

## Applying the Intervention Mapping Protocol to promote Active Transport to School in primary school students: the ProATS intervention

### Aplicación del Protocolo de Mapeo de Intervención para promover el Transporte Activo a la Escuela en alumnos de primaria: la intervención ProATS

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**Abstract.** The school setting is presented as an ideal context for behavioral interventions. Accordingly, evidence shows that school-based interventions positively impact on Active Transportation to School (ATS). However, behavioral interventions are rarely developed in a systematic way. The aim of this manuscript is to describe the content and development process of the ProATS (Promoting Active Transportation to School) intervention. For this purpose, an Intervention Mapping Protocol (IMP) is used for the design, implementation, and evaluation of ProATS. This intervention aims to increase ATS in children aged 10 to 12 years is used. ProATS is based on a literature review and is developed by a multidisciplinary team. There is input from experts (Local Working Group), school representatives (Planning Committee), and a facilitator in each school (a member of the research team). The ProATS intervention results in the following two components (i) curricular path, (ii) non-curricular path. In parallel, a guide is elaborated, which includes the strategies and activities to design and implement the ProATS project. The results of the pilot study seem promising, showing a significant increase in ATS (i.e., the frequency of ATS). IMP, targeting behavioral changes such as ATS, is a complex and time-consuming process. Yet, it helped us to carry out the planning and development of the ProATS intervention to make it feasible, effective, and sustainable. The process explanation followed with the IMP allows replication of the intervention in other school contexts.

**Keywords:** active transport to school, children, school-based intervention, behavior change, sustainability.

**Resumen.** El entorno escolar se presenta como un contexto ideal para las intervenciones que buscan cambios comportamentales. A su vez, los estudios muestran que las intervenciones desde el contexto escolar tienen un impacto positivo en los desplazamientos activos. Sin embargo, este tipo de intervenciones rara vez se desarrollan de forma sistemática. El objetivo de este manuscrito es describir el contenido y el proceso de desarrollo de la intervención ProATS (*Promoting Active Transport to School*). Para ello, se utiliza el *Intervention Mapping Protocol* (IMP) para su diseño, implementación y evaluación. Esta intervención tiene como objetivo aumentar la frecuencia de desplazamiento activos en niños de 10 a 12 años. ProATS se basa en una revisión de la literatura y es desarrollado por un equipo multidisciplinar. Hay aportaciones de expertos (Grupo de Trabajo Local), representantes de las escuelas (Grupo de Planificación) y un facilitador en cada escuela (un miembro del equipo de investigación). La intervención de ProATS resulta en los siguientes dos componentes: (i) vía curricular, (ii) vía no curricular. Paralelamente, se elabora una guía que incluye las estrategias y actividades para diseñar e implementar ProATS. Los resultados del estudio piloto parecen prometedores, ya que muestran un aumento significativo en la frecuencia de los desplazamientos activos. El IMP, utilizado para promover los cambios de comportamiento como el desplazamiento activo al centro escolar, es un proceso complejo y que requiere de mucho tiempo. Sin embargo, ayudó a llevar a cabo la planificación y el desarrollo de la intervención de ProATS para que fuera fiable, eficaz y sostenible. La explicación del proceso con el IMP permite replicar la intervención en otros contextos escolares.

**Palabras clave:** transporte activo a la escuela, alumnado de primaria, intervención en la escuela, cambio de comportamiento, sostenibilidad.

## Background

Active transport to school (ATS) (e.g., walking and cycling to/from school) is associated with several physical and social benefits for children (Henriques-Neto et al., 2020; Ikeda et al., 2018), and their communities (Mandic et al., 2019). Despite these benefits, the prevalence of ATS has markedly decreased over the last few decades in many countries all around the world (Chillón et al., 2013; Haug et al., 2021; Rothman et al., 2018). In Spain, youth rates of

ATS did not change significantly in the last decade (Gálvez Fernández et al., 2021).

Given that ATS is influenced by complex interactions of multiple factors at individual, social and environmental levels (Mandic et al., 2017), it is critical to obtain insights into these influences to develop effective interventions. Some predictive theoretical models have been tested (e.g., Ikeda et al., 2019; Zaragoza et al., 2020) to understand influences on ATS, including variables from socio-ecological models and social cognitive theories (Lu et al., 2014; Sniehotta et al., 2014). For instance, some individual factors (e.g., age, intention of commuting, perception of competence, etc.) or social/cultural and built environment factors (e.g., distance,

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parents' attitudes, family composition, etc.), are commonly related to higher levels of ATS (Souza et al., 2019).

Although some studies have focused on developing strategies based on social and environmental factors that influence children's ATS, those interventions have proven to be insufficient for promoting ATS (Pang et al., 2017; Chillon et al., 2011). The inconsistent evidence about the positive impacts of ATS interventions is potentially attributable to differences in study design and methodological quality (e.g., varying outcome measures and evaluation criteria, lack of controlled comparisons), as well as to differences between intervention content and program theory (e.g., reported cognitive and behavioral techniques) (Grimshaw et al., 2004).

The school setting provides several opportunities to modify behaviors as evidence shows that school-based interventions have a positive effect on ATS (Jones et al., 2019; Ginja et al., 2017; Carlin et al., 2016). However, school factors such as time (e.g., competing requirements, teacher overload), academic performance pressure, resource availability, and supportive school climate, might affect implementation of those educational strategies (Naylor et al., 2015). That is why transferring evidence-based interventions into routine practice is one of the great challenges that schools currently face (Kearns et al., 2019). Designing school-based ATS interventions (i.e., an intervention program integrated into the curriculum) can be challenging, as the intervention should be effectively incorporated into the school environment, and be easy to deliver and maintain by the school (Innerd et al., 2019). Previous studies have shown considerable promise in promoting ATS, when interventions incorporate the use of a theoretical framework, a systematic design, as well as the engagement of different agents and settings in the co-construction process (Carlin et al., 2016; Pang et al., 2017; Schoeppe et al., 2013). Our study tries to consider all this evidence in the design, implementation, and evaluation of a ProATs intervention program.

ProATs is a multicomponent school-based intervention program to promote ATS in children aged 10 to 12 years-old in the city of Huesca (Spain), which is developed within the CAPAS-City project (Zaragoza et al., 2019). ProATs, as previous literature suggests, entails the structured and evidence-based development of intervention programs (Brug et al., 2005). In this sense, ProATs has followed a theoretical framework (i.e., IMP) (Bartholomew et al., 2006, 2016) to overcome design limitations and guide the development of ProATs. IMP is both a framework and a structured way of planning, implementing, and evaluating health promotion programs (Bartholomew et al., 2016). IMP integrates the target group and agents (i.e., decision-makers or actors) with the planners to ensure cultural acceptability, appropri-

ateness and program implementation (Kok et al., 2017), providing a detailed description of the program rationale, its objectives, content, implementation, strategies, and evaluation plan. IMP is an iterative process encompassing 6 key stages.

This study describes in detail the step-by-step development of the ProATs intervention using Intervention Mapping Protocol. ProATs was designed to increase frequency of ATS among schoolchildren aged 10–12 years.

## Methods

### *Setting and participants*

ProATs project was carried out in Huesca (Spain). Huesca is a city situated in northern Spain and has approximately 55,000 inhabitants. All primary schools (N= 12, grade 4 and 5) in the city of Huesca (Spain) were invited to participate in the project. Schools were invited to participate in a meeting co-organized with the Department of Education of Aragon (i.e., administrative region that Huesca belongs to).

Consistent with the findings and recommendations of previous systematic reviews on school-based ATS intervention programs (Jones et al., 2019; Villa-González et al., 2018), ProATs was developed from the beginning in partnership with school community stakeholders. Stakeholders were identified by the CAPAS-city research team through a brainstorming session, answering questions like: «*Who is affected positively and negatively by the project?*»; «*Who has the power to make it succeed (or fail)?*»; «*Who are the end users?*»; «*Who has special skills that are crucial to the project?*». Finally, a multi-sectoral group of experts (i.e., Local Working Group) with representatives from the municipal agencies (i.e., municipal sports technician of local government), and from the main services in the areas of health (i.e., a representative of the Department of Health Government of Aragon), education (i.e., a representative of the Department of Education Government of Aragon), together with two representatives from CAPAS-city project (i.e., two researchers), was established in order to give advice about questions related to the intervention. In addition, a communication plan was determined to be discussed with them. A co-design process was established at each meeting, whereby key stakeholders provided input into the design and development of the ProATs intervention.

In addition, a Planning Committee was established in each of the participant schools (i.e., schools that received the intervention), which was involved in each step of the process. It comprised two teachers, one physical education teacher, the school principal, and one representative from the CAPAS-city project. Another key characteristic in this project was the assignment of a facilitator (i.e., CAPAS-city Project researcher with a leading role), one for each school

where the intervention was carried out ( $n=2$ ). This facilitator led and coordinated the intervention, fostering a collaborative approach with the working groups of students, teachers and families in the design, implementation, and evaluation of the intervention.

Once the schools had accepted to participate ( $n=11$  schools;  $N=1560$  children aged 9-11 years), at the beginning of the project, families of all children were invited to an initial meeting at school to receive direct information about the project. Parents signed an informed consent about their participation and gave signed permission for their children to participate ( $n=1347$  children). The Ethics Committee for Clinical Research of Aragon (CEICA) approved all procedures of this project (Ethics code: C1P117/0018).

### **Step 1: Needs assessment**

The needs assessment of the present study focused on the target group of the ProATs project (i.e., 10 to 12-year-old children).

- (1) A pertinent literature review was conducted to identify the determinants and correlates of childhood ATS and the effective interventions to promote ATS. This literature analysis was conducted by the CAPAS-city research team. The search strategy included use of the following databases: PubMed, SPORTDiscus, PsycInfo, MEDLINE Complete, ERIC, Dimensions, and Academic Search Complete. The search strategy was built on the systematic review protocol established by Li et al. (2021).
- (2) To develop a city context evaluation, one report was ordered by Huesca City Council and carried out by CAPAS-city research team, called «The patterns of ATS of primary school students in the city of Huesca: diagnostic evaluation». This report provided a clear picture of ATS patterns in the local context. Further, two studies were carried out by the CAPAS-city research team, with different objectives; a) to compare mothers' and fathers' barriers to ATS (Aibar-Solana et al., 2018), b) to develop and test a model that conceptualized relationships between children's ATS, and psychological, social cognitive and perceived environmental variables (Zaragoza et al., 2020).

During this step, two meetings were held with the Local Working Group and one with the Planning Committee at each of the schools where the intervention was carried out. At the first meeting with the Local Working Group, the research team presented the results of the two studies conducted in the local context, as well as the conclusions of the literature review carried out. At the second meeting (i.e., with the Planning Committee), local needs were defined by group members. At the meeting held with the Planning Committee, researchers from CAPAS-City

provided initial suggestions and proposals to be considered as grounds for discussing the IMP task, and to ensure and coordinate the intervention planning.

- (3) In addition, focus groups were planned at each intervention school. Focus groups were selected as the preferred methodology due to the promotion of group interaction, which encourages in-depth discussion (Gibson, 2007). The focus groups took place at the schools to ensure pupils remained in a familiar and convenient setting. Two parents, the teachers involved in the project and two representatives of the students participated in each focus group. A lead moderator and an assistant moderator belonging to the CAPAS-City research team, facilitated the focus groups to ensure the discussion remained on the topic of interest. A topic guide which reflected the study's aims to ensure consistency across all focus groups and to provide triggers for discussion was used. This guide had six parts: 1) Introduction; 2) ATS patterns; 3) individual, social, and environmental perceptions related to ATS; 4) attitudes to ATS; 5) intervention proposals; and 6) other contributions and summing up. All the sessions were audio-recorded and fully transcribed to ensure the accuracy of the participants' insights.

### **Step 2: Formulation of behavioral change objectives**

The second step involved giving shape to and specifying in detail the desired outcomes of the intervention. First, given that the overall desired outcome of the intervention was to increase children's ATS, different program and performance objectives were formulated to obtain behavioral outcomes that the intervention sought to accomplish. However, it is widely recognized that ATS has many different influences at different levels (e.g., personal, interpersonal, and environmental factors), so program and performance objectives were structured according to those levels of influence. Based on the literature review, the information derived from our research and the focus groups, and influences of ATS were listed by the researchers, specifying the intervention outcomes for each level of influence (i.e., children, parents, and teachers). Second, the influences selected were crossed with the performance objectives at each level of influence to create matrices with change objectives. These change objectives helped to specify what needed to be changed in the determinants of ATS in order to accomplish the performance objectives. All performance objectives, intervention outcomes, and change objectives were discussed and agreed at different meetings held by the Planning Committees of each school.

### **Step 3: Selection of theory-based methods and practical strategies**

The ProATs intervention program design was based on the Social-Ecological Model for health promotion (Naylor et al., 2015), Social Cognitive Theory (Bandura, 2004), Theory of Planned Behavior (Ajzen, 1991), Self-Determination Theory (Deci & Ryan, 2000) and Taxonomy of Behavior Change Methods (TBCM) (Kok et al., 2016).

The final selection of theory-based methods and strategies was initially performed Local Working Group researches consensus. Parents' focus groups were conducted to request their views on methods and strategies. Parents were asked to: a) review the methods and strategies selected by the Local Working Group, and b) make a list of what they believed were the most relevant methods and strategies. Finally, each Planning Committee selected the methods and strategies to be used at each intervention school.

### **Step 4: Program development**

A first proposal of the main components of the intervention program was reached, based on the discussions of 4 meetings of the Local Working Group. The ProATs intervention was structured around the following two components: (1) the curricular path, (2) the non-curricular path. Subsequently, two meetings were held with the Planning Committee of each school where the pilot study was conducted to discuss and determine the final strategies for each program component.

The strategies used from the curricular path were:

- a) Training teachers.
- b) Introducing activities such as a questionnaire on commuting mode, self-reported y families (parents or grandparents).
- c) Developing ATS-related learning in different curricular areas.
- d) Designing ATS-related curricular materials.

The strategies used from the non-curricular path were:

- a) Parental information.
- b) Walking School Bus.
- c) Participation in institutional events.
- d) Dissemination.
- e) Cycling infrastructure changes.

Later, a pilot study was conducted to test these strategies and their respective materials, and to investigate the effects of ProATs intervention program on ATS. The aim of this pilot study was to explore the effectiveness, viability, fidelity, acceptability, and feasibility of ProATs intervention project.

#### *Setting and participants of the pilot study*

After the diagnostic evaluation and the presentation of reports to the different schools, the priority schools for in-

tervention were identified. The priority centers was identified due to their low levels of ATS and its consequences for both the students in the schools and the surrounding environment (Corral-Abós et al., 2021). Based on previously published findings (Dobbins et al., 2013), a minimum sample size of 40 children per intervention is required to detect changes across groups in PA. Therefore, a total of 150 students from four different private schools were chosen to participate. In particular, two classes per school took part in this study, and were assigned by convenience (i.e., schools that could commit, based on their conditions, to implement the intervention) to the intervention (IG) or control group (CG). Both, IG and CG had similar characteristics (e.g., socioeconomic level, located in the same neighborhood). After excluding incomplete or invalid children's questionnaires as well as all children who lived outside the city (i.e., households located >4.5 km from the child's school), two independent analysis were calculated (one control compared to one intervention respectively) to exactly compare data collected in the same days. The baseline sample of the first comparison included in the analyses was 128 students (48.9% girls;  $10.42 \pm 2.05$  years; control group:  $n = 43$ , 61.4% girls; experimental group:  $n = 85$ , 37.0% girls). The second comparison was composed by 61 students (48.1% girls;  $10.46 \pm 1.75$  years; control group:  $n = 36$ , 61.4% girls; experimental group:  $n = 25$ , 37.0% girls).

#### *Measurements and instruments of the pilot study*

Children' ATS was assessed at baseline and immediately after the 12-week intervention program with objective and subjective instruments. ATS was measured subjectively using a self-reported questionnaire about school travel mode and frequency (Segura-Díaz et al., 2020). The effect size of the repeated measures ANOVA analysis was analyzed to see how much the change in travel frequency before and after the intervention was affected because of the intervention. Moreover, ActiGraph GT3X+ accelerometer (ActiGraph Pensacola Florida, USA) for one week were using for an objective perspective.

For more information on the evaluation design of the program, see section 3.6.

#### *Implementation, fidelity, acceptability, and feasibility of the pilot study.*

Both, teachers and facilitator implemented the intervention program at each experimental school. The intervention period lasted for 3 months, from January to March. Implementation fidelity was controlled through the presence of the facilitator at all practical sessions. Implementation of strategies was registered during or immediately after the session through a comprehensive checklist.

Acceptability and feasibility of interventions should, therefore, be examined with the experiences and views of key agents, such as teachers or children, using qualitative methods (Laine et al., 2017). Different focus groups were conducted with children, parents, teachers, the principal, and the facilitator of each school to assess acceptability and feasibility of the intervention at every school. The contributions of the different focus groups were analyzed by the Planning Committee of each school followed by an in-depth discussion about what successful contributions could be incorporated in future interventions.

#### ***Step 5: Adoption, implementation, and sustainability of the program***

Several barriers and facilitators are common across the adoption, implementation, and sustainability (Cassar et al., 2019).

First, regarding the adoption of the interventions, previous works suggest: a) the importance of having a real social problem that can be solved by an intervention (Huijg et al., 2013); and b) the importance of social and political support (Huijg et al., 2013).

Second, with respect to the implementation of health-related interventions, it is important for the professionals leading the project to be capable (i.e., have sufficient knowledge and skills) of delivering the intervention, and for them to experience the intervention's efficacy (Bartholomew et al., 2011). Also, at school-level, organizational factors, which include support from the school principal, coordination with other agents, and specific staffing considerations, are key determining factors of successful implementation in the education sector (Huijg et al., 2013).

Third and finally, sustainability requires the empowerment of the main agents involved in the implementation of school-based interventions (e.g., school teachers, families, policy-makers, etc.) to sustain the intervention effects over time (Mikkelsen et al., 2016).

Consequently, the adoption, implementation, and sustainability of the ProATs project was an overarching concern that we wished to incorporate in every step of the development process.

#### ***Step 6: Evaluation design***

Consistent with the five previous steps, increased frequency of ATS was selected as the main behavioral change objective to be achieved in children. As previously mentioned in steps 3 and 4, other performance objectives were put forward, such as overcoming barriers, improving their knowledge, or increasing their intention to carry out ATS. All these objectives should be evaluated to determine the effectiveness of the program.

An initial evaluation plan was drafted by the CAPAS-City researchers and discussed during two meetings of the Local Working Group in order to produce a final version. This plan permitted, (1) assessing the impact of the ProATs project, and providing a specific measure for its effectiveness and, (2) assessing its potential to maintain the strategies and actions implemented during the intervention.

## **Results**

### ***Step 1: Needs assessment***

#### *Literature review*

A review of literature revealed the complexity of the factors that impact ATS. Individual factors included gender differences (males more than females), and age (less likelihood of actively travelling to school in the case of younger children and adolescents) (Egli et al., 2018; Wilson et al., 2018). At family level, access to cars and bikes, family structure, parents' perceptions, and socio-economic status, are consistently related to ATS (Smith et al., 2019). At community level, school policies, socio-cultural norms, and physical environments have proven to have an important influence on active school travel as shown in literature (Egli et al., 2018). School involvement is an organization level factor that is causally related to successfully increasing ATS (Lindqvist et al., 2015). Consequently, in our intervention, teachers were highly involved in the development of the design, implementation, and evaluation of the program. The most common barriers to ATS in children that are reported in literature are distance to school, traffic volume and dangerous intersections (Ahlport et al., 2008; Lu et al., 2014). In addition, different systematic literature reviews, which have provided information about the effectiveness of the ATS interventions (Chillon et al., 2011; Jones et al., 2019; Pang et al., 2017), have highlighted lack of theory, weak methodological designs, and a lack of reliable and valid measurement tools to conduct ATS intervention programs.

Considering the different levels of the socio-ecological model, parents are an important factor at an interpersonal level in the type of intervention sample. Given that the children participating in the ProATs intervention were only 10 to 12 years-old, their parents became the gatekeepers of their behavior in terms of ATS. Consistent with the central factor in SCT (i.e., social support) (Van Lippevelde et al., 2012), parental attitudes must be used as a starting point, and be included in the development of intervention programs.

#### *City context evaluation*

The main results obtained showed that children from private schools used less active modes to commute to

school (i.e., 57.7% walk to school) than children from public schools (i.e., 79.9% walk to school). Moreover, less than 1% of children cycled to and from school, (report results: «The patterns of ATS of primary school students in the city of Huesca: diagnostic evaluation» (see, <https://capas-c.eu/inicio/profesionales/>); a) although some barriers to ATS were similar for both parents (i.e., distance, driving convenience, and parental mode of commuting to work), other barriers were only specific to mothers (i.e., organization of children's extra-curricular activities, and lack of children's interest in walking to school) (Aibar-Solana et al., 2018); b) social cognitive (i.e., perceived behavioral control was the strongest predictor of intention, and influenced by autonomy, competence, and perceived environment), and perceived environmental variables (i.e., safety, accessibility of the neighborhood) explained about 50% of variance of ATS (Zaragoza et al., 2020).

#### School context evaluation

Finally, according to Bardin, (2002) a superficial reading was carried out which is included within the first pre-analysis phase, prior to the realization of the category system. The results of the focus groups carried out in step 1 revealed that it is very important for parents to understand that the roads are safe, at their children's age. The focus groups revealed how social support could have a reassuring effect on families. For example, one of the teachers expressed, «depending on the family, if the mother is afraid, she will not let her child go alone».

Factors such as distance, heavy traffic, dangerous intersections, lack of police at those intersections, or bad or nonexistent bike paths, were important barriers

commented by parents and teachers. One mother proposed that, «for example, local police at zebra crossings may mean that people walk to school». Finally, one teacher said repeatedly that, «the bike path is very bad, it stops and starts all the time».

Social factors were also commented in the focus groups. One mother said, «family, the family organization, (...) we can walk there in the morning, but then, I have to go to work, or to after-school activities, and (...) we must go by car if we want to arrive on time». Both parents and teachers also talked about the weight of backpacks as a barrier to ATS, insisting that «it's annoying having to listen to your child protesting about his/her backpack for the 25 minutes the trip lasts».

#### Step 2: Formulation of change objectives

Based on the information obtained in the first step of the IMP, several program objectives to increase ATS were set. After that, the performance objectives for each of the program objectives were specified in this step (see table 1). Researches from The Local Working Group listed all the steps that would need to be taken in order to achieve the program objectives. Later, this list was validated by the Planning Committees of each school.

Table 1. Overview of the program and performance objectives set for each intervention level.

Finally, different matrices of change objectives were developed for each level of influence (see supplementary material, Appendix A). Different behavioral outcomes were identified for each level of influence according to the possibility of achieving the specific performance objective. Then, different change objectives were established for each determinant in order to impact the performance objective.

Table 1.  
Overview of the program and performance objectives set for each intervention level

Level	Target group	Program objective	Performance objective
Individual	Children	C1. Encourage children to use active school commuting (ATS)	C.1. PO.1. Increase their frequency of walking and cycling to school
		C2. Children's knowledge about ATS	C.1. PO.2. Overcome barriers to increase ATS
		C3. Children's motivation towards ATS	C.2. PO.3. Improve their knowledge of ATS (benefits, safety rules etc.)
Interpersonal	Parents	P.1. Involve parents in the planning process	C.3. PO.4. Increase their intention to use ATS, by improving their attitudes, and developing their competence and autonomy in the use of active forms of commuting
		P.2. Parental support for ATS, developing their knowledge and motivation	P1. PO.1. Get them to participate in focus groups organized at each school. Offer ideas for the intervention program.
		P.3. Identify the main barriers and possible solutions	P2. PO.2. Motivate their children to go to school on foot or by bike
Organizational	Teachers	T1. Empowerment of school principal and teachers	P2. PO.3. Be a role model for their children using active ways of commuting
		T2. Promote knowledge and motivation of teachers	P3. PO.4. Overcome barriers to increase children's ATS.
		T1. PO.1. Integrate ATS into the curriculum and take part in the teaching and learning process at school.	T1. PO. 2. Participate in the planning of strategies and assignments, which were directly connected to the curriculum (school principal and teachers). Get involved in the development of the design, implementation, and evaluation of the program (teachers)
		T2. PO.3. Improve their knowledge by providing training in different behavioral change strategies	T2. PO.4. Use different strategies to increase children's ATS
		T2. PO.4. Use different strategies to increase children's ATS	T2. PO.5. Encourage children to carry out ATS
		T2. PO.5. Encourage children to carry out ATS	T2. PO.6. Be a role model for the children

Note. PO: Performance Objectives.

### **Step 3: Selection of theory-based methods and practical strategies**

Linked to theoretical frameworks and theory-based methods, different practical strategies were defined to cope with the change objectives at each level of influence. Moreover, different practical implications of these strategies were highlighted to improve their application (see supplementary material, Appendix B).

### **Step 4: Program development**

An overview of the whole ProATs intervention program has been shown previously in Appendix B, where all strategies are portrayed. The development and timing of the activities can be consulted in the guide elaborated in the project (Ibor et al., 2019).

The strategies used from the curricular path were:

- a) Training teachers. Teachers and the facilitator from the experimental intervention schools were invited to attend four training sessions (20h). In the first training session (4 hours' duration), a general introduction was given about ATS. The aim of the second training session (6h) was to improve the teaching staff's capacity in terms of motivating and influencing students' behavior. The aim of the third training session (6h) was to establish potential links between ATS behavior and curricular learning of different curricular subjects. Possible strategies to encourage implementation in the school curriculum were discussed. Finally, in the fourth training session (4h), teachers and the facilitator initially designed the main learning activities of the project linked to ATS.
- b) Introductory activities such as a questionnaire on commuting mode reported by families (parents or grandparents).
- c) Develop learning related to ATS in different curricular areas. Given that ATS-related contents can help to fulfil national curriculum requirements in a variety of subject areas (e.g., social science, math, physical education, expressive arts), six specific modules were designed to include ATS. More specifically, those modules were: 1) high impact presentation of the project (2 lessons); visit by local police and high school students (2 lessons); bicycle didactic unit (8 lessons); exploring the route to school using photo-voice (3 lessons); design of safe routes to school (6 lessons); ATS week (2 lessons).
- d) Curricular materials. A logo and a t-shirt with that logo were designed by students to identify the ProATs project brand at each school to empower students. Bracelets to foster engagement in ATS were also designed by students as a way of emphasizing responsibility and belonging to the project.

The strategies used from the not curricular path were:

- a) Parental information. Different and periodic meetings were held with mothers and fathers. Parents were provided with information to improve their knowledge about how to increase children's ATS.
- b) Walking School Bus. Parents, teachers, or adult volunteers act as 'drivers' or 'conductors' to escort a group of children who walk to and from school.
- c) Participation in institutional events. All students, parents and teachers who took part in the ProATs project were invited to participate in an event called ITB. The ITB is an annual test of bicycle safety, roadworthiness aspects, and cycling-related skills and knowledge. This activity addressed the whole population of the city (i.e., Huesca), and young people (primary, high school, and university students) [see Zaragoza et al., (2019)].
- d) Dissemination included different elements used during the intervention such as thematic infographics and letters to families, publications in the local newspaper, and interviews in the local TV.
- e) Cycling infrastructure changes. Secure bicycle parking facilities. In collaboration with the City Council, different bicycle racks were installed in the schools.

### *Results of effectiveness of the pilot study*

The results of the pilot study were promising, showing a significant increase in ATS (i.e., frequency of ATS), when comparing experimental and control school students (overall effect size range from 0.09 to 0.53 ( $\eta^2$ ) in both analysis). Thus, ProATs school-based intervention program could be an effective program for increasing ATS in children.

### *Results of fidelity, acceptability and feasibility of the pilot study*

The facilitator, through the check list, was able to verify that the fidelity of the program was acceptable. 90% of the strategies were implemented in one of the schools and 80% in the other.

A superficial reading during pre-analysis phase (Bardin, 2002) were carry out with qualitative data from participating children, the school principal, teachers, facilitator and parents to explored the acceptability and feasibility of each intervention component.

Children recognized the perceived benefits of the different activities carried out, which further reinforced the acceptability of the intervention. Most of the children seemed to associate the activities with significant learning, and they perceived they had learned through the activities. One boy said, «I've learned to make tighter turns with my bike», one girl said, «I've learned the signals to cycle safer». The children provided some interesting suggestions for changes to the intervention, including the use of videos, and they also proposed carrying

out activities to connect their neighborhood to the school, for example walking or cycling.

Despite the training received, teachers still found it challenging to engage students in activities. Teachers did report a lack of confidence in delivering some of the activities. Teachers talked about a positive implementation of the strategies when the ATS topics were compatible with the curriculum. The teachers felt the activities were enjoyed by the children, appropriately linked to the curriculum, and that they would be beneficial as a whole-school scheme for sustainability and continuity throughout the year. However, the hours spent on the design and preparation of activities was suggested to be too time-demanding by the participating teachers. One teacher said, «*I acknowledge all the work that we have done, but I enjoyed the project because I like ATS as a subject-matter*».

The lack of family involvement was acknowledged by the facilitator and teachers as a barrier to implementation. They also pointed out that a significant weakness of the project was the capacity to encourage parents to become involved with their children. One teacher said «*It is a project that required important family engagement, but this did not take place*». Several modifications to the intervention were proposed by teachers and facilitators. These are as follows: increase training to be able to implement the project with greater competence and develop the project throughout the school year and not for a few months.

Despite the low parental attendance rates, they commented that the intervention was beneficial to children and schools. Parents felt that the school should be mainly responsible for supporting their children's ATS project, and they pointed out that they did not have much time to get involved. One mother explained. «*Parents do not participate because of the timetable, because they really cannot, or because they are not interested*». Some modifications to the intervention were proposed by the parents; for example, replacing some face-to-face meetings with other means of communication, such as reports, messages, infographics, etc., to facilitate their participation in the project.

#### **Step 5: Adoption, implementation, and sustainability**

To maximize the potential for adoption, implementation, and sustainability of the ProATs project, we took advantage of the structure of CAPAS-City, which was created to promote PA in Huesca (Spain) and Tarbes (France) (Zaragoza et al., 2019).

CAPAS-City provided professional staff and financial support to adopt and implement the ProATs project. Examples of this support could be: (1), the creation and coordination of structures such as the Local Working Group, (2) the Planning Committees, and (3) the facilitator. All this information is provided through a variety of digital

and printed resources and materials, available on the CAPAS-City website (<https://capas-c.eu>).

In order to guarantee the project sustainability, the researchers responsible for CAPAS-City signed an agreement to include the ProATs project within the local «Planning for Sustainable Mobility (<https://www.huesca.es/>)» of the city of Huesca. This Planning aims to develop policies in order to favor more accessible, friendlier, and safer cities, where pedestrians and cyclists are expected to be the main users of the city's public spaces, instead of drivers of motorized vehicles.

#### **Step 6: Evaluation design**

The evaluation plan allowed us to analyze both the effectiveness and the potential sustainability of the ProATs intervention program.

##### *Evaluation design to test the effectiveness of ProATs*

The aim of the effectiveness evaluation was to provide evidence about the potential of the ProATs intervention program to achieve its target outcomes by: (1) determining the program efficacy on modifying and increasing the mode and frequency of ATS, and (2) measuring the effect of ProATs on the targeted psychosocial variables such as attitudes, social norm, autonomy, perceived competence, intention, etc. A quasi-experimental trial design was planned with an IG from the school involved in the intervention process following the ProATs program, and a CG from a different, but similar school in the city of Huesca. IG was assigned by the local government and municipalities. CG was selected by the researchers, based on having similar characteristics to the selected IG (socioeconomic level and similar neighborhood). Outcomes were planned to be measured at baseline and at the end of the intervention program (12-weeks intervention period). A self-reported questionnaire was used to measure the following six aspects: 1) sociodemographic characteristics, 2) school travel mode and frequency compared to the previous week (Monday to Friday), 3) TPB (i.e., attitudes, social norm, PBC, intention to ATS), 4) BPNs (i.e., autonomy, competence, relatedness), 5) perceived neighborhood environments, and 6) perceived environmental barriers (Zaragoza et al., 2020).

##### *Evaluation design to test the sustainability of ProATs*

A process evaluation was designed through focus groups with different agents such as the school principal, teachers, facilitator, and children, to further assess issues related to the sustainability of the ProATs intervention program. Questions were designed to assess, for example, the extent to which participants found the program interesting and worthy, or questions regarding the degree to which the grantees found



the sustainability intervention helpful, and which aspects they found most and least valuable. Specifically, one single question was asked to assess the likelihood of program sustainability: «Which category most accurately describes your opinion about the organization's situation regarding sustaining ProATs? (definitely will; hope to; very little chance; no chance)». One question was used to assess the potential adaptations to the programs required to improve the likelihood of sustainability: «If you are planning to sustain, are you: (using the original program format; making minor adaptations; making major adaptations)».

## Discussion

Many behavioral interventions lack the level of detail required hindering not only its evaluation, but also its replicability and the subsequent scaling-up of effective interventions (Hanson et al., 2016). The insufficient description of intervention programs and processes represents a real problem (Reis et al., 2016). To fill this gap, this paper describes the evidence-based development of an intervention program focused on ATS. IMP was used as the conceptual framework for developing the ProATs project design to promote ATS among children aged 10-12 years old. This project was based on relevant theory and available evidence and developed in collaboration with stakeholders, to increase the potential efficacy and sustainability of the intervention (Thompson et al., 2002).

It is broadly known that the school setting has the potential to influence children's health (Bonell et al., 2013). However, it is therefore necessary to consider the challenges associated with school interventions, bearing in mind that each school has its own dynamics, shaped by a large number of microsystems and agents that interact and impact changes at school (e.g., children's home environment, and neighborhood) (Gubbels et al., 2014). Researchers convey that the nature of large and complex school-based programs produces problems in the design, implementation, evaluation, and sustainability of interventions (Hammerschmidt et al., 2011), and they indicate that collaboration among the different 'stakeholders' involved in the program is a key influencing factor for program efficiency and success (Lawson et al., 2007).

This collaboration may facilitate the process of translating research evidence into practice and policy (Koorts et al., 2018). Within the context of our ProATs project, it sought to actively engage a variety of stakeholders in the intervention. A multi-sectoral group of experts (i.e., Local Working Group) was established at the start of the project to provide inputs into all project phases. At the start of the project, in addition different planning committees were established, comprised of teachers, school principals, and CAPAS-city representatives, who participated and helped

in the contextualization of the proposals at each school within each of the phases.

Two key stakeholder groups were parents and teachers, given that their role is critical for underpinning any intervention feasibility, acceptability, and overall performance (Downs et al., 2012). Several studies have attempted to conduct interventions using both parents and teachers together, with a view to generating improved health outcomes (Haerens et al., 2006; Rhodes et al., 2020). For example, an increase in teachers' intrinsic motivation could decrease barriers to ATS and increase active travel to schools (Cerro-Herrero et al., 202x). However, increasing the number of social agents involved also increases the complexity of the intervention (Moore et al., 2019). Recruiting stakeholders to engage in a research project is considered to be the most challenging aspect of the research process (Leask et al., 2019). For example, in ProATS project, recruiting parents to participate in the intervention was the hardest part. Despite having held an initial meeting to explain the project, and that during the design and implementation phases, parents' participation was requested, many parents pointed out that the main barrier to participation was lack of time. This highlights the importance of exploring other methods of participation and feedback. Maybe, it is convenient to take advantage of other meetings programmed by the school (for example, the evaluation meetings), or to explore other methods, such as e-mail or a website. Previous studies suggested that, when trying to engage parents in interventions, support services such as personalized mail, may be the most acceptable method (McSweeney et al., 2017; Wolfenden et al., 2012). In addition to lack of time, it could also speculate that the low participation of parents is due to the feeling that the school is mainly responsible for supporting their children in the ProATs project. These findings are in agreement with Patino-Fernandez et al. (2013), who reported that parents felt the school was responsible for the project development, while the researchers and the school staff think that it is, or at least it should be, a shared responsibility.

Teachers reported high levels of acceptability and feasibility, and that the ProATs project fit well with their school climate. However, they sometimes reported not having sufficient time to correctly prepare the material and implement it. This may be attributed to the participatory approach we followed throughout all the project phases, co-developing intervention components with them (Jones et al., 2017). Further, teachers indicated that the main success factor was the availability of external agents and structures to support the project. However, the relationship and communication between teachers and PE teacher was suboptimal. They had to get used to each other, and their

mutual responsibilities were not completely clear. Maybe limited time available for formal meetings impeded a good collaboration and communication (Bartelink et al., 2019). To improve this, some schools promised to review the organization of meetings for the following school year.

The facilitator was also an essential figure in the ProATs intervention program, assisting the teachers at each school. Facilitators are defined as actors who, with their presence or absence, improve functioning, and increase the opportunity for children to participate in PA interventions (World Health Organization, 2007). They provided personal support and guidance to overcome possible environmental, social, and psychological barriers that appeared in the process of the intervention. This figure was highly appreciated in the ProATs project, and both schools indicated it was essential for the success of the intervention.

Some lessons can be derived from the authors' experiences in developing this intervention. The first lesson is the time necessary for its development and implementation. Although we found IMP useful, we think that, like other previous studies (Abraham & Michie, 2008; Lloyd et al., 2011), its main limitation is the time-consuming nature of the protocol. A significant amount of time was required by the school community and other structures to draft it. In fact, we estimate that this process required about six weeks of full-time work by the research team (especially the facilitator), and a total of 15 work meetings (i.e., 30h) of the Local Working Group. In addition, each Planning Committee spent an average of 30h at the different coordination and follow-up meetings established throughout the program. But, despite the time spent, we strongly believe that it allowed us to create an effective and sustainable intervention. Second, IMP offered a new perspective in ATS interventions, since ATS interventions are usually designed and implemented by experts and researchers. This protocol contained the concern to include and engage stakeholders from different levels of the local ecology (Kutywayo et al., 2018). Third, IMP provides guidelines to ensure that an ATS promotion program is based on empirical evidence and sound theories. IMP helps planners to apply theories by linking social-cognitive determinants of behavior to behavioral methods, and by linking methods for behavioral change to practical applications that operationalize these methods (Fernandez et al., 2019). Fourth, planners of future interventions should take into consideration that planning an intervention using IMP requires the coordination of different structures and necessary funding. The presence and participation of CAPAS-City appears to be a structure that is able to respond to the main needs and challenges of this intervention to increase ATS levels. However, its presence implies a cost that should be inescapably provided when an intervention

of this nature is to be applied. Fifth, although IMP provides guidance to identify needs and develop interventions, additional research and approaches are needed to more accurately address the questions posed by each of the steps; in particular, the identification of determinants and the selection of methods of behavioral change. Additional research is needed to build the evidence base for the effectiveness of certain methods to address ATS determinants (Crutzen et al., 2017). Sixth and final lesson, IMP enabled a flexible application of the protocol that helped teachers select and adapt the program to their needs and interests. All schools differed in the way they worked day-by-day, and it is possible that what worked well in one school may not work in another. School-based research is highly influenced by contexts, which differ significantly from one school to another, such as staff, teaching methods, budgets, leadership, and support (Berliner, 2002), so educational research should consider all these elements.

Some strengths and limitations of the ProATs intervention program should be considered. The collaboration between researchers and stakeholders, the standardization of the intervention materials and teacher training sessions, as well as the process of implementing the protocols, are the major strengths of this intervention. Due to the application of IMP, it was possible to document the development process of the program in detail, and therefore, information can now be made available to other researchers wanting to develop interventions such as this.

Regarding limitations, parental involvement in all process steps should be improved. Further, it should also be highlighted that this intervention did not include changes to the physical environment, and only included some minor changes to the environment (e.g., having a facilitator and fostering an ATS-supportive environment). Future interventions should give special consideration to attend to these environmental changes.

## Conclusions

Real-world interventions require a better understanding of the complex systems in which contextual factors, including organizations, intervention agents, target population, and social influences show a more reduced control. In this paper, we have provided the development process of a school-based intervention program aimed at encouraging children, aged 10-12 years, to engage in ATS. We have shown in detail, through the different steps guided by IMP, the complex protocol to develop the ProATs intervention program. The IMP explained in this study allowed us to develop a structured proposal to increase ATS that may be successfully applied in other school contexts.

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## Declaration of conflicting interests

The authors declare no conflict of interest.

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## Appendix A

## A.1. Matrix of change objectives of the ProATs intervention for children at an individual level

Performance objectives	Influences					
	Attitudes	Subjective norms and social support	Perceived behavioral control /Self-efficacy	Perceived barriers	Autonomy	Knowledge
C.1. PO.1. Increase the frequency of them walking and cycling to school	A.1. Express positive feelings toward ATS	S.N.1. Feel that the people who are most important to them think they should use ATS	B.1. Express confidence about their ability to use ATS	P.B.1. Be able to make a positive balance between the pros and cons of the ATS	A.1. Decide to participate in the project	K.1. List the learnings they need for safe ATS
C.1. PO.2. Overcome barriers to increase ATS	A.2. Point out their predisposition to overcome barriers	S.N.2. Feel that the people who are most important to them will help them overcome barriers	B.2. Express confidence to overcome identified barriers	P.B.2. Be able to provide solutions to overcome barriers	A.2. Feel that their viewpoints are taken into account, allowing them to make choices and to solve problems	K.2. Know how to overcome the specific barriers on their route to school
C.2. PO.3. Improve their knowledge of ATS (benefits, safety rules etc.)	A.3. Show interest in learning how to travel safely to school	S.N.3. Feel that the people who are most important to them will help them understand the rules and create a safe route	B.3. Believe they are capable of learning how be active commuters	P.B.3. Express their knowledge of environmental barriers on the route to school	A.3. Participate in identifying their learning needs	K.3. Know why ATS is recommended (physical, psychological, social, and environmental benefits)
P3. PO.4. Overcome barriers to increase children's ATS.	A.4. Express curiosity and attraction to come and go to school on foot or by bike.	S.N.4. Feel that the people who are most important to them will provide support for ATS	B.4. Express their capability and ability to go to school alone	P.B.4. Be willing to implement solutions to identified barriers on the route to school.	A.4. Feel that their interest in relation to ATS is a consequence of their personal initiative	K.4. Express a greater desire to use ATS.

Note: Attitude is conceptualized as an instrumental component (i.e., extent to which behavior is seen as beneficial and useful); Subjective norm conceptualized as injunctive norms (what significant others think), and descriptive norms (i.e., what significant others do); Perceived behavioral control is conceptualized as self-efficacy (i.e., an individual's confidence in her/his ability to perform the behavior), and perceived control (i.e., control within the environment).

## A2. Matrix of change objectives of the ProATs intervention for parents at an interpersonal level

Performance objectives	Influences			
	Attitudes	Perceived barriers	Knowledge	Social influences (social support, social norms)
P1. PO.1. Get parents to participate in focus groups organized at each school. Parents contribute to the intervention program with ideas	A.1. Parents express their interest in participating in the project, putting forward ideas to promote ATS	No change objective	No change objective	No change objective
P2. PO.2. Parents motivate their children to go to school on foot or by bike	A.2. Parents express their interest in helping towards a change in behavior, and encourage the use of ATS	P.B.2. Parents express their interest and concern for looking for solutions to overcome the barriers that allow promoting their children's ATS	K.2. Parents know the benefits of ATS, both for their children and for the environment	S.I.2. Parents indicate that they are able to motivate their children towards ATS
P2. PO.3. Parents are a role model for their children using active modes	A.3. Parents express positive feelings about being role models for their children	No change objective	K.3. Parents know that being a role model for their children, encourages them in ATS	S.I.3. Parents change their own habits and reduce their use of the car
P2. PO.4. Parents overcome barriers to increase children's ATS.	A.4. Parents express the need to overcome barriers to children's ATS	P.B.4. Parents discuss their doubts and fears about allowing their children to walk and cycle to school, and propose solutions	K.4. Parents know solutions to overcome the different barriers	S.I.4. Parents understand the importance of supporting, and encouraging their children to overcome the barriers identified on the route to school

A3. Matrix of change objectives of the ProATs intervention for teachers at an organizational level

Performance objectives	Influences			
	Belief about capabilities (perceived behavioral control/self-efficacy)	Knowledge	Attitude	Social influences (social support, social norms)
T1.PO.1. Teachers involved in the development of the design, implementation, and evaluation of the program	B.1. Teachers point out the importance of actively participating in the different project phases	K.1. Increase knowledge about other strategies to improve ATS	A.1. Teachers express positive feelings about their participation in the project	No change objective
T1.PO.2. ATS is integrated into the curriculum, and is part of the school's teaching and learning	B.2. Teachers point to the importance of identifying the curricular learning that can help to promote ATS	K.2. Teachers know how to optimize interpersonal styles (e.g., autonomy support, self-determined motivation, development of strategies to promote competence and relatedness need satisfaction)	A.2. Show positive attitudes towards ATS in related contents	No change objective
T2.PO.3. Teachers use different strategies to increase children's ATS	B.4. Teachers express confidence that they can use different strategies to increase children's ATS	K.3. Teachers know and list different strategies to increase children's ATS	A.3. Teachers express positive feelings about the benefits of using different strategies to increase children's ATS	No change objective
T2.PO.4. Teachers encourage children to use ATS	B.5. Teachers express confidence that they can encourage children to use ATS	K.4. Teachers know that ATS is beneficiary for children	A.4. Teachers express positive feelings about the benefits of encouraging children to use ATS	S.I. 4. Teachers encourage children to use ATS
T2.PO.5. Teachers are a role model for children	B.6. Teachers express confidence that they are a role model for children to use ATS	K.5. Teachers know that being a role model for children encourages them to increase ATS	A.5. Teachers express positive feelings about being a role model for children's ATS	No change objective

Appendix B

B1. Theoretical frameworks and methods, and subsequent strategies and practical implications to achieve the change objectives at individual intervention level.

Influence	Change Objectives	Methods	Main related theories	Global strategies	Practical implications Some examples	
Attitudes	A.1. A.2. A.3. A.4.	Provide a rationale	SDT	Use photographs as criticism	Photo-voice to give participants the chance to reflect upon photographs that mirror the social and environmental reality that can influence their lives and their behaviors	
		Goal-setting	TPB	Encourage student participation in the development of objectives based on information about individual, social, and environmental consequences of ATS behavior	Brainstorming to create meaningful and realistic goals. Write individual goals. Design a timeline that helps children remember the established objectives and their timing	
		Emphasize responsibility	SDT	Encourage children to participate in the different challenges and activities of the project	Children design and participate in Walking School Bus Participation in the community ITB (bicycle safety test)	
Subjective norms and social support	S.N.1. S.N.2. S.N.3. S.N.4.	Behavioral journalism	TBCM	Disseminate the project to the community	Participation in social media Interviews in local newspaper and on local television	
		Use of lay health workers; peer education	TBCM	Involve students from other courses	Invite students from higher courses to share their experiences in ATS	
Belief about capabilities (perceived behavioral control/self-efficacy)	B.1. B.2. B.3. B.4.	Verbal persuasion to boost self-efficacy	TBCM	Guide children to adopt an idea through the repetition of messages with arguments designed to strengthen positive beliefs	My diary of Active Transport to School	
		Provide optimal challenge	SDT	Match challenges to student competences Set tasks in pedestrian and bicycle training	Bicycle teaching unit	
		Social support	TPB	Participation of other significant agents for the child	Parental and police involvement in school routes	
Perceived barriers	P.B.1. P.B.2. P.B.3. P.B.4.	Barrier identification	SDT	Analyze the results of perceived barriers obtained through questionnaires, and plan strategies to overcome them	Photo-elicitation interviews using photo-voice photos and others.	
Autonomy	A.1., A.2., A.3., A.4	Choice	SDT	Involve students in decision-making	Children choose and select meeting points for walking school bus	
Knowledge	K.1. K.2. K.3. K.4.	Elaboration	TBCM	Connect learning with reality	Interview with the local police	
		Use Imagery	TBCM	Test learning in a safe environment	Road safety circuit	



## B2. Theoretical frameworks and methods, and subsequent strategies and practical implications to achieve the change objectives at interpersonal intervention level

Influence	Change Objectives	Methods	Main related theories	Global strategies	Practical implications Some examples
Attitudes	A.1., A.2. A.3., A.4.	Social planning	TBCM	Inform about social and environmental consequences	Presentation and discussion of the data of ATS patterns, and influence factors of their children
Perceived barriers	P.B.2. P.B.4.	Participatory problem solving	TBCM	Encourage participation in the walking school bus	Participate in the design of the routes to escort your children to school
		Barrier identification	SDT	Identify barriers on main routes to school	Photo-voice interviews and questionnaires.
Knowledge	K.2. K.3. K.4.	Discussion	TBCM	Share information about parents' top concerns	Regular meetings Experts' meetings
		Information	TPB	Raise awareness of the benefits of ATS	Infographics and reports
Social influences (social support, social norms)	S.I.2. S.I.3. S.I.4.	Modeling	TPB SCT	Encourage and support, to facilitate ATS behavior	Parents participate in different activities such as a cycling trip outside school.
		System change	TBCM	Make alliances with different agents	Co-organize / co-prepare events (e.g., ATS week) Focus group

## B3. Theoretical frameworks and methods, and subsequent strategies and practical implications to achieve the change objectives at organizational intervention level

Influence	Change Objectives	Methods	Main related theories	Global strategies	Practical implications Some examples
Belief about capabilities (perceived behavioral control/self-efficacy)	B.1. B.2. B.3. B.4. B.5.	Enact mastery experiences	TBCM	Review teachers' previous experiences, and adjust needs to implement the project	Create support structures for teachers such as Planning Committees
		Verbal persuasion	TBCM SCT	Record audiovisual resources	City Mayor and representatives from the public health, sport, and culture sectors recorded a video to transmit messages to encourage children to use ATS
		Provide information feedback	SDT	Self-monitoring of behavior	Use diary records to monitor ATS progress
		Goal-setting	TPB	Connect the objectives of the project to those of the curriculum	Education Resource Kit
Knowledge	K.2. K.3. K.4. K.5.	Technical assistance	TBCM	Improve the teaching staff's capacity in terms of motivating and influencing students' behavior	Training program for teachers
Attitude	A.1., A.3., A.4., A.5.	Entertainment education	TBCM	Promote environmental awareness	Webquest about friendly and sustainable cities
Social influences (social support and norms)	S.I.4.	Modeling	TPB SCT	Active participation of teachers	Teachers help at the meeting points
		Social encouragement /support	TPB SCT	Plan collaboration with other city agents	Meeting with the person in charge of city mobility