuanian experts of adapted physical education were consulted about the clarity, conciseness and terminological precision of the Lithuanian version of the PESEISD-A. The initial version of the instrument was administered to a sample of 43 PE teachers. This version confirmed its suitability for further analysis and was labelled PESEISD-A-LT.

Data analysis. SPSS Version 22.0 software was used to compute the statistical processes.

Construct validity. In order to establish the SE scale's factorial, structure and construct validity of the PESEISD-A-LT we chose to use an exploratory factor analysis (EFA). Based on Field's (2009) recommendations, an EFA was conducted using the principal component analysis (PCA) extraction method, followed by orthogonal (Varimax) rotation to maximize variance. Before conducting the PCA, statistical assumptions necessary for PCA were tested (Field, 2009). For example, the Kaiser-Meyer-Olkin (KMO) index should be greater than 0.70 and is considered inadequate if less than 0.50 (Field, 2009), and Bartlett's test of sphericity has to be highly significant ($p < .001$) (Field, 2009). The optimal number of factors was determined by latent root criteria (eigenvalues > 1.0, the Kaiser's criterion K1) and inspection of the scree plot (Field, 2009). An item with communality of less than 0.40 was removed from the analysis, and the PCA was computed again (Field, 2009).

Reliability analysis. Cronbach's alpha coefficient was employed to determine internal consistency, and test-retest reliability was employed to determine stability over time. Cronbach's α values of 0.70 and above imply an acceptable level of internal consistency (Bryman, 2015; Field, 2009). Test-retest reliability was used to examine stability

among items in SE scale and each sub-scale. The period between the test-retest was 14 weeks. Test-retest reliability was assessed by using Spearman-Brown's correlation. Following Vallerand (1989), we estimated that a coefficient of 0.6 or more for test retest is satisfactory.

Descriptives. Mean (*M*), standard deviations (*SD*), and frequency counts were used to characterize participants' demographics.

Spearman's rank correlation coefficient (*r*) was used to discover the strength of the relationship between the SE scale and each subscale.

RESULTS

The total of 346 PE teachers from 28 municipalities were included to the basic data analysis. Participants' age ranged from 24 to 65 years (M = 47.19; SD = 9.04); gender distribution was 143 males (M = 46.04; SD = 10.35) and 203 females (M = 48.09; SD = 7.92). Participants had general PE teaching experience ranging from 1 to 45 years (M = 22.06; SD = 9.86). Demographic information is illustrated in Table 1.

In order to fulfil the test-retest analysis, a group of nine males and 13 females, in total 22 PE teachers, was formed. This group participants' mean age was 52.73 years (SD = 6.37 years). These participants had a mean general PE teaching experience of 28.82 years (SD = 8.64 years). Eighteen of these PE teachers reported having experience working with students with ASD in general PE in the last five years.

The EFA generated a one-factor solution accounting for 82.99% of the variance, the KMO measure verified the sampling adequacy for the analysis, exhibiting a KMO index of 0.941 and all KMO values for individual items > 0.90. Bartlett's test of sphericity (χ^2 [45] = 5131.7, p < .001) indicated that correlations between items were sufficiently large for the PCA. An initial examination of the items using PCA revealed high communalities, and ranged from 0.74 to 0.88. Cronbach's alpha measured internal consistency of the (sub)scales showed that all statements of the (sub)scales perfectly reflect the tested value (Table 2).

A repeated interview with the same respondents was done after 14 weeks to retest the stability of the (sub)scale. The Spearman-Brown correlation

Table 1. **Demographic information of physical education teachers (n = 346)**

Demographic factors	*N*	Percentage
Had undergraduate or graduate courses APE		
Yes	73	21.10
No	273	78.90
Had undergraduate or graduate courses Special Education		
Yes	176	50.90
No	170	49.10
Have been included students with ASD in PE class		
Yes	166	48.00
No	180	52.00
Have support from APE specialist	40	11.60
Have support from Teacher assistants	50	14.50
Have support from Special Education Teacher	158	45.70
Have support from Physical therapist	30	8.70
Personal experiences with ASD		
No experience	319	92.20
Yes	27	7.80
ME, VE & SP	106	30.60
ME &VE	25	4.90
ME & SP	17	7.20
VE &SP	4	1.20
ME only	44	12.70
VE only	21	6.10
SP only	5	1.50
ME, VE & SP did not have	124	35.80
Total 346		

Note. APE – Adapted physical education; ASD – Autism Spectrum Disorder; PE – physical education; ME – mastery experience; VE – vicarious experience; SP – social persuasion; *N* – number of physical education teachers.

Table 2. **Cronbach's Alpha values of PESEISD-A-LT instrument SE scale and subscales (*n* = 346)**

(Sub)scales	N of Items	*Mean*	*SD*	*Cronbach's Alpha*
Self-efficacy	10	5.36	2.18	.977
Mastery experience	10	1.69	1.65	.991
Vicarious experience	10	1.35	1.63	.994
Social persuasion	10	1.33	1.81	.996
Physiological state	10	2.49	1.49	.993
Behaviour	2	2.97	1.17	.932
Perceived challenges	11	3.37	0.94	.931

Table 3. **The Self-efficacy scale and subscales of the test-retest reliability (*n* = 22)**

(Sub)scales	Cronbach's Alpha		Spearman-Brown (Test-retest)
	1 Time	2 Time	*r*
Self-efficacy	.97	.97	.88
Mastery experience	.98	.98	.89
Vicarious experience	.99	.99	.85
Social persuasion	.98	.99	.87
Physiological state	.99	.99	.88
Behaviour	.79	.74	.81
Perceived challenges	.91	.95	.46

Table 4. **Inter-correlations of PESEISD-A (sub) scales**

(Sub)Scale	SE	ME	VE	SP	PS	BEH	PCH
SE	–						
ME	.366*	–					
VE	.282*	.574*	–				
SP	.271*	.616*	.600*	–			
PS	–.300*	–.299*	–.186*	–.201*	–		
BEH	.296*	.796*	.580*	.628*	.292*	–	
PCH	–.343*	–.312*	–.249*	–.269*	–.456*	–.315*	–

Note. SE – Self-efficacy; ME – mastery experience; VE – vicarious experience; SP – social persuasion; PS – physiological sate; BEH – behaviour; PCH – perceived challenges; * – correlation is significant at the .01 level.

coefficient of SE scale and subscales for assessing test-retest reliability was > .80, except perceived challenges subscale, which test-retest reliability coefficient was r = .46; correlation coefficients' of each subscale are shown in Table 3.

Correlation analysis indicated significant relationships between (sub)scales (p < .01; Table 4).

DISCUSSION

The first purpose of this study was to approve the Lithuanian version of the PESEISD-A validity and reliability.

The results of an exploratory factor analysis on the 10 question SE scale of the Lithuanian versions revealed a one-factor solution explaining 82.99 percent of the variance, while Taliaferro (2010) exploratory factor analysis revealed a one-factor solution explaining 57.05 percent of the variance, and Li et al. (2018) conducted Confirmatory Factor Analysis revealed the one-factor model of the PESEISD-A fit the total sample (n = 432) adequately. The coefficients of internal consistency and test-retest reliability of PE teachers' self-efficacy toward including students with ASD into general PE classes scale, Mastery Experiences subscale, Vicarious Experiences subscale, Social Persuasion subscale, Physiological State subscale, and Behaviours subscale confirmed the appropriateness of the Lithuanian versions of PESEISD-A-LT for data analysis. However, when we analysed the test-retest reliability of perceived challenges subscale

we found lower than .6 correlation coefficient. This result shows that perceived challenges subscale is more sensitive to time period than other subscales. Perhaps it is related to a long time period between tests (14 weeks). When we compare our research results with those of Taliaferro's (2010) (n = 236) results, it can be observed that SE scale and all subscales validity and reliability coefficient values are similar or higher except for the coefficient of perceived challenges subscale test-retest scores, where the value was less than .60. A recently conducted study by Li et al. (2018) involving Chinese preservice physical educators (n = 432) showed high coefficients of internal consistency (α = .92) and test-retest reliability (r = .90) of SE scale.

The second purpose of this study was to assess relationship between self-efficacy scale and subscales. The correlation analysis between PEISEISD-A-LT (sub)scales showed that PE teachers' SE belief had strongest influence of mastery experience. According to Bandura (1995), the most influential source of efficacy information is personal mastery experiences because they provide the most authentic evidence of whether one can master whatever it takes to succeed in a particular field or endeavour. Tschannen-Moran and McMaster (2009) propose that SE beliefs may be diminished when success is achieved through extensive external assistance, after considerable effort, or on a task perceived as easy or unimportant. It serves to convince them that they have what it takes to achieve increasingly difficult accomplishments of a similar kind. Self-mastery is best achieved through progressive mastery, which is attained by breaking down difficult tasks into small steps that are relatively easy, in order to ensure a high level of initial success. Individuals should then be given progressively more difficult tasks in which constructive feedback is provided and accomplishments are celebrated before increasingly challenging tasks are attempted (Heslin & Klehe, 2006). Also we found that source of efficacy information as vicarious experience, social persuasion, and physiological states are significant predictors on PE teachers' SE belief. The impact of modelling on beliefs of personal efficacy is strongly influenced by perceived similarity to the models (Bandura, 1986; Tschannen-Moran & Mcmaster, 2009). Through their behaviour and expressed ways of thinking, competent models transmit knowledge and teach observers effective skills and strategies for managing environmental demands (Klassen & Tze, 2014). People who are persuaded verbally that they possess the capabilities to master given activities are likely to mobilize greater effort and sustain it than if they harbour self-doubts and dwell on personal deficiencies when problems arise (Bandura, 1997; Tschannen-Moran & Mcmaster, 2009). To the extent that persuasive boosts in perceived SE lead people to try hard enough to succeed, self-affirming beliefs promote development of skills and a sense of personal efficacy. People also rely on their physiological and emotional states in judging their capabilities. They interpret their stress reactions and tension as signs of vulnerability to poor performance (Bandura, 1995). It is not the sheer intensity of emotional and physical reactions that is important but rather how they are perceived and interpreted (Bandura, 1995). For example, people who have a high sense of efficacy are likely to view their state of affective arousal as an energizing facilitator of performance, whereas those who are beset by self-doubts regard their arousal as a debilitator (Vancouver, Thompson, & Williams, 2001). Strategies for controlling and reducing emotional arousal (specifically anxiety) while attempting new behaviours should enhance SE beliefs and increase the likelihood of successful implementation (Maddux, 2009). Social integration and regular positive interactions with others are thought to promote better mental and physical health by fostering the development of meaningful social roles, self-worth and SE, and a stable sense of self (Maddux, 2009). According Bandura (2006), the impact that these informational sources have on SE depends on a variety of factors, such as how the individual attends to, interprets, and recalls them.

Results of analysis showed that SE beliefs had influence on their behaviour to work with students with ASD who are included in their classes. Physical educators who had higher levels of self-efficacy toward including students with ASD tended to engage in behaviours associated with inclusion more frequently. In addition, we found that mastery experience, vicarious experience, social persuasion are strong predictors on behaviour. PE teachers who had these experiences performed more often the tasks (modified equipment, activities, instructions, rules, created a safe environment, promoted social interactions, assessed motor skills, collaborated effectively with others, motivated the student) for students with ASD who are included in general physical education classes. Armitage and Conner's (2001) meta-analysis showed that self-efficacy accounted

for the most additional variance in intention, and both perceived behavioural control and self-efficacy accounted for equivalent proportions of variance in behaviour. The implication is that individuals form intentions that they are confident with and they can enact (those they perceive self-efficacy better), and that translation of intention into action may be facilitated both by self-efficacy and assessment of more external factors tapped by perceived behavioural control (Armitage, & Conner (2001). Taliaferro (2010) found that PE teachers' SE beliefs toward including a student with ASD were a strong predictor on self-reported inclusion behaviour.

Also SE had a significant inverse relationship with perceived challenges. Physical educators who had higher levels of self-efficacy perceived fewer challenges associated with including students with ASD in their classes. Bandura (1997) proposed that SE beliefs are associated with the degree of challenge that exists in the context of a task. The people who have high levels of SE are more likely to view difficult tasks as a challenge to be overcome rather than avoided, are more likely to put forth more effort and persist longer in these tasks, and are more likely to successfully perform the activity than are people with low SE (Bandura, 1977). As it pertains to teaching students with SEN, physical educators with low self-efficacy may view students with SEN as a threat instead of a challenge for their professional performance (Hutzler et al., 2005). Bandura (1997) suggested that individuals with high levels of SE beliefs are more likely to engage in an activity and more likely to attempt difficult tasks. As a result, those with high SE should perceive fewer challenges, as they feel they have the ability to confront obstacles and succeed if given appropriate effort.

CONCLUSION

The PESEISD-A-LT instrument' SE scale and subscales appear to be valid and reliable to measure SE of physical educators toward the inclusion of students with ASD in their classes in the context of Lithuania. In this study, positive and significant relationships between SE scale, mastery experience, vicarious experience, social persuasion, physiological state, behavior, and perceived challenges subscales were determined. It may be suggested that the PEISEISD-A-LT version is an appropriate instrument for measuring SE toward including students with ASD frameworks.

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INSTRUCTIONS FOR CONTRIBUTORS

1. Aims and scope

The BJSHS journal publishes research articles in the following areas: Social Sciences (Physical Education, Sports Coaching, Sports Pedagogy, Sports Psychology, Sports Sociology, Research Methods in Sports, Sports Management, Recreation and Tourism), Biomedical and Health Sciences (Coaching Science, Sports Physiology, Motor Control and Learning, Sports Biochemistry, Sports Medicine, Physiotherapy and Occupational Therapy, Physical Activity and Health, Sports Biomechanics, Adapted Physical Activity) and Humanities (Sports History, Sports Philosophy, Sports Law, Sports Terminology). The issues contain editorials, reviews of recent advances, original scientific articles, case studies.

Peer-Review Statement

All papers undergo the regular review process by at least two members of the Editorial Board or by expert reviewers selected by the Editorial Board.

The author (reviewer) has the option of the blind review. In this case the author should indicate this in their letter of submission to the Editor-in-Chief. This letter is sent along with the article (review).

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The manuscript with an accompanying covering letter proving that the article submitted is original and not previously published should be submitted via online Manuscript Submission System following the link: www.manuscriptmanager.com/bjshs/.

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  Title Page File:
  Include the title of the article; the authors' names and surnames and their institutional affiliations (indicating the city and the country); mailing address, telephone and fax number, and e-mail address for the corresponding author.

  Article File:
  The main text of the article, beginning from the title of the article and Abstract till References (including tables and figures) should be in this file. Do not include your names and affiliations in this file.
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- Step 5: Check submission details and send.

3. Preparation of manuscripts (Article File)

The manuscript must be written in English. The guideline for the preparation of manuscripts is the *Publication Manual of the American Psychological Association (6th edition).*

The title page should contain the title of the article; the authors' names and surnames and their institutional affiliations (indicating the city and the country); mailing address, telephone and fax number, and e-mail address for the corresponding author.

Page 2 should include the **abstract** (250 words) revealing the scientific problem and providing the major data of the research. It must be structured into the following sections: Background. Methods. Results. Conclusion. Keywords (from 3 to 5 informative words and/or phrases).

The full text of the manuscript should begin on page 3. It should be structured as follows:

Introduction. It should contain a clear statement of the problem of the research, the extent of its solution, the new arguments for its solution (for theoretical papers), most important papers on the subject, the aim, the object and the original hypothesis of the study.

Methods. In this part the choice of specific methods of the research should be grounded. The research participants, methods, apparatus and procedures should be identified in sufficient detail. If the methods of the research used are not well known and widely recognized the reasons for the choice of a particular method should be stated. References should be given for all non-standard methods used. Appropriate statistical analysis should be performed based upon the experimental design carried out. It is necessary to indicate the methods of mathematical statistics applied (statistical reliability, statistical power, confidence interval, effect size), and to explain the estimation of the sample size. Information that will identify human subjects must not be included. Research involving human subjects should be carried out following the principles of the Declaration of Helsinki.

Results. The findings of the study should be presented concisely, consistently and logically, not repeating the chosen methods. The statistical significance and statistical power of the finding should be denoted.

Discussion. At the beginning of the discussion section the authors should provide major original research statements that are supported by the data. We recommend structuring the discussion of the findings into subsections (each original research finding should be discussed in a different subsection). The data and the conclusions of the research are compared to the data obtained by other researchers evaluating their similarities and differences. Authors should emphasize the original and important features of the study and avoid repeating all the data presented within the Results section.

Conclusions. The conclusions provided should be formulated clearly and logically avoiding excessive verbiage. The most important requirement for the research conclusions is their originality in the world. It is advisable to indicate the further perspectives of the research.

Acknowledgements. On the Acknowledgement Page the authors are required to state all funding sources, and the names of companies, manufacturers, or outside organizations providing technical or equipment support (in case such support had been provided).

References. Only published materials (with the exception of dissertations) and sources referred to in the text of the article should be included in the list of references. References should be consistent with the *Publication Manual of the American Psychological Association (6th edition).*

Manuscripts must be typed in 1.5 space and in 12 pt. font with 3 cm margin on the left and 1.5 cm on the right, 2.5 cm margins at the top and the bottom of the page. Pages should be numbered in the bottom right-hand corner beginning with the title page numbered as page 1. Line numbering should be switched on.

All abbreviations should be explained in parentheses what they stand for on their first occurrence in the text. Non-standard special abbreviations and symbols need only to be defined at first mention. The results of all measurements and symbols for all physical units should be those of the System International (SI) Units. In the text of the article all numbers up to ten are to be written in words and all numbers starting from eleven on – in Arabic figures.

Every **table** should have a short subtitle with a sequential number given above the table (the tables are numbered in the same sequence as that of references given in the text). All explanations should be in the text of the article or in a short note added to the table. The symbols and abbreviations given in the tables should coincide with the ones used in the text. The location of the table should be indicated in the text, e.g. [Insert Table 1 here].

All **figures** are to be numbered consecutively giving the sequential number in Arabic numerals, e.g. Figure 1. The location of the figure should be indicated the text, e.g. [Insert Figure 1 here]. The figures should be presented in open file formats so that they could be edited.

In-text references should be cited as follows: Brown (2011) investigated… or: An investigation (Brown, 1991) found …. References cited in the text with two authors should list both names: Wright and Mander (2002) found...; Reviews of research on sport and reading (Wright & Morgan, 2001) have concluded.... references cited in the text with three, four, or five authors, list all authors at first mention; with subsequent citations, include only the first author's last name followed by et al.: Campbell, Brady, Bradley, and Smithson (1991) found ... (first citation); Campbell et al. (1991) found ... (subsequent citations); (Campbell, Brady, Bradley, & Smithson,1991), (Campbell et al., 1991). References cited in the text with six or more authors should list the first author et al. throughout.

In the reference section, references should be listed in alphabetical order taking account of the first author. First the references in Latin characters are given, then – in Russian (Cyrillic) characters. For works up to seven authors, list all authors. For eight or more authors, list the first six, then ellipses followed by the last author's name. In the case when there are several references of the same author published at the same year, they must be marked by letters, e.g. 2001 a, 2001 b, etc. in the list of references and in the article, too.

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Chapter in a book:

Author, A. (year). Title of chapter. In E. Editor (Ed.), *Title of book* (pp. xx–xx). Location: Publisher.

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Journal and newspaper articles (print and online)

Author, A. A., Author, B. B., & Author, C. C. (year). Article title. *Journal Title, volume number* (issue number), page numbers.

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These are the most common examples cited. For a complete list of examples please consult *Publication Manual of the American Psychological Association*, 6th ed.

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