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INJURY PREVENTION IN PRE-PRIMARY AND PRIMARY EDUCATION: AN ANALYSIS OF TEACHERS´ PERSPECTIVES AND EXPERTISE

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Abstract/Izvleček

The article presents a study focused on the teaching staff and the impact of their occupational health and safety (OHS) teaching on pupils in pre-primary and primary education. A questionnaire survey was conducted among 227 teachers from eleven pre-primary and primary schools in Prague, Czech Republic in 2021. Pre-primary teachers rated themselves as more competent in OHS than teachers of primary education, although pre-primary children had a higher rate of injuries. More frequent OHS training did not affect teachers' self-assessment but reduced child injury rates, especially if such training was completed more than once a year.

Keywords:
Children's Injury Prevention, Injury Incidence, Occupational Health and Safety, Pre-primary and Primary School, Teachers.

Preprečevanje poškodb v predšolskem in osnovnošolskem izobraževanju: analiza perspektiv in strokovnega znanja učiteljev

V članku je predstavljena raziskava, osredinjena na pedagoško osebje ter vpliv njihovega poučevanja varnosti in zdravja pri delu (VZD) na učence v predšolskem in osnovnošolskem izobraževanju. Leta 2021 je bila izvedena anketna raziskava med 227 učitelji enajstih predšolskih izobraževalnih ustanov in osnovnih šol, v Pragi na Češkem. Učitelji predšolskih otrok so se ocenili kot bolj usposobljeni za področje VZD kot učitelji osnovnošolskega izobraževanja, čeprav so imeli predšolski otroci večjo stopnjo poškodb. Pogostejše usposabljanje na področju VZD ni vplivalo na samooceno učiteljev, zmanjšalo pa je stopnjo poškodb otrok, zlasti če je bilo opravljeno več kot enkrat letno.

Ključne besede:
pojavnst poškodb, predšolska vzgoja in osnovna šola, preprečevanje poškodb pri otrocih, učitelji, varnost in zdravje pri delu.

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Introduction

Protecting children's health is a complex task that requires interventions at the government, societal and local community levels (Gray, 2022). Ensuring the safety of learners during education and developing their health and safety awareness are among the core tasks of pre-primary and primary education. This regularly appears in legislative, curriculum and strategic documents ("Council Resolution on a strategic framework for European cooperation in education and training towards the European Education Area and beyond (2021-2030) 2021/C 66/01," 2021; Farewell et al., 2021; Okan et al., 2020; Paakkari et al., 2020; Wiseman et al., 2016). Teachers' professional abilities are key agents in Occupational Health and Safety (OHS) education (Kullmann, 2022). Teachers are facilitators of OHS education, supervise compliance with safety conditions (Tureková and Depešová, 2019), and influence children's OHS practices in school (Nursyuhada Binti Mohamad et al., 2019). The extent of teaching experience or frequency of continuing professional development (CPD) in OHS for teachers are variables that influence the provision of safety in the learning environment and the development of children's awareness of OHS (Jourdan, 2011; Smith et al., 2005). Therefore, in many countries, teachers are required to regularly participate in ongoing OHS training (Horáčková and Kuhnová, 2017); however, it is not well known how effective these mandatory measures are. For this reason, the research focused on how teachers themselves assess their abilities and whether any links can be identified between child injury rates in pre-primary and primary education and the experience and abilities of teachers in this area. The aim of the study is to explore the relationships between (i) length of teaching experience, (ii) level of education being taught, and (iii) frequency of OHS training and first aid training and (a) the number of injuries in each teacher's practice during the school year, and (b) perceptions of their own expertise in OHS teaching. Teachers' approach to safety issues constitutes an essential component in implementing a safe environment and safety education for children. The significance of this study lies in the fact that it can contribute to the understanding of teachers' experiences with and perceptions of OHS and thus promote injury prevention among children and improve their safety in the school environment.

socio-cultural backgrounds, and of varying size in the Prague region should be represented, with maximum respect for the proportionality of representation in the region. The questionnaire was distributed in the selected schools to all the teachers involved in the education of children of pre-school and primary school age. Research participants included 227 respondents from teaching staff, of which 177 are qualified teachers, 32 teaching assistants and 13 educators (5 participants did not provide this information). The participants are predominantly female (N = 202), with only 24 male respondents among them (1 respondent did not complete the gender item). The teaching staff was differentiated by length of teaching experience: N = 41 (19%) less than 3 years; N = 39 (18%) 3-5 years; N = 62 (27%) 6-20 years, and N = 79 (36%) more than 20 years. All participants should be trained in OHS at least once every 2 years because the educational institutions are obliged to ensure the health and safety of all persons with regard to the performance of work, study and activities in pre-primary and primary schools ("Act of the Czech National Council on on pre-school, basic, secondary, tertiary professional and other education (Educational Act)," 2023; "Act of the Czech National Council: Labour Code," 2023).

Instrument and Procedure

For data collection, a questionnaire was designed, comprising 18 questions divided into two categories: demographic statements about the teaching staff, and statements about their experiences with and opinions on OHS awareness for children in pre-primary and primary education. Demographic statements focused on gender, the teaching staff member's position in the school, the length of their teaching experience, and their highest level of education, as well as the type and size of the school where they worked. The second part of the questionnaire used closed-ended questions, 2 open-ended questions and 5-point Likert scales to assess teachers' self-assessment of their own abilities to teach OHS to children in pre-primary and primary education, and the frequency of OHS training. This part of the questionnaire also recorded the average number of injuries and accidents in the school year, their type and cause, the methodological materials and aids used to prevent children's injury and the perceived risks to children in the school. This paper primarily uses data from the closed-ended questions and Likert scales, which are analysed using statistical methods within a quantitative research design.

The questionnaire was developed and administered through the open-source application 1KA (https://www.1ka.si/) directly to pedagogical staff from the pre-primary and primary schools participating in the survey. Completion of the questionnaire was voluntary, and anonymous data collection took place from April 2021 to September 2021. The ethical dimension of the questionnaire design and data collection was covered under the Ethical Codex of Charles University (2018) to ensure that participants were informed about the purpose of the research.

Data Analysis

The data from the 1Ka survey system were exported as an Excel file. After initial checking, the cleared data were transferred to Statistica v 13.3 (StatSoft Inc., TIBCO Software, Palo Alto, CA, USA/) and the IBM SPSS 24 statistical package. The data analysis set the margin of error or confidence interval at ±9.60%. The size of the file was calculated based on the Sample Size Calculator with a Confidence Level of 95% and a Margin of Error at 9.6% (Population Proportion 50%), with a base file of N = 100 000. The detected sample size is N = 105. This means 105 or more measurements/surveys are needed to have a confidence level of 95% that the real value is within ±10% of the measured/surveyed value. The analysis worked with a total of N = 227 respondents.

Based on the assertion of Benjamin et al. (2018), a significance level of .05 was chosen. Because of the negative perception of the choice of significance level (McShane et al., 2019), it was decided to present p-values and not limit findings to statements of statistical significance. Given the nature of the data, the chi-square distribution and non-parametric statistical methods were primarily used (primarily the Kruskal-Wallis ANOVA and the Mann-Whitney U test). Statistical calculations were supplemented with substantive significance measures. The choice of coefficient for calculating substantive significance for the chi-square result depended on the number of categories, and for this reason Cramer's V was chosen. In line with the opinion of Soukup et al. (2021), Fisher's Eta was used as the substantive significance measure for the Kruskal-Wallis ANOVA, and Cohen's d for the Mann-Whitney U test. Cramer's coefficient is a value from the interval <0; 1> a value approaching 1 indicates a high degree of material significance, a value approaching 0, on the contrary, a minimum value of material significance. The range of the absolute value of Cohen's d and his evaluation was as follows: small effect (0.2- 0.5), medium effect (0.5- 0.8), large effect (≥ 0.8). For items using five-point Likert scales

(Likert, 1932) for respondent answers, the Cronbach α (Cronbach, 1951) was calculated, with generally acceptable values for the coefficient between 0.7 and 0.95 (Tavakol and Dennick, 2011). In this case, α = 0.795. The validity of the instrument was addressed on the basis of expert judgement.

Results

Descriptive statistics of the responses focused on selected items of the questionnaire dealing with the teachers' self-perception of their own OHS expertise, the sources of information, and the types of accidents that can happen in pre-primary and primary education. The differences in the total number of N are due to the reluctance of teaching staff to answer some of the questions; given the voluntary nature of the questionnaire, not all items were mandatory.
The results of the descriptive analysis show that teaching staff perceive themselves as competent in the OHS of children in pre-primary and primary education (N = 194; 89%). Teaching staff draw most of their information in this area from the head teacher (N = 192; 86%), from available teaching materials and manuals (N = 129; 58%) and from colleagues (N = 115; 52%). Teaching staff were most likely to report no injuries (N = 105; 47%) or 1-2 injuries (N = 91; 41%) in their teaching per year. In their opinion, the following accidents and injuries are most likely to occur during educational activities or events (N = 220): bites, pinches (N = 153; 70%); fracture (N = 149; 68%); head injury (N = 147; 67%), and allergic reactions (N = 146; 66%).

RQ1: What is the relationship between a teacher's length of teaching experience and the self-assessment of their abilities in the OHS of children in pre-primary and primary education?

Teaching staff perceived themselves as competent in the area of OHS for children in pre-primary and primary education on a 5-point Likert scale (Strongly agree, Rather agree, Neither agree nor disagree, Rather disagree, Strongly disagree).
The initial examination focused on the respondents' perception of themselves as competent in the field of OHS for children in relation to their length of teaching experience (see Table 1).

Table 1
Descriptive statistics of teachers' self-perception of their OHS skills as a function of their years of teaching experience:

Years of teaching experience	N	Mean	Median	Mode	Min	Max
<3	40	1.73	2	2	1	3
3–5	37	1.92	2	2	1	4
6–20	59	1.80	2	2	1	4
>20	76	1.83	2	2	1	4

Subsequently, a Kruskal-Wallis test was performed: H (3, N=212) =1.461, p = .691. Cohen's d in this case is d = .102. It can thus be concluded that the individual differences are not significant.

RQ2: What is the relationship between the level of the educational system and teachers' self-assessment as competent in the field of OSH for children in pre-primary and primary education?

The initial examination focused on the respondent's perception of themselves as competent in the field of OHS for children in relation to the level of the educational system (see Table 2).

Table 2
Descriptive statistics of teacher's self-perception of their OHS skills as a function of the level of educational system:

Level of educational system	N	Mean	Median	Mode	Min	Max
Pre-primary schools	78	1.67	2	2	1	3
Primary schools	77	1.82	2	2	1	4
Primary schools (with activity also at lower secondary school)	48	2.04	2	2	1	4
After-school club	12	1.92	2	2	1	2

Statistical and substantive significance was further calculated by the Kruskal-Wallis test: H (3, N = 215) = 8.305390, p = 0.0401. Post hoc shows differences only between pre-primary and primary schools. In terms of substantive significance (Cohen's d), this is a small effect (d = 0.35).

RQ3: What is the relationship between the number of injuries or accidents to children occurring in an average year within each level of the educational system based on the teacher's experience?

First, an examination of the frequencies in each category of education level was carried out (see Table 3).

Owing to the low numbers for injuries in each area -- (i) 6-10, (ii) >10, only the others mentioned (i.e., 0, 1–2 and 3–5 injuries per year) will be considered in the inductive analysis. The Pearson Chi-square test was performed: $\chi 2 = 14.912$, df = 4, p = .021. Cramer's V was chosen to calculate the substantive significance: V = .159.

Table 3
Frequency of the number of injuries or accidents to children that occur in an average year within each level of the educational system based on the teacher's experience:

Level of educational system	0	1–2	3–5	6–10	>10	Sum
Pre-primary schools	31	40	10	1	0	82
Primary schools	34	32	10	1	0	77
Primary schools (with activity also at lower secondary school)	32	13	1	1	1	48
After-school club	7	6	0	0	0	13
Sum	104	91	21	3	1	220

It turns out that there are significant differences between groups at the significance level of $p < 0.05$. In terms of substantive significance, this is a weak relationship. Based on descriptive analysis, it can be concluded that pre-primary education has the highest frequency of injuries, followed by primary and then lower secondary education. Thus, according to the respondents, younger children are more likely to be injured, and this frequency decreases with increasing age.

RQ4: What is the relationship between the number of injuries or accidents to children and first aid training and teachers' self-assessment of their OHS competence?

The initial examination focused on the descriptive items of perception of oneself as competent in the field of OHS for children in pre-primary and primary education in relation to the frequency of OHS and first aid training (see Table 4).
In the case of items focusing on the frequency of training, the null hypothesis was constructed as follows: There is no statistically significant difference in the perception of oneself as a competent person depending on the frequency of training. Since we are working with multiple variables, the Kruskal-Wallis test was used for the calculation: H (3, N = 210) = 1.186, p = .756 with Cohen's d = .126 for OSH training and H (4, N = 210) = 7.775, p = .102 with Cohen's d = .308 for first aid training. It turns out that there is no significant difference between the groups, as can also be seen (estimated) from the descriptive analysis.

Table 4
Descriptive statistics of self-perceived OHS competence as a function of the frequency of OHS and first aid training:

Training		N	Mean	Med	Mod	F	Min	Max	SD
Health and safety training	Several times a year	24	1.71	2	2	13	1	3	.624
	Once a year	158	1.83	2	2	94	1	4	.660
	Once every 2 years	15	1.93	2	2	8	1	3	.704
	I don't know / I haven't participated yet	13	1.92	2	2	7	1	4	.862
First aid training	Several times a year	13	1.54	2	2	7	1	2	.519
	Once a year	119	1.76	2	2	72	1	4	.624
	Once every 2 years	29	1.97	2	2	16	1	3	.680
	Less than once every 2 years	18	1.83	2	2	13	1	3	.514
	I don't know / I haven't participated yet	31	2.06	2	2	15	1	4	.854

RQ5: What is the relationship between the frequency of OHS training and first aid training and the number of injuries or accidents to children that occur in an average year?

The frequencies in each category for the number of injuries or accidents to children that occur in an average year depending on the frequency of OHS training and first aid training are reported in Table 5.

Table 5
Absolute frequencies for the number of injuries or accidents to children that occur in an average year depending on the frequency of OSH training and first aid training for teaching staff

Training		0	1–2	3–5	6–10	>10	Sum
Health and safety training	Several times a year	19	2	4	0	0	25
	Once a year	70	74	14	2	1	161
	Once every 2 years	5	8	2	0	0	15
	I don't know / I haven't participated yet	6	5	2	0	0	13
	Sum	100	89	22	2	1	214
First aid training	Several times a year	8	2	3	0	0	13
	Once a year	64	46	10	2	1	123
	Once every 2 years	9	16	5	0	0	30
	Less than once every 2 years	3	13	1	0	0	17
	I don't know / I haven't participated yet	15	12	4	0	0	31
	Sum	99	89	23	2	1	214

It appears that categories representing 3–5, 6–10 and more than 10 injuries are very underrepresented and were therefore not considered in the following analyses. The Pearson Chi-square test and Cramer's V were performed. For the frequency of OSH training, the values were as follows: χ^2=14.07464, *df*=4, *p*=.007, V=.158. It turns out that there are significant differences between groups at the significance level of p<.01. In terms of substantive significance, this is a weak relationship.
Based on descriptive statistics, it appears that in the given set of respondents, training organised in OHS more than once a year corresponds with more frequent reporting of injuries at a low level or even at zero (see Table 5).
This does not apply to first aid training, where the values were as follows: χ^2= 4.880, *df* = 4, *p* = .299, V = .093. In this case, there are no significant differences between the groups.

Discussion

The study aimed to investigate the current situation related to injuries among children in pre-primary and primary schools. The study also examined the relationships between teaching experience, educational system level, OHS and first aid training frequency, and the number of injuries per year in each teachers' practice, as well as teachers' self-assessment of their OHS competence.
In terms of the influence of teaching practice (RQ1), the data obtained from the respondents corresponds with data published in older studies of Czech and foreign origin (Dvořáková et al., 2019; Marádová, 2011). The differences between groups of teachers in length of practice were not significant. This result differs from the Gowri and Missiriya (2017) study, where there was a positive correlation but weak linear correlation between the practice and the level of teachers' OHS knowledge. In general, the respondents rated their competence positively (median 2, i.e. the teachers rather agreed that they perceived themselves as competent in the area of OHS). This could be explained by the fact that for contemporary teachers, awareness of their own expertise is very important, and they are rather self-conscious in this respect (Stará and Vodrážková, 2022). Interestingly, teachers with less than 3 years of experience, in contrast to their more experienced colleagues, never indicated that they felt only partly competent or not at all competent in OHS. Teachers' first aid skills and knowledge are also related to OHS; however, teachers often have sufficient theoretical knowledge of first aid but only a few practical skills (Deutsch et al., 2022).

Teachers took the traditional ways of professional development (information shared by school management, manuals and information gained from colleagues) as their preferred method, as confirmed by Turekova and Depesova's (2019) study, which concluded that teachers' readiness to educate children on OHS is closely related to their training and the available teaching materials.

For the RQ2 focusing on the differences in teachers' self-assessment of their OHS competence, statistically significant differences were observed only between pre-primary and primary teachers. An interesting result is that pre-primary and primary teachers rated themselves as competent in OHS more than secondary teachers did (Mean 1.67 and 1.82). This is an interesting insight since statistically more injuries are experienced by children in pre-primary and primary school age categories than by older students (Czech School Inspectorate, 2022), which is consistent with our findings among teachers (RQ3). Conversely, in another study (Nursyuhada Binti Mohamad et al., 2019), primary school teachers had less knowledge and less favourable attitudes compared to secondary school teachers in school health and safety. On the other hand, in Czech public pre-primary schools, the school injury rate is lower than at the primary and secondary levels (Czech School Inspectorate, 2022). The inquiry in relation to RQ4 revealed that most teachers participate in OHS and first aid training once a year. However, an interesting finding was that the frequency of training did not correlate with teacher self-assessment. Here, one may question why this is the case, as the general assumption was that regular in-service teacher training would lead to the development of teacher expertise and increase their internal perception of their own level of competency. A possible reason for these results could be the content of the training courses, which often do not target common problems, risks in routine teaching situations, but extreme situations, and thus may appear irrelevant for teachers in terms of their everyday experience. This leads us to consider the effectiveness of the use of finances in the OHS training system in its current form in the Czech Republic. An important outcome in RQ5 is the finding that while more frequent OHS training does not affect teachers' perceptions of their own competence, it does influence lower child injury rates, especially if OHS training occurs more than once a year. The research therefore implies that it would be desirable to diversify OHS training to also focus on everyday problem situations, the use of multiple sources of information and educational constructs for one's own pedagogical work, as well as self-reflection and support for the teacher in relation to their OHS abilities (knowledge transfer/skills development, attitudinal change and empowerment) (O'Connor et al., 2014).

Implications for School Health Policy, Practice, and Equity

Most injuries occur outside the building as injuries during physical activities or free play (Jaffe et al., 2021), situations where teachers have a rather limited ability to intervene to prevent the occurrence of injury and where children have a greater degree of freedom and thus need to be adequately prepared for this responsibility by teachers as part of quality educational provision. The findings from the data examined in relation to RQ2 and RQ3 suggest that teachers of younger children are more confident in their level of competence in OSH, but at the same time these children have a higher injury rate. Further research could therefore explore this disparity.

Consequently, we recommend more inclusion of OHS issues for teacher training and in-service training practices in pre-primary and primary education. Lengthy work experience, the type of kindergarten, and previous training in first aid were all positively associated with attitudes towards first aid (Ganfure et al., 2018) among pre-primary teachers. We also recommend providing teachers with tools and strategies to strengthen passive and active safety measures in all environments inside and outside schools (Burgos-García, 2010; Jensen and Simovska, 2005), but most importantly to educate children and strengthen their OHS competences and involvement in the "Whole-School Approach" to OHS (European Agency for Safety and Health at Work, 2013). Primary and pre-primary schools should cooperate with parents to positively influence children's behavioural patterns (Howells, 2022; Scheuer and Heck, 2022) and develop support programmes focusing on children's health competences (OECD, 2020, pp. 90-91).

Limitations

The first limitation is that the selection for the research sample was not, and could not be random, since our study used educators involved in the project for further comparison of research data from parents and pupils. The second limitation is the reluctance of some teachers to answer the whole questionnaire, which was a consequence of the voluntary nature of the questionnaire. Another limitation is related to the fact that the questionnaire was intended only for Czech teachers, who may have different teaching experiences and conditions related to cultural and geographical differences.

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