Journal of civil engineering and transport **transEngin**

2022, Volume **4** Number **3** **ISSN 2658-1698, e-ISSN 2658-2120**

DOI: 10.24136/tren.2022.009

CERTIFICATION SYSTEM AS A TOOL FOR IMPROVING THE SAFETY AND SUSTAINABILITY OF SCHOOL-RELATED TRAVELS

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Reviewed positively: 24.03.2022

Information about quoting an article:
Okraszewska R., Mackun T. (2022). Certification system as a tool for improving the safety and sustainability of school-related travels. Journal of civil engineering and transport. 4(3), 9-23, ISSN 2658-1698, e-ISSN 2658-2120, DOI: 10.24136/tren.2022.009

Abstract – Despite the well-established physical, social, emotional, cognitive, and spatial benefits of active and autonomous school commuting of children and adolescents', many are driven by car. Pilot surveys and field research held in 2019 in 10 Gdansk primary schools confirmed this trend. The article presents a certification system for schools, commissioned by the City of Gdańsk, which is an element of a systemic solution shaping patterns of transport behavior in school trips. The essence of the proposed approach is motivating and supporting schools by government to create conditions conducive to independent and active travel of children and adolescents. An important element of the certification process is the assessment stage in accordance with the set of criteria adopted and grouped into six areas concerning: children transport behavior, infrastructure and traffic organization in and around the school, mobility policy, road safety, promotion, and education. Groups of criteria were divided into basic and extended ones and assigned points in an assessment calculator. A minimum threshold of points has been set in each category to attract schools to take comprehensive action. The assessment calculator has been supplemented by catalogues of good practices describing possible actions that could be taken to meet a given criterion. The full certification process has not yet been completed in Gdańsk due to the coronavirus pandemic and the transition to remote learning. However, the first infrastructural improvements have already been made in the vicinity of schools.

Key words – active travel, certification, mobility management, school commuting, sustainability

JEL Classification – L91, O18, R41, H75, I12

INTRODUCTION

According to WHO recommendation children and youth aged 5-17 should accumulate at least 60 minutes of moderate - to vigorous-intensity physical activity (PA) daily [1]. Despite the well-established health benefits of physical activity for young people, most do not meet PA guidelines. Moreover, there is strong evidence demonstrating that insufficient and decreasing [2-6] physical activity in school-aged children and adolescents conducive to obesity [7] [21] and other non-communicable diseases [8]. A substantial body of literature confirms a decrease in the number of children using an active form of transport (AT) to school [3-6] [9] what has been linked to decreasing PA. Therefore, methods to effectively address such high levels of transport-related inactivity in children and adolescents are urgently needed.

The results of pilot surveys conducted in Gdansk primary schools [10] are in line with these findings. Most children live within walkable distance from school, however, there are still pupils who commute by car. As the distance of residence from school determines the transport behavior of children (p-value for the test of independence chi-square = 0.00), the share of car travel is higher among those living further away from school. Nevertheless, 7% of children living closer than one kilometer from school are still picked up by car (Fig. 1). The transport

behavior and preferences of this group should be the main objective of planned educational and promotional interventions.

Besides providing a significant part of daily PA the autonomous commuting to school plays important role in the development of children's independence and thus fostering social, emotional, cognitive [11], and spatial development [12]. Associated psychological benefits of active and autonomous commuting include improved cognition, self-esteem, and emotional well-being, with a reduced risk of depression and anxiety [13-15]. Typically, children's independent mobility increases as children aged, however, has been restricted (to the age and range) from generation to generation [12][16]. The modern tendency of increasing parents' restriction of an autonomous outdoor stay includes school commuting, and thus extend to PA limitations.

The results of Gdansk pilot surveys show [10] that despite most of the surveyed pupils already travel to and from school on their own (83% in children's opinion and 73% in parents opinions), many have asked their parents for such an opportunity in the last 12 months (10% in children's opinion and 21% in parents opinions) (Fig. 2). According to Polish law, seven years is the age limit to which a child needs an accompaniment when using a public road [17]. However, parents' opinions on this subject may be slightly different (Fig. 3). The cause of concern is that habits children develop in their youth may determine how they choose to travel later in their adult lives. Therefore, parents' education is an important element of shaping the next generation transport patterns.

Among the reasons for limiting children's independence in mobility is often the convenience of parents, but also the fear of safety. Children are one of the most vulnerable road users due to limited psychophysical possibilities and age-related skills. An important feature that affects road safety is height, which is directly related to the field of vision and visibility. Children with short stature (especially under 10 years of age) have a limited field of vision due to the presence of many obstacles at eye level (vehicles, hedges, etc.), which makes them more difficult to see at the same time [18-19]. A proper assessment of the traffic situation may also cause them a problem. Especially primary school children have a lack of sufficiently developed space-time orientation which results in less or no ability of the distance and speed assessment of an approaching vehicle.

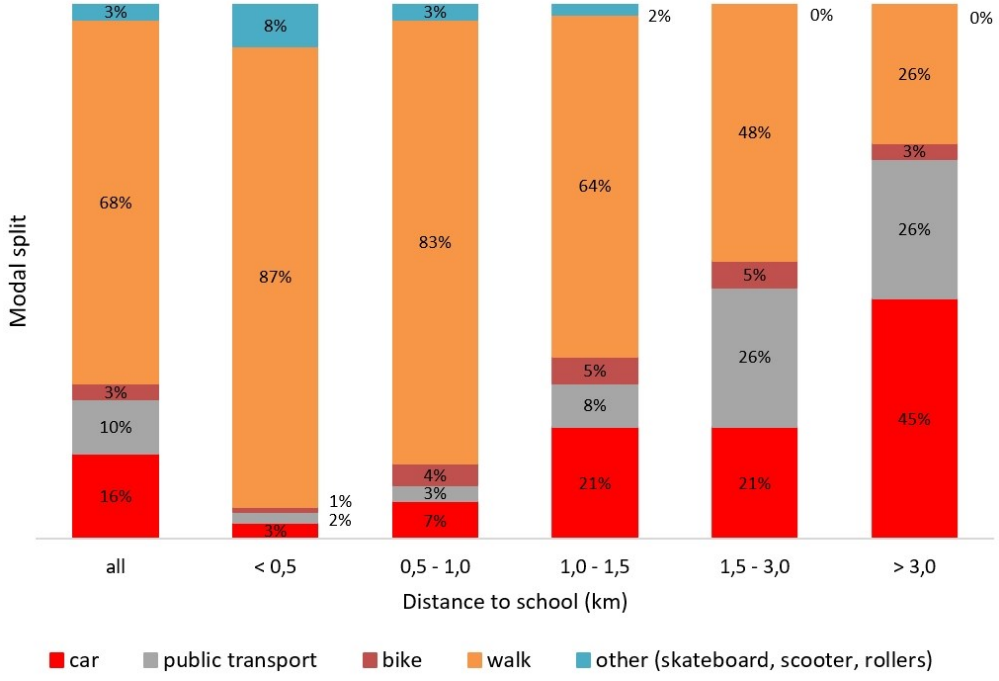

Fig. 1. School-related trips in Gdańsk - modal split depending on the distance from home [10]

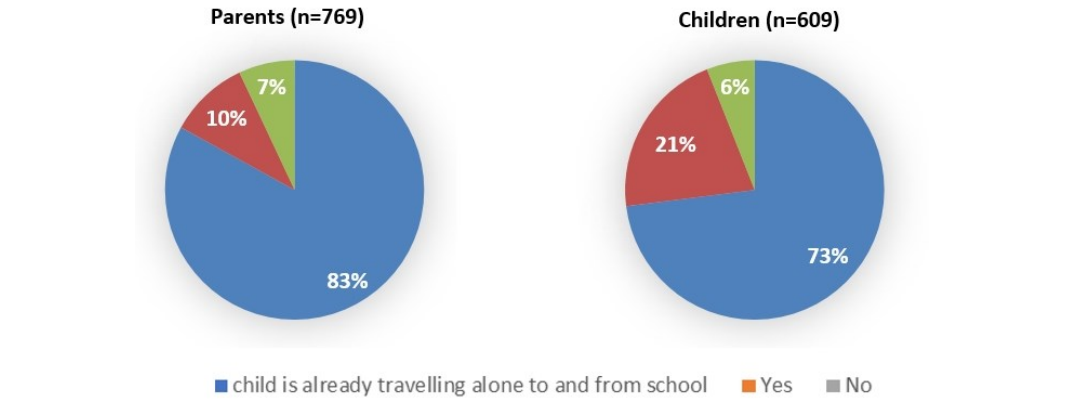

Fig. 2. Responses of children and parents to the survey question: Has the child asked parents to travel independently to and from school in the last 12 months? [10]

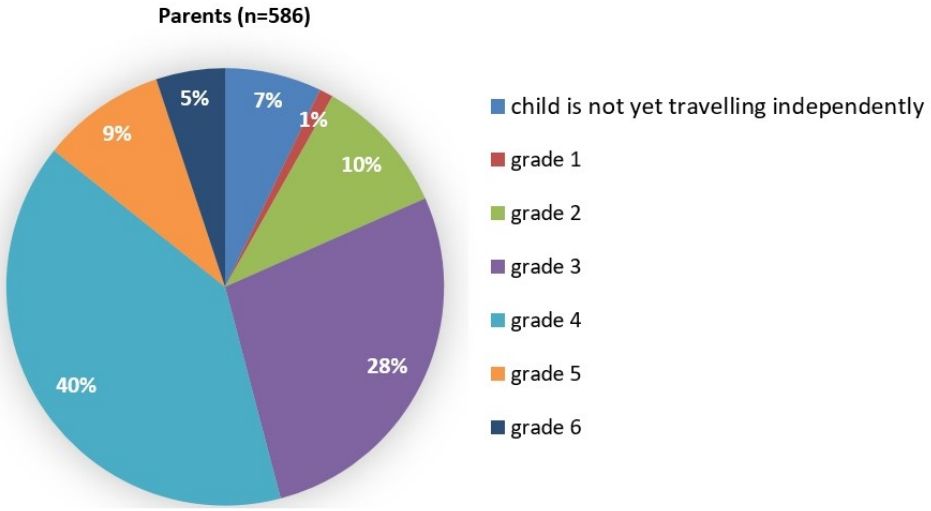

Fig. 3. Parents' responses to the survey question: From which grade is your child traveling to and from school independently? [10]

Road traffic injuries are the second leading cause of death in children between 5-14 [17]. Despite the number of child fatalities in traffic is decreasing, it's still too high (654 children under the age of 15 died in road traffic in 2015). Although the highest risk of fatality for children is a car passenger, also high is as pedestrians (30%) and as cyclists (13%) [17]. Polish statistics, although in line with the European downward trend (Fig. 4) indicate a necessity to take actions to improve road safety. As beyond the age of 6, 70-75% of journeys are to and from school, particular attention should be paid to the school vicinity [19].

Ensuring a safe road for students in the home-school-home relationship requires planning of school vicinity and catchment areas and as a complex problem and requires comprehensive actions and tools (educational, organizational, spatial, physical and legal) [20].

Referring to evidence in insufficient and decreasing PA within young people there is growing interest in walking and biking to school as a way to increase children's physical activity levels. Therefore, effective interventions aiming at promoting active, autonomous and safe commuting to school are needed worldwide and in Gdańsk.

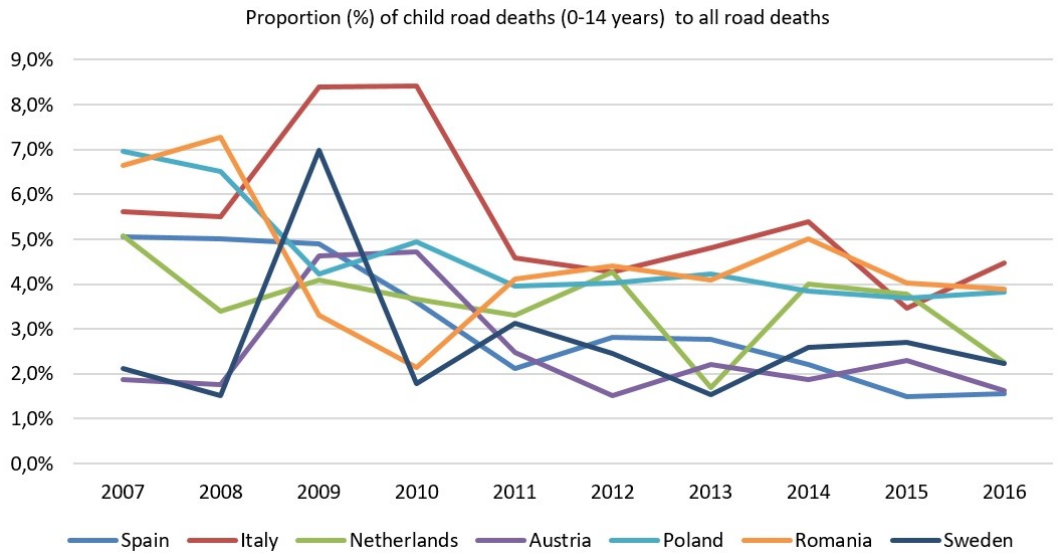

Fig. 4. Proportion (%) of child road deaths (0-14 years) to all road deaths. Source: Own study based Annual Accident Report 2018, European Road Safety Observatory

A review of the literature provides many cases of initiatives and interventions to increase active school commuting [22]. Case studies vary greatly in intervention type and duration, outcome measures, follow-up duration, and study location. These school-setting intervention areas with evidence of active transport impact were: **convenient transport infrastructure, active travel promotion and education, and shift of transport mode**. They follow the methodological approach toward transport systems (infrastructure, human and transport modes) [23].

Convenient transport infrastructure refers to the school area, vicinity and catchment area. Changes in the environment are expected to affect transport choices. Changes in the environment are to increase the comfort and safety of vulnerable road users and thus encourage active forms of mobility. Therefore, school-setting interventions are often dedicated to cyclists (bicycle racks, paths, lockers) or pedestrians (separated, safe sidewalks, car-free areas, priority for pedestrians, limited speed zones, traffic calming, visibility-enhancing, crossing measures, changes in street alignment, lighting, monitoring) or both [24-25].

The safety within the catchment area is linked to urban and transport planning and sector policies. School travel policies and practices predominantly focus on road traffic safety [25].

The main goal of **education and promotion** programs is behavioural change of target groups (children, parents, drivers, teachers, etc.). Education aims to raise awareness of individual transport choices on the environment, health, own safety and others. Educational and promotion strategies should be implemented within country, city and school settings. In several European countries, national schemes exist to promote active travel to school [26-27]. While, the teaching programs and materials in the field of safe and sustainable mobility are within European countries, to a greater or lesser extent, an element of the core curriculum, practical classes or training for walking or cycling are rather rare.

Activities to promote cycling and walking can be in the form of written, video, or events. Promotion strategies can include incentives and reward schemes to enhance motivation. Practical exercises such as a group walk or cycle are more popular than classroom-based activities. Numerous examples of promotional activities can be found on the project's [28], governmental [29], NGO's or enthusiasts' [30] websites devoted to cycling. Intervention programmes and campaigns to improve the safety of children and teenagers have been and are being carried out in several European countries. Despite, the effectiveness is not well known, some intervention programmes are considered as successful [31]: "Gehen geht"

(walking works) in Austria [19], EUCHIRES (EUrope CHIld REstraint System) in the Netherlands [19], Car Free Schools in Denmark [25].

Interventions where children are encouraged to **shift from car to active transport** modes, base on an assumption that habits developed in childhood track into adulthood. This is the purpose of organizing caravans of children who go to school in a group [31] (Piedibus in Italy, Piesze Autobusy in Poland), adults attendance of pedestrian crossings around the school (Policemen Grandparents in Italy), and actions and programs encouraging in specific time or place to bike (Bike to school in Italy, Cycling May in Poland) and many others.

To evaluate interventions and determine the most successful strategies for increasing active transportation to school, more research with higher quality study designs and measures should be conducted [32]. However, using existing evidence to select individual interventions in the process of developing structured mobility management interventions (strategies) can contribute to a synergistic effect of the entire package.

To reduce uncertainty caused by limited evidence and to strengthen existing evidence, the European Commission launched in 2017-2021 the School Chance [32] project under the Interreg Europe program. The main project goal is to develop a comprehensive strategy for making sustainable mobility at school an essential element of city mobility policy and for increasing sustainable mobility by changing the behavior of schoolchildren and the next generation's mindset towards sustainability.

The project consortium consists of eight partners from seven European countries: the City of Gdańsk (Poland), the City of Girona (Spain), the City of Reggio Emilia (Italy), the Austrian Institute for Mobility Research - FGM-AMOR (Austria), the Region of Catalonia (Spain), the City of Utrecht (Netherlands), the City of Gävle (Sweden) and Metropolitan Agency for Sustainable Development in Brasov (Romania).

The objective of the School Chance project is to reduce carbon emissions by finding innovative and coordinated ways to systematically address the four most pressing challenges in the development and implementation of school mobility policies: information, education, promotion and infrastructure [32]. Gdańsk authorities decided to take a systemic approach to meet those goals. Based on the good practice provided by program partners Gdańsk authorities decided to develop a certification system to create a framework for cooperation between schools and other municipal units for changing the transport behavior of school communities.

Although, the results of research on the effectiveness of interventions have not confirmed the expected correlation of complexity [31], an intersectoral and systematic approach was needed to support active school travel. The proposed certification system provides such. A systemic approach is guaranteed by the integration of mobility of school communities into the local policy. Additionally, the system creates frameworks for cooperation for various stakeholders: children, parents, schools and the municipal units. Besides, motivation through competition and support through evidence-based catalogs of good practices favor the selection of the set of optimal measures.

There are similar certification systems in several countries where the main prize is the prestige of the winner [33]. In the described system of certification, the system of incentives was extended with measurable financial benefits. Additionally, the points system was adjusted to a car-dominated country and the economy of a developing country. Sharing a detailed description of the evaluation and scoring criteria is intended to fill a gap that authors encountered during the design work.

The article describes the process of how the certification system was developed and the main outcomes. The structure of the article follows the stages defined in the continual improvement process theory. Chapter 2 describes the methodical approach to process design, framework and requirements as well as the method for acquiring input data. Chapter 3 presents the certification process and frame conditions for candidates. Next, it describes target groups, resources, topics and assessment categories. Finally, it gives timeframes, funding sources and evaluation indicators. Chapter 4 discusses the challenges related to designing effective certification processes and potential threats, which will be verified in subsequent editions. Finally, chapter 5 provide conclusion and recommendation for schools, owners and managers of the adjacent school area and some solution to mitigate identified problems.

1. METHODS

FRAMEWORK AND REQUIREMENTS

The Gdansk school certification system and its methodology meet the framework conditions set out in the document "Mobility-friendly School Certification" [34], developed as part of the School Chance project. The document defines the structure and the central elements of certification schemes which should be taken up by the partners but adapted to individual requirements. According to the framework, certification should have multiple approaches combining mobility and educational activities. It should serve as a quality feature of

mobility-friendly schools. The focus should be on:

- Increase in the share of sustainable modes of transport (walking, cycling, Public Transport) to school,
- Creation of visible, attractive and safe school surrounding,
- Improving safety,
- Reducing the share of students brought to school by car.

Apart from the set of requirements, the Gdansk certification system draws inspiration from the experience of other School Chance program partners, in particular:

- The participatory nature of the process - the active involvement of authorities, schools, students and parents, inspired by "Good Practices" presented by Utrecht, especially in the "Road Safety Label and School Zones" [28],
- Promoting safe and sustainable mobility,
- A multifaceted approach combining educational, promotional, information and organizational activities,
- Incentive mechanisms for participants to develop further, regardless of their certification level (based on Utrecht's experience [28]),
- Appointment of a school mobility manager (MM) inspired by the good practice of Reggio Emilia, where the need for MM cooperation with the city is emphasized, but also the city's support in terms of tools and knowledge (e.g., manual for MM, training, workshops, scope and action plan, terms and conditions of cooperation with the city, etc.).

Process Design

Given the wide range of requirements (information, education, promotion, infrastructure) and stakeholders (Municipality, parents, pupils, teachers) and an unspecified time horizon (goals increase over time), it was decided to apply the theory of a continual improvement process (CIP) [35]. The certification system follows proposed by European Union approach to mobility planning [36] and draws on earlier work in this area, namely Guidelines for SUMP [37]. The same as for SUMPs the planning process for a certification system describes the logical rather than sequential steps for a complete and continuously improving planning process. The continual improvement aims at updating a set of criteria, the points assigned to them and catalogues of good practices taking into account conclusions from the editions held.

Thanks to a systematic approach, the process involves an ongoing search for "incremental" improvement over time by implementing improvements based on the conclusions of the previous iteration. The certification system as a process requires the school and its community to be active in the longer-term (3-year cycle). Thus, it creates conditions for consolidation of sustainable transport behaviors undertaken by the participants as a result of the actions and allows them to reach higher levels in subsequent iterations.

Fig. 5. Diagram of the continual improvement process (Source: Own study)

PILOT STUDIES

The input data for the development of the certification system come from pilot surveys, questionnaires for schools, researches on modal split and field audits, which in 2019 were held in ten, preselected Gdansk schools (Table 1) [10].

The selected schools differ in conditions that may have a direct or indirect impact on student mobility: size, number of school departments, number of rooms, plot size, a period of establishment and location in the urban structure (Table 1).

Surveys: The purpose of the survey was to understand the behavior of primary school students on their way to school, their transport choices and why they were made. Selected classes from grades IV-VIII (the younger ones must travel accompanied) were invited to the survey. The survey covered a total of 780 students and 608 parents. The respondents constitute 19% of all students in grades IV-VIII. The gender and age distribution of the sample was fairly even, with females constituting 52% and with each grade constituting an average of 20% (Table 2).

Children and parents were surveyed using the direct questionnaire method. Questions concerned the distance from home to school, travel time to school, student independence, transport behaviors and preferences, reasons for the transport behaviors and assessment of the school premises and surroundings for how they promote active travel.

Participation was voluntary and anonymous. The questionnaire was conducted in March 2019. The reason why this period was selected was the good weather (encouraging active forms of mobility) and regular study periods with no days off or promotion events (e.g. Cycling May).

Questionnaires for schools: The purpose of questionnaires for schools was to obtain information from school principals on existing school-settings related to bicycle infrastructure and practical bike classes, active mobility promotion and education, rules on students drop-off and pick-up to school. Questionnaire for schools contained questions about traffic organization and parking in the school area, educational and promotional activities undertaken and identification of the main conditions that are not conducive to active mobility. The persons answering the questions were school heads.

Researches on modal split: The purpose for research on modal split was to identify the real school-related modal split. Selected classes from grades IV-VIII were invited to the survey. The cross-sectional studies were carried out by the teacher in classrooms over three consecutive typical days of the week. Based on structured questionnaires students were asked how they got to school. The questionnaires were being filled in at the beginning of the lesson on June 4-6, 2019.

Table 1. Characteristics of the studied schools

Gdańsk Primary Schools (PS)		Number of students						
Nr/name	address	I-III grades	IV-VI grades	VII-VIII grades	Total	size	location*	land use density**
nr 12	ul. Człuchowska 6	343	525	320	1178	L	HE	M
nr 19	ul. Emilii Hoene 6	321	487	288	1096	L	HE	M
nr 42	ul. Czajkowskiego 1	224	291	132	647	M	HE	M
nr 5	ul. Matki Polki 3A	92	155	105	352	S	CE	I
nr 62	ul. Kępna 38	46	92	42	180	S	CS	E
nr 67	ul. Żabi Kruk 5	50	15	46	111	S	CC	I
nr 79	ul. Kołobrzeska 49	188	278	130	594	M	CC/HE	I
nr 83	ul. Stokłosy 1	48	48	140	136	S	CS	E
Marine (PS)	ul. Rogalińska 17	447	569	194	1210	L	HE	E
Positive (PS)	ul. Azaliowa 18	282	230	49	561	M	CS/HE	M

* location: HE- housing estate, CC- city center, CS - city suburbs

** land use density – I – intensive, E – extensive, M – moderate

Table 2. Surveyed groups size and characteristics

Surveyed group	Population size	Number of respondents	Response rate	Gender distribution		Grade distribution				
				Female	Male	IV	V	VI	VII	VIII
Parents	4136	608	15%	53%	47%	23%	21%	21%	16%	19%
Students	4136	780	19%	52%	48%	23%	20%	20%	17%	20%

Field audits: The purpose for field audits was to identify and assess pedestrian and bicycle traffic conditions within and around the school and to recommend necessary to take action. The audits were carried out by a group of experts consisting of representatives of police, municipal office, universities and road safety auditors. During their field visits, the auditors filled out semi-structured questionnaires. The questions concerned the pedestrian and cyclist infrastructure (occurrence, condition), organization of traffic (speed, traffic volume, signs and signals), safety (visibility, barriers), parking settings (occurrence, availability), level of pedestrian priority.

2. RESULTS

The "Certification system of primary schools in the field of improving the safety and comfort of students traveling to school in the city of Gdansk" was developed under a contract extended by Gdańsk City Hall. The main goal of the certificate is to promote autonomous (independent) and sustainable mobility of primary school children. The proposed certification system creates a framework for cooperation between schools and other municipal units designed to change the transport behavior of school communities. Schools are more motivated to engage in shaping sustainable transport behaviour if they are supported by municipal investments in their area. Having relevant allocations in their budgets also helps cities to better integrate their mobility policies with school mobility policies.

FRAME CONDITIONS/CRITERIA:

Certificates can be obtained by schools that educate children in the field of sustainable and safe mobility, promote active forms of mobility among staff, students and their parents, and implement facilities for pedestrians and cyclists. Schools joining the program must appoint a mobility manager to liaise with the city. The number of schools that can be included in the certification process in a given year will be determined annually by the certification body. This number will depend on the funds provided in the City budget. About 10 schools are planned annually.

TARGET GROUP

The main final beneficiaries of the certification process are school children aged 6 to 15, but also their parents and guardians, as well as the rest of the school community. The certification process also benefits local government units; they use the results of surveys and field audits to identify areas which require priority action.

TOPICS AND CATEGORIES FOR ASSESSMENT

Certificates are awarded for three years on a three-point scale (gold, silver, bronze). The certificate level awarded depends on the implementation of the criteria. The categories are grouped into six areas (Table 3).

In the areas that schools are responsible for the following was proposed:

- Basic measures, which must be met to a minimum score to obtain a certificate, and
- Extended measures, which after meeting the minimum threshold of basic measures may extend the total score and the awarded certificate level.

Establishing minimum points for each category requires a comprehensive approach to the issue of students' travel to school. The minimum point values for mandatory areas of action were set considering the proportion of effort and possible effects to be achieved. Establishing the minimum thresholds for each group of areas will force schools to take at least minimal action in the full spectrum to support active mobility activities. This rule will ensure that schools that operate in only one area, apart from the others, will not be able to obtain a certificate. An important minimum threshold is the requirement to obtain 3 points within the modal split of school-related travels area, which is the minimum threshold for a sustainable travel share of 40 %.

The result of the modal split survey is a basic and mandatory measure and the infrastructure and organization of traffic on the streets in the vicinity of the school are in the group of extended measures.

The individual criteria consist of specific actions and solutions assigned to scores. The list of activities and solutions, grouped into categories, together with the assigned points form an assessment calculator - a practical tool to help determine the state of preparation of the school and the granting of certificates. Actions and solutions proposed in the calculator are described and illustrated by examples in the catalogues of actions.

During the certification process, the school declares and then reports on the performance of the activities underlying the assessment. The following catalogues support schools in planning activities:

- Examples of organizational and technical solutions on the school premises subject to evaluation in the certification process,
- Examples of organizational and technical solutions around the school subject to evaluation in the certification process,
- Examples of educational and promotional solutions focused on improving the safety and comfort of

students traveling to school subject to evaluation in the certification process,
- Organizational and technical solutions on the school premises and around the school that are not subject to evaluation in the certification process.

Table 3. Assessment criteria

Areas	Subareas	Score	
		Min	Max
Modal split of school-related travels	**Basic measures** – Share of sustainable travel (40–100 %)	3	20
Infrastructure and traffic organization within the school	**Basic measures** – Number of bicycle parking places per class – Share of bicycle parking places under roof – Type of bicycle parking place (U -shaped recommended) – Number of places in cloakroom for personal transport devices per class – The building and space around it accessible to disabled persons and persons with special needs – Rules for car access to the school grounds (gradation of rules: from the organization of parking to no access for cars) – School site lighting (illuminated partly or all-lit) **Extended measures** – Organization of safe passenger exchange in cruise coaches and school buses – Attractive space dedicated to pedestrians and cyclists encouraging active forms of mobility (gradation: from part of the terrain to the whole area)	4	20
Infrastructure and traffic organization on the streets in the vicinity of the school	**Extended measure** – Tempo 30/residence zone on the streets at the entrances to the school – Traffic calming at all pedestrian crossings around the school – Traffic calming at pedestrian crossing at the nearest entrance to the school – Kiss&Ride zone – Bicycle path directly to school	*	5
Mobility and road safety policy run by schools	**Basic measures** – School statutes with mobility policy elements – Annual plan of teaching, care and education activities – School mobility plans – Procedures or rules for the safe drop off and pick up of children from school **Extended measures** – Cooperation in the field of road safety and mobility with the road authorities – Cooperation in the field of road safety and mobility with Police, Municipal Guard – Cooperation in the field of road safety and mobility with universities – Involving parents in school mobility policy – School walk maps – Periodic street closures	2	15
Promotional activities	**Basic measures** – The appointment of a sustainable mobility coordinator – Participation of children in sustainable mobility or road safety events organized by external units – Regular school activities encouraging parents to allow their children to travel to and from school on their own **Extended measures** – School campaigns and events promoting active mobility – Involving parents in sustainable mobility activities	2	15
Theoretical and practical education	**Basic measures** – Recurring education, minimum 1 hour every two months – Occasional education – Occasional education - participation of an external expert or parental participation – Exercise behavior in "bike towns" or on the playground – Practical activities in real motion - walking, cycling, use of public transport – Practical classes in real traffic - use of personal transport equipment **Extended measures** – Teaching contents extend the national curriculum – Use of additional material outside the national curriculum – Skills verification	4	25
Sum		**15**	**100**

* Extended measures, minimal threshold of points is not required

RESOURCES

The stakeholders and main actors of the certification process include mobility manager (MM), Certification Body, and City Hall.

The appointment of a mobility manager (MM) is a prerequisite for the school to enter the certification process. The manager is selected from the school's employees. The main duties and tasks of the school's mobility manager in the certification process are to:

- Maintain contact with the certification unit,
- Register the school for the program,
- Participate in course,
- Self-assessment process management according to available criteria,
- Develop and agree an action plan to meet the certification criteria,
- Submit a self-assessment form,
- Monitor the implementation of the action plan,
- Collect information and materials confirming the implementation of the plan,
- Coordinate staff and student surveys,
- Participate in the field audit of the certification group - advisory role.

The certification body will be an interdisciplinary working team appointed by the Mayor of the City of Gdańsk. The team will be composed of representatives of the departments of the City Hall in Gdańsk and other municipal units as well as the Police and Municipal Guard. The team will be chaired by team coordinator. The coordinator, in consultation with the working team, appoints an audit team. Members of the working team may also be appointed to the certification team. Tasks of the working team are to:

- Develop the regulations and schedule of the certification process,
- Run a website containing: basic information about the project, contact details, regulations and schedule of the certification process and updates,
- Receive and manage applications from schools,
- Train mobility managers,
- Provide substantive support for schools and mobility managers at the planning stage of activities,
- Annalise data from forms, audits and surveys and assess schools according to the criteria,
- Organize an official announcement of the results and awards ceremony,
- Build a recognizable and prestigious certificate brand,
- Promote the certification process, events, campaigns and other activities that encourage sustainable transport behavior.

The Gdansk primary school certification system for improving the safety and comfort of students traveling to school is an urban program. That means, the city provides funds for:

- Program implementation,
- Activities related to improving the safety and comfort of traveling to school and around the schools involved in the certification process.

PROCESS OF GETTING CERTIFIED

The certification process consists of 4 phases, 10 stages, and 27 steps presented in Figure 6. **The preparation** phase lasts until the end of June of the year in which the school wants to join the program. It allows the school to become familiar with the principles of the certification process and decide if it wants to join the program based on the self-assessment calculator. The possibility of registering a school for the program ends at the end of the school year.

The planning phase begins with the training of mobility managers selected from school employees. The planning stage is mainly associated with the development of an action plan necessary to be taken to achieve the assumed level of certification. The certification body provides consultations for MM. This stage falls on the holiday break. The implementation phase begins at the beginning of the school year and lasts until mid-April. During this time, activities planned to achieve the certificate are implemented, surveys are conducted among students and school authorities, materials, and data needed to confirm the implementation of the declared activities are collected. **The assessment and monitoring** phase consists of summarizing the level of implementation of activities declared by the school based on forms completed by the school, surveys, and field audits and using the assessment calculator. Announcement of results and awards ceremony takes place at a formal gala. The monitoring process covers the period from issuing the decision to grant certificates to the next assessment period, during which schools already possessing the certificate will be subject to reassessment to see whether they have abandoned any activities that constituted the basis for granting the certificate.

The certificate is valid for three years, but each year the level is verified based on a short report submitted by the school. If the school has discontinued mobility activities, the certificate will expire.

Applying for a higher level of certification is possible, at the earliest, one year after obtaining a bronze or silver badge. A higher level of certification may be granted provided that the school introduced new and more mobility-friendly measures in the past year. By following the procedure, every year the school must prove, through a short report, that

it still meets the requirements of the level reached.

Maintaining the certificate after three years of its validity requires a repeat of the certification process and proof that positive and measurable changes have been made to implement sustainable mobility activities. The certification process is related to the field audit and school staff surveys. The results of field research and survey studies are to indicate areas where action is needed. They are to provide suggestions for schools and local authorities in which areas actions should be taken first. Infrastructure works to improve the safety and comfort of students, parents, and teachers around the school will be carried out by municipal units.

Time frame and Indicative Funding Sources

The certification system as a city's initiative is financed from the city's budget. The funds reserved every year should include support for the certification process as well as funds for investments and activities aimed at improving the safety and comfort of children traveling to school, recommended for implementation in audit reports, and agreed with schools that have obtained certificates.

Evaluation

The main purpose of the certification process is to change students' transport behavior to a more sustainable one. Therefore, the basic measure of the effectiveness of the system and individual activities will be the modal split and changes expressed in the following indicators:

- Change in the share of total travels made during the year using active forms of mobility [%],
- Change in the share of total travels made during measurement periods using active forms of mobility [%].

Indirect indicators for assessing the certification process will be:

- Number of schools joining the certification process [units],
- Number of schools obtaining certificates [units],
- Completion rate of activities and investments versus the year's plan [%].

It is recommended that a short on-line process evaluation survey should be completed by participants of the certification process including the mobility manager, students, parents, etc.

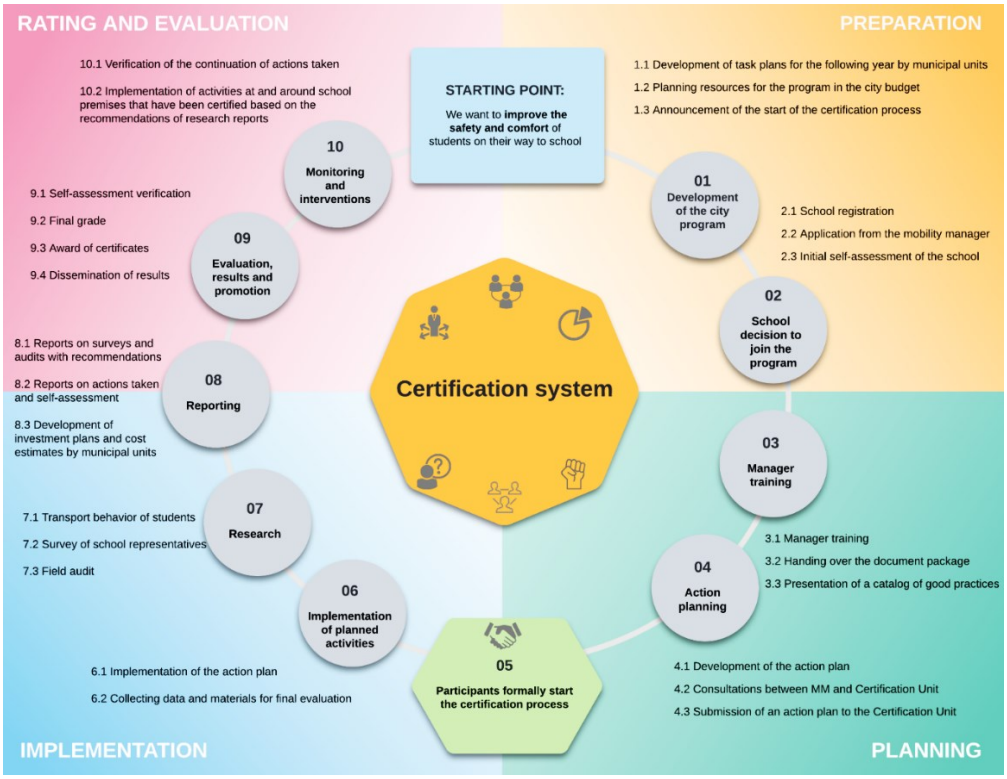

Fig. 6. Certification process: stages, steps, activities

3. DISCUSSION

A school acts as a facilitator of interventions for active school travel by providing safe and supportive environments and as a key driver of reinforcing active school travel habits and values. However, because the school's ability to interact through infrastructural or behavioral patterns are limited to the school vicinity and the time spent there, pursuing partnerships with all stakeholders (municipality, parents, neighbors, police) is an important option to support changes in active transport to school. Ikeda and colleagues [25] article 'Keeping kids safe for active travel to school' indicated the role of support from local authorities as an anchor of school travel policies and practices. The proposed certification system creates a framework for cooperation between schools and other entities and draws on earlier works [34], the experience of project partners [28] and lessons learned and evidence on intervention effectiveness [19, 25-27, 31].

Certification is a commonly used tool to confirm that an organization, a person or a group of people meet specific characteristics. However, in our case the characteristics refers to behavioral changes which are difficult to obtain and time consuming. Moreover, a school certificate differs slightly from professional certifications for companies, it is not so much a license but a motivational tool to undertake a joint effort to change the transport behavior of a certain group into a more sustainable one. The schools are assessed for their effort but the effects should last longer than the competition and extend the target group to the parents and neighbors. Additionally, they should involve wide groups of stakeholders.

It is worth mentioning that each school is unique (size, location, modal split) and operates under a different local policy context; schools make different progress in managing school community mobility. Schools all over the world and the way children commute to school differ significantly. Americans take children to school and use vast areas of land to build access roads to the school and a queue of cars carrying children appears every morning. On the other side, we have, for example, Dutch schools, where school areas are very small, much smaller than in Poland, and in general the need to drive children is small. In Poland, as a result of education reforms, the closure of small schools and construction of large schools with a high level of education and equipment, some children have to travel 3 to 4 km to school.

Apart from School Chance Project experience there is evidence from case studies that certain interventions have been effective. However, to the best of the authors' knowledge, comparative studies are lacking. Consequently, there are no guidelines or models to simulate the effectiveness of a certification system in advance.

Therefore, the main challenge in developing the certification for schools is to select an intervention adapted to the local conditions and decide on the weight of the criteria and the minimum thresholds. The authors of the certification process, based on the literature and evidence of effectiveness of interventions, have aimed to balance the amount of work that the school has to put into obtaining a certificate concerning the success achieved. If the points and weights are distributed incorrectly the following threats may occur:

- No school will enter the certification process due to the presumed heavy workload,
- None of the schools that enter the certification will even reach the brown level because the criteria will be overestimated,
- All or most schools will win the gold certificate because the criteria will be underestimated,
- The city council will not reward the extra work properly which will discourage the school from further action.

All of the above threats have been analyzed during the programming of the certification process, but the variety of school characteristics may mean that some threats will not be mitigated. An objective assessment will be possible after the first edition. The continual improvement process requires regular verification and update of the calculator points, weights, count and types of evaluation criteria after each edition. In 2-3 years, it will also be possible to exchange the experiences with partner cities from the School Chance project.

The development of a certification system for Gdańsk schools has an international and national dimension. On the one hand, it contributes to knowledge about the transport behavior of school children, trends and changes and the level of commitment to change transport behavior by a country and can help to define sustainability standards for school mobility. On the other hand, the systemic approach to managing the mobility of the school community is a pioneering solution on a Polish scale. The authors hope that the proposed framework for the development of the certification system and the example described in detail will be helpful for the development of other similar solutions in other cities. The authors lacked similar support when creating the evaluation sheet for Gdańsk schools.

The School Chance project has not been completed in any of the city – partners, therefore the effects of the activities are not known. Although the launch of the program in Gdańsk has been postponed from July 2020 to July 2021 due to the coronavirus pandemic and the change to remote learning, the positive effects of the audits, surveys and studies can already be indicated:

- 10 schools joining the pilot program,
- strengthening cooperation between schools and the city office,
- some of the barriers identified in the reports (e.g. missing ramps, missing road signs) were immediately removed by responsible municipal or school units.

After the implementation of the recommendation to improve the infrastructure and traffic organization in 10 pilot schools, a field audit of another 10 schools in Gdańsk was carried out in April 2022. Unfortunately, pandemic restrictions and the transition to remote learning made it impossible to fully complete the school certification process. It will be necessary to undertake this action again in the pilot schools in the area of education and promotion.

CONCLUSIONS

Pilot research has confirmed the need to take action to promote independent and active mobility among students. Information on the relationship between distance from school and the level of independence and transport choices indicate the need for changes in the planning of school areas. Auditors' observations, consistent with the results of surveys, helped to identify the main problem areas in and around the school districts, and thus the development of a preliminary list of recommendations for both schools and city authorities in the field of actions necessary to improve the safety and comfort of students traveling to school.

Recommendations for schools include [10]:

- Changes in traffic organization around school premises,
- Limiting car traffic,
- Investments increasing the attractiveness of pedestrian space and infrastructure for cyclists and other active forms of mobility.

The proposed solutions to the problems are contained in the catalogues of organizational and technical activities and constitute attachments to the certification system.

Recommendations for owners or managers of adjacent areas (municipality or housing association) include:

- Development of infrastructure for pedestrians and cyclists,
- Use of pedestrian and cyclist protection devices,
- Organization of traffic in the area around the school,
- Enforcement of currently binding regulations on streets around schools,
- Traffic calming,
- Creating a Kiss & Ride zone near the school,
- Introducing residential zones at the school premises.

The proposed solutions to the problems are contained in the catalogues of organizational and technical activities constituting attachments to the certification system and system solutions in the areas of:

Education:

- Introducing mandatory training and exams for a cycling license,
- Developing single teaching programs and materials in the field of safe and sustainable mobility,
- An obligation on municipal units to conduct educational classes,

Information:

- Introducing a system of spatial visualization of school premises (signage, colors). It is desirable that the marking of the school premises should be associated with information about the working time of the school, ideally if it meets the condition of a variable message sign depending on the actual school work time. A low-budget solution that meets the above condition is a system of flags displayed only during school work.

Promotion:

- Using the Gdansk educational platform to promote the certification process, participating schools, campaigns promoting sustainable behavior.

Security:

- Recommendation of project catalogues for investments around school premises.

Transport service:

- Kiss & Ride - location of this type of parking lots where it is possible and development of a graphic sign and/or color marking indicating that there is no parking possibility and the parking lot is used for drivers dropping off children. Parking lots must be located near the entrance to the building (in the case of children in classes I-III) and can be located at a greater distance from the building (children in classes IV-VII) and guarantee a safe path to this entrance,

- Considering information about where students travel to given schools and including it in timetables to adapt them to school hours,
- Designating places in public transport dedicated to school children near the driver.

Planning:

- Working to reduce the size of existing school catchment areas so that schools can be reached within a distance of 1500 m,
- Verification of the location of school catchment areas to check for routes with heavy traffic,
- Increasing compliance with the rules of school catchment areas.

The idea of the certification process is to systematically carry out audits of a school applying for certification. The recommendations are intended to guide the city in terms of investment needs and priorities. Selected investments, as part of the funds guaranteed for this purpose in the city budget, after consultation with the winning schools, will be successfully implemented by the City and its institutions.

Author Contributions: Conceptualization, R.O. and T.M.; methodology, R.O. and T.M.; formal analysis, R.O.; investigation, R.O.; writing-original draft preparation, R.O.; writing-review and editing, R.O. and T.M; visualization, T.M.; supervision, R.O.; funding acquisition, R.O All authors have read and agreed to the published version of the manuscript.

Acknowledgments: The article has been presented at the 13th International BRD GAMBIT 2020 Conference.

Conflicts of Interest: R. Okraszewska and T. Mackun are the authors of described certification system developed under a contract extended by Gdańsk City Hall.

SYSTEM CERTYFIKACJI JAKO NARZĘDZIE POPRAWY BEZPIECZEŃSTWA I ZRÓWNOWAŻONEGO CHARAKTERU PODRÓŻY SZKOLNYCH

Pomimo dobrze ugruntowanych fizycznych, społecznych, emocjonalnych, poznawczych i przestrzennych korzyści płynących z aktywnego i samodzielnego podróżowania dzieci i młodzieży do szkoły, często są oni dowożenie przez rodziców samochodem. Badania pilotażowe i badania terenowe przeprowadzone w 2019 r. w 10 gdańskich szkołach podstawowych potwierdziły ten trend. W artykule przedstawiono opracowany na zlecenie Miasta Gdańska system certyfikacji dla szkół, stanowiący element systemowego rozwiązania kształtującego schematy zachowań transportowych w podróżach szkolnych. Istotą proponowanego podejścia jest motywowanie do i wspieranie przez samorząd szkół do tworzenia warunków sprzyjających samodzielnemu i aktywnemu podróżowaniu dzieci i młodzieży. Istotnym elementem procesu certyfikacji jest ocena placówek zgodnie z przyjętym zestawem kryteriów, pogrupowanych w sześć obszarów dotyczących: zachowań w transporcie dzieci, infrastruktury i organizacji ruchu w szkole i wokół niej, polityki mobilności, bezpieczeństwa drogowego, promocji i edukacji. Grupy kryteriów podzielono na podstawowe i rozszerzone oraz przypisano im punkty w kalkulatorze oceny. W każdej kategorii ustalono minimalny próg punktów, aby zachęcić szkoły do podjęcia kompleksowych działań. Kalkulator oceny został uzupełniony o katalogi dobrych praktyk opisujących możliwe działania, jakie można podjąć, aby spełnić dane kryterium. Pełny proces certyfikacji nie został jeszcze zakończony w Gdańsku z powodu pandemii koronawirusa i przejścia na zdalne uczenie. Jednak otoczeniu szkół wprowadzono już pierwsze ulepszenia infrastrukturalne.

Słowa kluczowe: aktywne podróżowanie, certyfikacja, podróże do szkoły, zarządzanie mobilnością, zrównoważony rozwój

REFERENCES

[1] Janssen I., LeBlanc A.G. (2010) Systematic review of the health benefits of physical activity and fitness in school-aged children and youth. *Int J Behav Nutr Phys Act*, 7, 40. https://doi.org/10.1186/1479-5868-7-40.

[2] Mazur J., Oblacińska A., Jodkowska M., Ałkowska-Szkutnikd A., Tabak I., et al. (2013) Physical activity of school youth aged 9-17. Current indicators, tendencies of their changes and selected external and internal conditions (in Polish). Report. Warszawa.

[3] Kohl H.W., Cook H.D. (2013) Educating the student body. *Educ Student Body*. https://doi.org/10.17226/18314.

[4] Fyhri A., Hjorthol R., Mackett R.L., Fotel T.N., Kyttä M. (2011) Children's active travel and independent mobility in four countries: Development, social contributing trends and measures. *Transp Policy*, 18(5), 703–710.

[5] Garrard J. (2009) Active transport: children and young people (an overview of recent evidence).

[6] McDonald N.C. (2007) Active Transportation to School. Trends Among U.S. Schoolchildren, 1969-2001. *Am J Prev Med*, 32(6), 509–516.

[7] Haslam D.W., James W.P.T. (2005) Obesity. *Lancet*, 1197–1209.

[8] Timperio A., Ball K., Salmon J., Roberts R., Giles-Corti B., Simmons D., Baur L.A., Crawford D. (2006) Personal, family, social, and environmental correlates of active commuting to school. *Am J Prev Med*, 30(1), 45–51.

[9] Black C., Collins A., Snell M. (2001) Encouraging walking: The case of journey-to-school trips in compact urban areas. *Urban Stud*. https://doi.org/10.1080/00420980124102.

[10] Czuba T., Suchanek M. (2019) Summary Report. Audit and certification of conditions for cycling and walking in primary and secondary schools (in Polish). Gdańsk.

[11] Fang J.T., Lin J.J. (2017) School travel modes and children's spatial cognition. *Urban Stud*, 54(7), 1578–1600.

[12] Chaudhury M., Oliver M., Badland H.M., Mavoa S. (2016) Public Open Spaces, Children's Independent Mobility. *Play Recreat. Heal*. Wellbeing. Springer Singapore, 315–335.
[13] Tomson L., Pangrazi R.P., Friedman G., Hutchison N. (2003) Childhood Depressive Symptoms, Physical Activity and Health Related Fitness. *J Sport Exerc Psychol*, 25(4), 419–439.
[14] Rasmussen M., Laumann K. (2013) The academic and psychological benefits of exercise in healthy children and adolescents. *Eur J Psychol Educ*, 28(3), 945–962.
[15] Parfitt G., Pavey T., Rowlands A.V. (2009) Children's physical activity and psychological health: the relevance of intensity. *Acta Paediatr*, 98(6), 1037–1043.
[16] Lin J-J., Chang H-T. (2009) Built Environment Effects on Children's School Travel in Taipai: Independence and Travel Mode. *Urban Stud*, 47(4), 867–889.
[17] European Commission Directorate General for Transport. (2017) Traffic Safety Basic Facts on Children.
[18] Krystek R., Jamroz K., Michalski L., Prawdzik E., Romanowska M., et al. (2004) Principles of organizing a safe way to school (in Polish). Report. Gdańsk.
[19] European Commission Directorate General for Transport. (2018) Traffic Safety Basic Facts on Children.
[20] Zalewski A. (2000) Road traffic safety in school areas - methods and means of improvement (part II). Review of selected solutions (in Polish). BRD 3
[21] Faulkner G.E.J, Buliung R.N., Flora P.K., Fusco C. (2009) Active school transport, physical activity levels and body weight of children and youth: A systematic review. *Prev Med* (Baltim), 48(1), 3–8.
[22] Zukowska J., Gobis A., Krajewski P., Morawiak A., Okraszewska R., et al. Which transport policies influence physical activity of the whole of society? A Systematic Review. *Trnasport Heal*.
[23] Haddon W. (1980) Advances in the epidemiology of injuries as a basis for public policy. Public Health Rep, 95(5), 411–421.
[24] O'Loghlen S., Pickett W., Janssen I. (2011) Active transportation environments surrounding Canadian schools. *Can J Public Heal*, 102(5), 364–368.
[25] Car Free Zones Around Schools. (2009) Available from: http://www.copenhagenize.com/2009/08/car-free-zones-around-schools.html, (access date: 05/05/2020).
[26] Staunton C.E., Hubsmith D., Kallins W. (2003) Promoting Safe Walking and Biking to School: The Marin County Success Story. *Am J Public Health*, 93(9), 1431–1434.
[27] National scheme to promote active travel to school - European Health Information Gateway. Available from: https://gateway.euro.who.int/en/indicators/hepa_survey_13-national-scheme-to-promote-active-travel-to-school/ (access date: 20/12/2020).
[28] School Chance | Interreg Europe. Available from: https://www.interregeurope.eu/schoolchance/ (access date: 19/05/2020).
[29] Durham County Council. (2016) How to get more children walking to school.
[30] Jones C., Gee K. (2020) Ideas on how to get more children cycling safely to school. Available from: www.cyclesprog.co.uk/family-cycling-advice/get-children-cycling-safely-to-school/ (access date: 23/05/2021).
[31] Jones R.A., Blackburn N.E., Woods C., Byrne M., van Nassau F., Tully M.A. (2019) Interventions promoting active transport to school in children: A systematic review and meta-analysis. *Prev Med* (Baltim), 123, 232–241.
[32] Chillón P., Evenson K.R., Vaughn A., Ward D.S. (2011) A systematic review of interventions for promoting active transportation to school. *Int J Behav Nutr Phys Act*, 8(1), 10.
[33] Curtis P., Mouncher K. (2016) STARS Report (in Polish), Kraków.
[34] Mobility-friendly School Certification. (2019)
[35] Lahy A., Found P. (2015) Toward a Theory of Continuous improvement. University of Buckingham, 11.
[36] European Commission, (2017) *Sustainable Urban Mobility: European Policy, Practice and Solutions*. Brussels.
[37] Wefering F., Rupepecht S., Buhrmann S., Bohler-Baedecker S. (2013) *Guidelines - Developing and implementing a sustainable urban mobility plan*.