

CHILDREN'S INDEPENDENT MOBILITY

The Case of Chaves

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A minha mãe

*A child's sense of a city should not be one of barriers and restrictions but of connection
and possibility*

Kevin Lynch

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ABSTRACT

Children's Independent Mobility is essential for child development, encouraging autonomy, physical activity and social interaction. However, in recent decades there has been a significant reduction in Children's Independent Mobility caused by urbanization, increased car dependency, parental safety concerns and inadequate infrastructure. This study analyzes the factors that influence Children's Independent Mobility in Chaves, Portugal, a city with simultaneously urban and rural characteristics.

A mixed-method approach was adopted, combining a questionnaire for parents with participatory activities involving 5th and 6th grade students from the Nadir Afonso Elementary School. The questionnaire examined parents' perceptions of safety, infrastructure and mobility options, while the children's activity explored their fears and experiences of independent travel. The results indicate that the majority of children use cars to get to school, with a limited number walking or using public transport. Parents expressed significant concerns about traffic safety and personal safety, reinforcing restrictions on children's autonomy.

The results points that promoting children's mobility requires a multidimensional approach, including better pedestrian infrastructure, lower traffic speeds, community awareness programs and urban planning strategies that prioritize children's mobility. By addressing these factors, cities can promote safer and more sustainable environments that encourage children's independence and active mobility.

KEYWORDS: Children's Independent Mobility, Active School Travel, Parental Safety Perceptions, Travel Behaviour, Children's Experiences

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1

INTRODUCTION

Children's Independent Mobility is the ability of children to move in their environment and take part in everyday activities such as going to school, playing outdoors, or socializing with friends without the supervision of an adult, according to (Hillman, 1990). There is a strong connection between children's independent mobility and active mobility most frequently walking, due to the fact that children are not generally able to use motorized vehicles independently (Silonsaari et al., 2024). The level of Children's Independent Mobility varies considerably depending on the specific situation of each child as a result of various factors, such as gender, cultural beliefs, environmental context, parental concerns and socio-economic aspects (Carver et al., 2014).

Various studies report a significant reduction in children's active and independent mobility, as well as an increase in passive modes in the Western world, including Portugal (Arez & Neto, 1999; Lopes et al., 2014; Shaw et al., 2015). There are several factors that have contributed to this reduction, including accelerated urbanization, growing dependence on cars, concerns about child safety on the side of parents and the lack of adequate infrastructure for active mobility (Lopes et al., 2014; Sharmin & Kamruzzaman, 2017). Among these factors, the influence of parents plays a crucial role, as they are primarily responsible for deciding on their children's mode of transportation. Research suggests that parents' concerns about traffic safety, social dangers and inadequate infrastructure often lead them to favor passive modes of transport (Mandic et al., 2015; Rodríguez-López et al., 2013). Parents' fears, which depend on the context, range from heavy traffic and unsafe road crossings to the lack of adequate sidewalks and crime risks (Dellinger & Prevention, 2002; Timperio et al., 2004). Consequently, this protective attitude limits children's independent mobility and reinforces dependence on motorized transport (Kerr et al., 2006). The loss of this autonomy has significant impacts on children's physical, cognitive and social development, affecting their ability to explore their surroundings, develop spatial skills and promote healthier lifestyles, thus Children's Independent Mobility plays a vital role in the formation of well-rounded and capable individuals, as it encourages social interactions, increases self-confidence, promotes physical activity and improves cognitive ability (Rissotto & Tonucci, 2002).

On a social level, children who travel independently have more opportunities to interact with other children or even adults (Rissotto & Tonucci, 2002) allowing them to develop friendships and social skills such as empathy and cooperation, which are fundamental to the development of healthy relationships, and improve their links with the community. Through participation in unstructured play and autonomous exploration of their surroundings, children develop a sense of connection to their local area, which can promote their participation in local activities and events (Rudner, 2012). Furthermore, research suggests that children who travel independently to school, compared to those who travel by car, are more likely to be allowed to play outdoors with their colleagues, reinforcing

their sense of autonomy and happiness (Clark et al., 2020; Rissotto & Tonucci, 2002). This strengthens the argument that promoting independent mobility is essential for children's social and emotional well-being.

From a psychological point of view, Children's Independent Mobility helps to develop autonomy and independence and has a positive impact on increasing self-esteem and self-confidence (Masoumi et al., 2020). Children who have the freedom to decide how to move develop skills in decision-making, problem-solving and risk evaluation, promoting a sense of security and reducing anxiety in unfamiliar situations (Rissotto & Tonucci, 2002). In Flanders, Belgium, a study was conducted with 247 adolescents where, through their reports, the influence of parental autonomy permissions on their types of identity was examined. As a result, it was possible to affirm that the perception of autonomy is fundamental to the development of a positive child's identity (Smits et al., 2010).

Nowadays, high levels of Child obesity and insufficient physical activity are common and recognized problems in developed countries (Clark et al., 2020). This reduction in physical activity is due to various factors, including the increased use of motorized transport (Shaw et al., 2015), as well as the increasing urbanization of cities and the industrialization of society. In a study carried out in China between 2004 and 2015, it was not only possible to conclude that children's physical activity had decreased over this period of time, but also to assess the differences between distinct areas of urbanization. It was found that children from areas of high or medium urbanization had a 29.8% lower level of physical activity when compared to those from areas of low urbanization (Xi et al., 2021).

So encouraging active forms of transportation on the way to school, such as walking and cycling, has been presented as a way to mitigate these negative tendencies and improve children's physical health, since they can be easily integrated into the daily routine (Chillón et al., 2011).

Promoting active independent mobility helps make it easier for children to take part in various forms of sport (Rissotto & Tonucci, 2002) and leads to improve better motor coordination (Carver, 2011; Larouche et al., 2023). Recent studies also point out that active transportation to school plays a key role in improving cardiovascular health, with cycling having a particularly strong impact compared to walking. In addition, active transportation to school also contributes to reducing environmental pollution by cutting vehicle emissions, which has broader implications for both public health and sustainability (Chillón et al., 2011; Panter et al., 2010; Wilson et al., 2018).

Children's Independent Mobility also plays a crucial role in promoting cognitive development. Children who travel alone tend to learn to recognize and interpret spaces better and demonstrate better spatial awareness and navigation skills than those who rely on adults or cars to get around (Chagas, 2014; Rissotto & Tonucci, 2002). They are also able to create mental maps, have a better understanding of distances, and recognize landmarks more easily (Rudner, 2012). These cognitive abilities increase their academic success, especially in subjects such as mathematics and geography (Rissotto & Tonucci, 2002).

In this context, this research focuses on how children travel to school in the city of Chaves. This municipality was selected due to its combination of urban and rural characteristics, which has an influence on children's independent mobility. The literature shows that rural environments tend to allow children greater freedom, thanks to lower traffic density and a stronger sense of community, fostering parental confidence in allowing independent movement (Carver et al., 2014; Lopes et al., 2014; Masoumi et al., 2020).

Urban areas, in contrast, despite offering better infrastructure, often present more barriers to mobility due to increased traffic, higher population density and concerns for parents' safety (Masoumi et al.,

2020). So, Chaves presents a distinct scenario, not only because of its combination of urban and rural characteristics, but also because of its status as a border region with unique mobility challenges. Furthermore, the literature on children's autonomous mobility in border regions remains limited, making this study a valuable contribution to understanding the dynamics of mobility in these contexts.

In addition to its geographical characteristics, as a native of Chaves, I possess an in-depth knowledge of the city's organization and dynamics, which not only facilitated access to the local school board but also allowed me to gain a more comprehensive and personal understanding of the challenges and opportunities related to Children's Independent Mobility in the municipality.

The main objective of this research is to analyze how children travel to school, as well as the factors that may influence children's independent mobility in Chaves, considering both the parents' perceptions of safety and the children's own experiences, while also trying to compare and understand the influence that each has on the other. Through a mixed methodological approach, which includes questionnaires to parents and interactive activities with 5th and 6th graders at the Escola Básica Nadir Afonso, the aim is to acquire an in-depth understanding of the obstacles and opportunities that exist to promote greater autonomy for children at this school.

In this context, the study aims to better understand the dynamics of children's school mobility by addressing key questions such as:

- What are the most common ways children travel to school?
- What are parents' main concerns about their children's independent mobility?
- How do children perceive their safety and freedom on the home-school journey?

By addressing these questions, the research aims to provide a clearer understanding of the factors that shape children's mobility and the extent to which their autonomy is supported or constrained.

Additionally, this research aims to contribute to the discussion on children's independent mobility in Portugal, providing information and new data that can support urban planning and sustainable mobility decisions. Identifying obstacles and possible solutions can help implement strategies that promote a safer and more autonomy-friendly environment for children, encouraging more active and sustainable travel.

Therefore, by exploring the case of Chaves, it is anticipated that this research will provide valuable insights into the dynamics of children's mobility in urban and rural contexts, allowing for a better understanding of the challenges and opportunities faced in promoting children's independent mobility in contemporary Portugal.

2

LITERATURE REVIEW

2.1 CHILDREN'S INDEPENDENT MOBILITY AND ACTIVE MOBILITY

Children's Independent Mobility and Active Mobility are often connected but distinct concepts. Active Mobility refers to moving around on foot, by bicycle or other non-motorized modes, however, a child can participate in Active Mobility without this meaning that they are doing so independently (Katsavounidou et al., 2024). Therefore, the presence of Active Mobility does not automatically imply high levels of Children's Independent Mobility. Studies show that many children walk or cycle to school, but accompanied by adults, reflecting parental concerns about safety and accessibility (Aranda-Balboa et al., 2020).

There are a variety of factors that make the relationship between Children's Independent Mobility and Active Mobility complex. The built environment plays a key role in determining children's travel habits, with infrastructure such as wide sidewalks, safe bike lanes, traffic calming measures and green spaces influencing both the practice of Active Mobility and parents' perception of safety. However, the existence of a good urban environment does not guarantee that parents will feel comfortable allowing their children to walk alone (Faulkner et al., 2010; Michail & Torun, 2024). Research into the choice of school routes shows that children often opt for longer routes rather than shorter ones when they travel alone, favoring other factors over distance, such as streets that offer greater comfort and protection. These elements improve the Active Mobility experience, but Children's Independent Mobility still depends on parents' confidence in the safety of the environment (Faulkner et al., 2010; Michail & Torun, 2024).

Another determining factor is the distance between home and school. A study carried out on mobility choices found that children who live closer to school tend to walk or cycle more often than those who live further away (Fagerholm & Broberg, 2011) but even within short distances, Children's Independent Mobility can be restricted, and this is largely due to socio-economic factors and cultural perceptions on the part of parents, which have a significant value on children's autonomy. In the case of this study carried out in Finland, since parents consider the areas safe and most of the children's mobility takes place within 500 meters of their homes, Finnish children walk and use bicycles as their main forms of mobility, with around 80% of cases being adult independent (Fagerholm & Broberg, 2011).

Studies indicate that children from lower income families have higher rates of Active Mobility, often out of necessity, as access to private transportation can be more limited (Larsen et al., 2009). However, in these situations, factors such as urban insecurity or concerns about crime can lead to stricter parental supervision, reducing the chances of Children's Independent Mobility (Huertas-Delgado et al., 2018). Similarly, in upper-class neighborhoods, the preference for motorized transport

conveys the idea of comfort and safety, resulting in lower levels of Active Mobility, without necessarily meaning that there is greater autonomy for children living in these areas (Larsen et al., 2009). In this perspective, it is also possible to notice a decreasing tendency in the practice of active mobility as the parents' level of education increases (Larsen et al., 2009).

When parents in Granada (Spain), were asked about their perceptions of the barriers to active mobility to school, Huertas-Delgado *et al.*, (2019) they indicated that, in addition to safety and traffic concerns, there were also practical constraints associated with walking and cycling. According to the study, several parents expressed the view that walking is boring and would interfere with before and after school activities, forcing them to spend more time on these journeys, was put forward by several. In addition, when the barriers to cycling were analyzed, the inconvenience of carrying a bicycle while carrying school materials was mentioned, with a focus on heavy backpacks (Huertas-Delgado et al., 2019).

For these reasons, understanding the difference between Active Mobility and Children's Independent Mobility is fundamental to developing effective urban policies. Promoting Active Mobility alone can result in an increase in walking and cycling without any genuine progress in children's independence (Schoeppe et al., 2014). In order for children to truly gain autonomy in their daily journeys, the strategies adopted need to consider not only the creation of safer and more accessible urban environments, but also the transformation of parental perceptions of safety and confidence in children's ability to move around on their own.

2.2 PARENTAL CONCERNS AFFECTING CHILDREN'S INDEPENDENT MOBILITY

There has been a noticeable reduction in active transportation in children and Children's Independent Mobility in recent decades, mainly due to parents' concerns about safety and potential dangers (Carver et al., 2014; Ridgewell et al., 2009). Parents are the main decision-makers in children's travel behavior in general (Aranda-Balboa et al., 2021) and school travel behavior in particular (Kerr et al., 2006). The concept of "mobility licenses" (Hillman, 1990) helps to understand how parents regulate children's independent mobility. These licenses refer to permissions granted to walk to school, cross streets, ride a bicycle or use public transportation without adult supervision (Curtis et al., 2015). Studies indicate that these permits vary according to age, gender and the level of parental concern about factors such as road safety and urban risks.

Rudner (2012), states that parental fears are focused on dangers seen as uncontrollable, such as intentional harm from strangers or traffic accidents. This growing restriction on mobility is linked not only to the safety concerns but also to urban development trends that have increased distances between key destinations. Changes in land use, such as urban expansion and car-oriented planning, have contributed to the conversion of streets into road spaces as urban areas prioritize roads for vehicles over pedestrians (Alberto, 2022).

A questionnaire carried out in Greece, based on the methodology of the Safe Routes to School survey (Touran et al., 2004), by analyzing the multiple-choice question on the parameters that parents take into account when deciding whether to take their children to school. Among the 97 parents who participated, concerns regarding safety from violence and crime (88.66%) and traffic safety (87.57%) were the most common responses, followed by vehicle speed (85.57%), safety when crossing streets (83.51%), the existence and quality of sidewalks (78.35%) and traffic volume (77.32%) (Katsavounidou et al., 2024).

A study by the Policy Studies Institute, which analyzed 16 countries, found that nations like Finland and Germany lead the way when it comes to giving children independence. In Finland, children start moving around on their own from the age of seven, and by the age of ten they are using public transport independently. This phenomenon is attributed to strong urban planning and a culture that values children's autonomy. Similarly, in Germany, the presence of numerous cycle paths and adapted infrastructure facilitates independent mobility. The study also showed that, in countries such as Finland and Japan, there is greater trust in the community, which contributes to a wider social acceptance of children's independence (Fagerholm & Broberg, 2011; Shaw et al., 2015).

Research indicates that involving parents in discussions about urban planning can help to reduce concerns and promote a more welcoming environment for children's autonomy (Lopes et al., 2014).

2.2.1 PERSONAL SAFETY FEARS

Fear related to personal safety is one of the main factors restricting children's independent mobility. Many parents express significant fears about potential external threats, such as violence, kidnapping and contact with strangers. These concerns tend to be greater than those expressed by children themselves and may originate from protective instincts (Wilson et al., 2018).

This concern focuses not only on the risks inherent in children's daily activities but, above all, on the perceived danger that can derive from the presence of strangers (Rudner, 2012). Studies show that parents are especially sensitive to the possibility of their children encountering “malicious adults”, which is one of the fundamental reasons for limiting children's autonomy (Rudner, 2012). For instance, in Rudner (2012) research, 75% of parents reported concerned about their children's interaction with strangers, of which 48% had very high levels of concern, directly influencing their decisions about whether or not to allow children's independent mobility. Despite this fear, the same study showed that more than 50% of parents recognize that restricting children's autonomy deprives them of important learning and personal development opportunities. However, this recognition rarely translates into more freedom, as fears persist and are reinforced by social norms and local regulations. In fact, some regulations frame children as particularly vulnerable and unable to cope with situations, emphasizing continuous adult supervision, which can contribute to the perception that an environment where the presence of unaccompanied children in public spaces is seen as a risky situation (Rudner, 2012).

The perception of danger is highly influenced by the media representations and parents' personal experiences (Hackett, 2008). The media tends to emphasize extreme risk scenarios, amplifying fears and creating a distorted perception of the real frequency of events such as abductions or assaults on children. Studies indicate that this continuous exposure to negative reports reinforces an “emotional space of worry”, in which parental decisions are guided more by the anticipation of hypothetical risks than by real probabilities of incidents occurring (Rudner, 2012). The impact of media narratives leads many parents to adopt restrictive parenting practices, limiting children's freedom of movement even in relatively safe environments (Payne, 1988).

The way in which this concern manifests itself varies according to the level of urbanization and the cultural context. Research suggests that in heavily populated urban areas, where the sense of community may be weaker and the fear of crime more present, the tendency to restrict children's independent mobility is higher (Cordovil et al., 2015). On the other hand, in neighborhoods where parents feel more integrated into the community, there is a greater predisposition to allow children to move around independently. In some cultures, strong community ties and social networks have a

positive influence on children's mobility. In tight communities, there is a collective approach to raising children, where neighbors share the responsibility of supervising the youngest. This sense of community vigilance can reassure parents and encourage them to allow their children independent mobility. In contrast, in more fragmented communities, parents can feel isolated in their parenting role, leading to a greater reluctance to grant children independence (Masoumi et al., 2020).

The study by Lopes, Cordovil and Neto (2014) also revealed that, in Portugal, the gender of the child influences the perception of risk, with parents of girls showing higher levels of concern compared to parents of boys. When another study was carried out in England on how boys and girls experience independent mobility, it was concluded that girls have a different form of independent mobility compared to boys (Brown et al., 2008). According to Brown *et al.*, (2008), in the case of girls, it is based more on the use of public transport, visiting people and places across greater distances and doing things in the company of friends, creating widely dispersed networks. Boys, on the other hand, tend to travel alone and are more likely to have friends nearby, gaining intimate knowledge of a small territory. Boys are more likely to play outside on most days, girls rarely play outside, especially out of sight of home (Brown et al., 2008). This difference translates into higher levels of children's independent mobility for boys, which in turn allows them to achieve better results in cognitive mapping tasks, given that they develop greater familiarity with the urban space (Rissotto & Tonucci, 2002).

In some countries, social and cultural norms further exacerbate gender disparities in mobility. In Brazil and South Africa, for example, studies indicate girls have significantly more restricted mobility than boys, reflecting gender norms that perpetuate the idea that girls are more vulnerable and need greater protection (Fagerholm & Broberg, 2011; Shaw et al., 2015). This scenario reinforces a cycle of inequality in children's autonomy, in which opportunities to explore urban space and learn hands-on are limited for certain children due to deep-rooted social perceptions. While this disparity is particularly evident in these countries, in Portugal, gender differences in children's independent mobility are less pronounced, with only a slight gap between boys and girls (Lopes et al., 2014).

In parallel, family structure can also play a relevant role in the licenses granted to children's independent mobility. A study carried out in a suburban city in Germany showed that families with more than one child tend to grant higher levels of autonomy to children, as traveling with siblings generates a greater sense of security (Scheiner et al., 2019). This factor suggests that the presence of a companion, even another child, can serve as a mitigator of parental fear. In addition, studies indicate that parents' own experiences with independent mobility and their travel behaviors influence their children's autonomy. Duffy et al., (2024) found that parents who had less independent mobility in their own childhood were more likely to impose similar restrictions on their children.

Essentially, fear related to personal safety has a significant impact on Children's Independent Mobility and is shaped by individual, sociocultural and urban factors. Parental concern, amplified by the media and reinforced by certain regulatory frameworks, creates an environment in which constant supervision becomes the norm, even in traditionally safe spaces. Despite the recognition of the benefits of Children's Independent Mobility for child development, emotional and social barriers often override rational arguments, restricting children's freedom to explore the world independently. By allowing parents to enter into discussions about urban design, they can also ensure greater relief from their worries as this brings them a greater sense of community and feeling of control over their children's safety (Lopes et al., 2014).

2.2.2 CAR DEPENDENCY AND TRAFFIC-RELATED DANGERS

In recent decades, the reduction of active mobility and the growth of car use, facilitated by cheap oil and pro-car urban planning, have been identified as key factors influencing children's independent mobility (Lopes et al., 2014). These changes have significantly impacted urban dynamics of cities and reducing children's autonomy (Shaw et al., 2015).

Traffic safety is one of the main concerns of parents and plays a decisive role in granting permission for Children's Independent Mobility. Multiple studies present traffic-related risks as one of the main barriers to Children's Independent Mobility, more relevant than fear of strangers or distance to school (Duffy et al., 2024; Katsavounidou et al., 2024; Wangzom et al., 2023). A study carried out in Kordelio-Evosmos, Greece specifically analyzed parents' perceptions of traffic conditions in their neighborhoods and revealed alarming statistics regarding their concerns about road safety, proving that parents tend to perceive the road environment as highly dangerous: 93% considering the behavior of drivers to be a problem, 85.4% reporting speeding in residential areas and 81.3% mentioning disrespect for pedestrian rights and violation of red traffic lights (Katsavounidou et al., 2024). This feeling of insecurity is not only based on objective accident data, but when a comparative study was carried out between different neighborhoods and regions, it was possible to see the differences strongly influenced by personal experiences, cultures and the social circle of the parents (Masoumi et al., 2020). For instance, parents who live in neighborhoods with a history of high accident rates tend to be more apprehensive, while those who live in areas with good infrastructure show greater confidence in the safety of the streets (Masoumi et al., 2020). Interviews with a number of parents in the Netherlands showed that before having children, many of them chose to live in areas with higher traffic volumes and were less aware of the risks associated with these, since they enjoyed the convenience of being close to services that urban life provided (Karsten & Vliet—, 2006).

This social and cultural influence can generate pressure to normalize car use, since in many communities there is a stigma about active mobility and not using the car (Cadima et al., 2024). In addition, several parents interviewed in research stated that they do not use active transport due to incompatibilities with their lifestyles and their children's extracurricular activities (Zuniga, 2012).

In the Portuguese context, it can be seen that only 30% of children actively and independently travel home after school (Cordovil et al., 2015). To better understand such concerns, it helps to look at the country's road safety data. With a traffic fatality rate of over 10 deaths per 100,000 inhabitants, the fear of hit-and-run and vehicle accidents has a direct impact on the granting of "mobility licenses" (Masoumi et al., 2020), with approximately 10% of Portuguese children aged 15 not being allowed to return home alone after school, and around 20% being prohibited from cycling alone on main roads (Masoumi et al., 2020).

Although this is a common phenomenon throughout the country, this data tends to differ according to the level of urbanization. In urban areas, parents have more control over children's mobility due to the heavy traffic and busier environment. In contrast, in rural areas, parents show a greater sense of community and allow their children to play and explore their surroundings more freely (Lopes et al., 2014). This pattern is reflected in the age at which children are allowed to move around on their own. In Portugal, children in rural areas reach this autonomy at the age of 11, while in urban areas this milestone only occurs at the age of 13 (Lopes et al., 2014). However, this greater control does not necessarily mean more concern. When studying the level of parental concern in the urban environment, with a rate of 51.6%, parents are more relaxed as they are used to interacting with traffic on a daily basis, unlike rural parents who see their children as less experienced in interacting with traffic, thereby increasing the rate of parental concern to 66.4% (Lopes et al., 2014).

Increased traffic and the perception of road dangers have increased dependence on private transport, which significantly limits opportunities for Children's Independent Mobility (Zuniga, 2012). A study in the USA revealed that the rate of children walking or cycling to school fell from 47.7% in 1969 to significantly lower figures in 2009, in line with the growth in the use of cars for short journeys (Adams & Requia, 2017). This tendency, often justified as a protective measure, creates a vicious cycle in which the increase in car traffic intensifies traffic dangers, making routes more dangerous for those who walk or cycle (Cadima et al., 2024). Also, contributes negatively to the environment by reducing air quality in school zones (Katsavounidou et al., 2024). Studies indicate that the reduction in child traffic fatalities is not due exclusively to the creation of safer infrastructure, but mainly to the fact that children are increasingly being removed from the streets due to the restriction of their independent mobility (Cordovil et al., 2015). This trend has implications on their physical and mental health, reducing opportunities for exercise and exploring public spaces, leading to this new generation being called the “back-seat generation” (Karsten & Vliet—, 2006).

2.2.3 URBANIZATION, INFRASTRUCTURE AND PUBLIC SPACE SAFETY

Accelerated urbanization and transformations in the built environment have profoundly impacted children's independent mobility (Lopes et al., 2014). The expansion of cities and increasing population density have introduced significant challenges for children's autonomy, altering travel habits and increasing parental concerns regarding safety. Over the past decades, urban spaces have become increasingly dominated by motorized traffic, prioritizing vehicles over pedestrian-friendly infrastructure (Cordovil et al., 2015). This shift has led to a reduction in green spaces and safe pedestrian areas, making streets less conducive to play, socialization, and exploration (Lopes et al., 2014). Wide streets with high traffic volumes and complex intersections generate significant concerns about accidents, leading to lower parental permission for independent mobility (Sharmin & Kamruzzaman, 2017).

Population density plays an ambiguous role in children's mobility. While dense residential and mixed-use areas provide walkable destinations and promote shorter travel distances, the high number of intersections and congested streets can pose obstacles to children's freedom (Sharmin & Kamruzzaman, 2017). A meta-analytic study found that dead-end streets significantly enhance children's independent mobility by reducing traffic and creating safer spaces for movement. Additionally, proximity to moderate shopping areas positively influences mobility by increasing the likelihood of walking (Sharmin & Kamruzzaman, 2017).

The spatial structure of street networks also affects children's route choices. Research suggests that directional accessibility is a significant predictor of route preference, with children favoring more direct and linear streets with fewer directional changes (Michail & Torun, 2024). Consequently, well-designed neighborhoods with fewer street intersections between home and school are linked to higher levels of independent travel (Masoumi et al., 2020). The perception of safety within neighborhoods also plays a crucial role. Urban environments that integrate parks, playgrounds, and community spaces foster a greater sense of trust, encouraging parents to grant their children more autonomy (Shaw et al., 2015), and the presence of green spaces further supports this trend (Duffy et al., 2024). Public spaces such as parks and playgrounds are essential for fostering children's mobility and social interactions. Studies show that proximity to green areas and recreational spaces increases walking frequency and provides safer environments for play (Lopes et al., 2014). However, urban areas with high concentrations of commercial activities tend to be avoided by children on their school routes, likely

due to their location along major roads (Michail & Torun, 2024). This contradicts earlier studies that associated mixed-use areas with increased active mobility (Argin et al., 2017; Torun et al., 2020).

Urban infrastructure, particularly sidewalks, crosswalks, bike lanes, and street lighting, is fundamental to children's independent mobility (Shaw et al., 2015). When these infrastructures are inadequate or absent, children's autonomy is often restricted, leading to increased dependence on motorized transport (Davison & Lawson, 2006). Well-maintained pedestrian pathways are essential for promoting active mobility, yet many urban areas fail to prioritize them, resulting in narrow and poorly maintained sidewalks often obstructed by parked vehicles. A study analyzing school routes in England found that the presence of crosswalks and traffic lights was a key determinant in children's route choices, as they provided safer and more predictable crossings (Michail & Torun, 2024).

The existence of dedicated cycling infrastructure is another critical factor. The lack of bike lanes limits children's ability to use bicycles as a mode of transport, reducing their autonomy and physical activity levels (Lopes et al., 2014). Parents' perception of safety is significantly influenced by the presence and quality of cycling infrastructure (Masoumi et al., 2020). Dead-end streets (cul-de-sacs) and residential areas with minimal through traffic encourage children's mobility by creating safer environments, whereas wide roads with high traffic volumes and complex intersections are associated with lower levels of independent mobility (Sharmin & Kamruzzaman, 2017). Research also indicates that the presence of traffic lights improves the usability of these roads, mitigating some of the associated risks (Dessing et al., 2016; Michail & Torun, 2024).

Street lighting is another key element in urban safety perceptions. Well-lit environments reduce feelings of insecurity and increase parents' confidence in allowing their children to travel independently (Lopes et al., 2014). Additionally, surveillance cameras and community policing efforts can contribute to a safer urban environment, further encouraging children's mobility (Lopes et al., 2014). Access to public transportation also plays a role in fostering autonomy. Areas with reliable public transport networks enable children to commute to school and other activities independently, while regions with limited or inefficient transport options increase parental reliance on private vehicles, thereby restricting children's mobility (Lopes et al., 2014; Masoumi et al., 2020).

Some urban strategies have demonstrated positive effects on independent mobility. Research by Larsson et al., (2023) found that autonomous shuttles were perceived as a safe option for children's travel due to the presence of onboard safety operators and low vehicle speeds. However, while this approach offers a sustainable transport alternative and reduces car dependency, it raises concerns about whether it genuinely fosters independence. There is a risk that such mobility solutions could replace active transportation (walking, cycling), thereby reducing children's physical activity levels.

Improving urban infrastructure and public space design is essential for promoting children's independent mobility. However, for these improvements to be effective, urban planning must consider the specific challenges of different urban contexts. Cities face unique issues ranging from congested streets to inadequate public transport systems, requiring tailored interventions (Masoumi et al., 2020). Engaging parents and the community in the urban planning process can help create more favorable environments for children's mobility (Lopes et al., 2014).

A transition towards more balanced and sustainable urban planning that prioritizes active transportation over car-centric development is crucial to reversing the decline in children's independent mobility. By creating accessible, safe, and inviting urban spaces, cities can enhance children's autonomy while also promoting social and health benefits, encouraging more active lifestyles, and fostering stronger interactions with the urban environment (Lopes et al., 2014).

2.3 POLICIES AND STRATEGIES TO PROMOTE CHILDREN'S INDEPENDENT MOBILITY

Children's independent mobility has been addressed and impacted by various policies and initiatives around the world. Some approaches focus on urban infrastructure, improving streets, sidewalks and bike lanes to ensure safe travel for children. Others emphasize cultural and social changes, encouraging active transport through educational campaigns and community events. To create a truly child-friendly urban environment, cities must integrate safe infrastructure with policies that promote autonomy and active mobility (Yin et al., 2022).

One of the most recurrent and effective strategies for increasing Children's Independent Mobility is the implementation of traffic calming zones. This includes reducing speed limits to 30 km/h in residential and school areas, installing speed bumps and reorganizing traffic to prioritize pedestrians and cyclists. Studies show that this measure has been associated with an increase in children's active transportation, making journeys safer and encouraging parents to allow their children to move around without constant supervision (Garrard, 2009; Pucher & Dijkstra, 2000; Tranter & Sharpe, 2012). As well as reducing the risk of being run over, these zones create a friendlier urban environment for children, allowing for greater social interaction and the use of public space for outdoor play and activities.

Some cities have implemented concrete measures to reclaim urban spaces for children. In Delft, the Netherlands, residents organized protests to restrict traffic in residential areas, arguing that the excessive presence of cars was harming children's safety and well-being. As a result of this mobilization, the city adopted measures such as reducing vehicle speeds, creating pedestrian-only areas and increasing the number of public spaces for children's play (Karsten & Vliet—, 2006). This experience demonstrates the positive impact of involving the community in the urban decision-making process, ensuring that children's needs are taken into account when formulating public policies.

When it comes to school-related mobility, specific strategies are required to ensure children can travel safely between home and school. Active school transport programs have emerged as another effective alternative to reduce car dependency and encourage healthy habits. For example, the Walking School Bus, initially created in England, has been implemented as a viable solution to ensure that children walk safely to school in several countries around the world. In this initiative, a group of children walk accompanied by two adults, one at the front and one at the back, following a predetermined route and picking up other children along the way, in a similar way to a school bus (Katsavounidou et al., 2024; Kearns et al., 2003). As well as meeting the need for safety, this model allows children to progressively develop autonomy within a controlled environment.

Events such as International Walk to School Day have also shown positive impacts on the adoption of active transportation. These initiatives encourage families to experiment with new ways of getting around, helping them to overcome psychological and practical barriers that would normally make them choose to drive (Kingham & Ussher, 2005; Zuniga, 2012). By experiencing active commuting in a safe and organized manner, families are more likely to adopt these practices in the long term, gradually shifting their habits toward sustainable transportation.

Traffic pollution around schools has also become a concern in many cities. Studies indicate that pollutant concentrations tend to peak during school entry and exit times, potentially affecting children's respiratory health (Adams & Requia, 2017). To mitigate these risks, several studies propose measures to reduce vehicle emissions near schools. Among the proposed solutions are the relocation of vehicle loading and unloading areas away from school gates and the implementation of dedicated pedestrian and cycling lanes at these locations. These changes not only reduce children's exposure to

pollution, but also improve road safety by minimizing congestion and the risk of being run over (Adams & Requia, 2017).

For example, Paris (France) has adopted the “School Streets initiative” as part of its wider effort to reclaim urban space for children and encourage active mobility (Alexander, 2023). This intervention involves temporarily closing streets near schools to motorized traffic during school drop-off and pick-up times, reducing pollution and increasing the safety of children walking or cycling to school. The initiative is in line with Paris' wider “Rendre la rue aux enfants” (“Give the streets back to the children”) policy, which promotes child-friendly urban spaces. Research suggests that these interventions not only increase safety, but also encourage independent mobility for children, promoting a more pedestrian-friendly environment (Alexander, 2023). However, challenges remain, including balancing the needs of local businesses with securing long-term public support. Despite these obstacles, School Streets have been shown in this study to have the potential to reshape urban mobility patterns, making city streets more accessible and liveable for children.

Cultural and social changes also play an essential role in implementing effective policies for Children's Independent Mobility. One innovative approach was to use Disney-Pixar films as an educational tool to encourage active transportation and change social behaviors. Films such as *Monsters S.A.* and *WALL-E* were analyzed as metaphors for urban and environmental issues, helping to illustrate the negative impacts of car dependency and sedentary lifestyles in children (Tranter & Sharpe, 2012). Research suggests that exposure to these narratives can generate a positive emotional response, encouraging behavioral changes in both children and adults. The use of engaging and accessible stories arouses empathy and promotes identification with the characters, making the message more impactful. In this way, children can come to see the act of walking or cycling as something positive and fun, while parents can be led to reflect on the impact of their transportation choices on their children's health and autonomy (Pucher & Dijkstra, 2000).

In addition to these approaches, some cities have completely redesigned their urban planning to ensure greater independent mobility for children. Vancouver (Canada) and Rotterdam (Netherlands) are two prominent examples of this approach. Started in the 1980s, the “Living First” program in Vancouver achieves an effective connection between high-density urban living and the needs of families. The urban areas are planned to provide families with close access to facilities such as schools, parks and stores within walking distance. Playgrounds can be seen from the residential properties, allowing parents to supervise their children from inside their homes, ensuring a safe and child-friendly atmosphere. In addition, the city emphasizes environmental standards, providing safe areas with fresh air to promote social engagement and reduce car dependency. This program has converted Vancouver into an attractive place for families, promoting independent and healthy habits for children and improving the overall happiness of the residents (Shaw et al., 2015).

In Rotterdam, the plan was called “Building Blocks” and aimed to incorporate children's needs into urban design. Residential planning prioritizes family units, with public green spaces and playgrounds integrated into residential communities to provide safe play areas. With the aim of encouraging safe movement, the city created streets with low speed limits, exclusive cycle paths, increased the number of crosswalks and ensured residents' needs such as stores and sports facilities were within residential areas to allow easy access on foot (Shaw et al., 2015).

A similar approach has been adopted in Barcelona (Spain) through the “Superblocks model”, which restructures urban spaces to give priority to pedestrians and reduce car dependency (López et al., 2020). Superblocks consist of clusters of urban blocks (typically 400m x 400m) where passing traffic is restricted, promoting cycling, walking and public transport. This model has led to reductions in

pollution, noise and car-related congestion, while increasing green spaces and improving urban liveability. However, as Eggimann (2025) points out, challenges such as integrating public transport, mitigating gentrification and resisting local businesses must be carefully managed. The large-scale implementation of the Superblock is seen as a crucial step towards climate change mitigation and sustainable urban development (López et al., 2020).

For this reasons, policies aimed at Children's Independent Mobility must balance different approaches, combining safe infrastructure, incentives for active transportation, community involvement and cultural changes. Shaw et al., (2015) argue that a well-planned urban environment, combined with targeted school mobility strategies, can effectively foster children's independent mobility while promoting sustainable transportation practices.

3

CASE STUDY- CHILDREN'S INDEPENDENT MOBILITY IN CHAVES

3.1 THE CITY OF CHAVES

3.1.1 SOCIO-ECONOMIC CONTEXT OF CHAVES

The municipality of Chaves is located in the north of Portugal, in the district of Vila Real, near the border with Spain. It is an important regional center in the Alto Tâmega e Barroso sub-region, combining urban and rural characteristics that significantly influence mobility patterns.

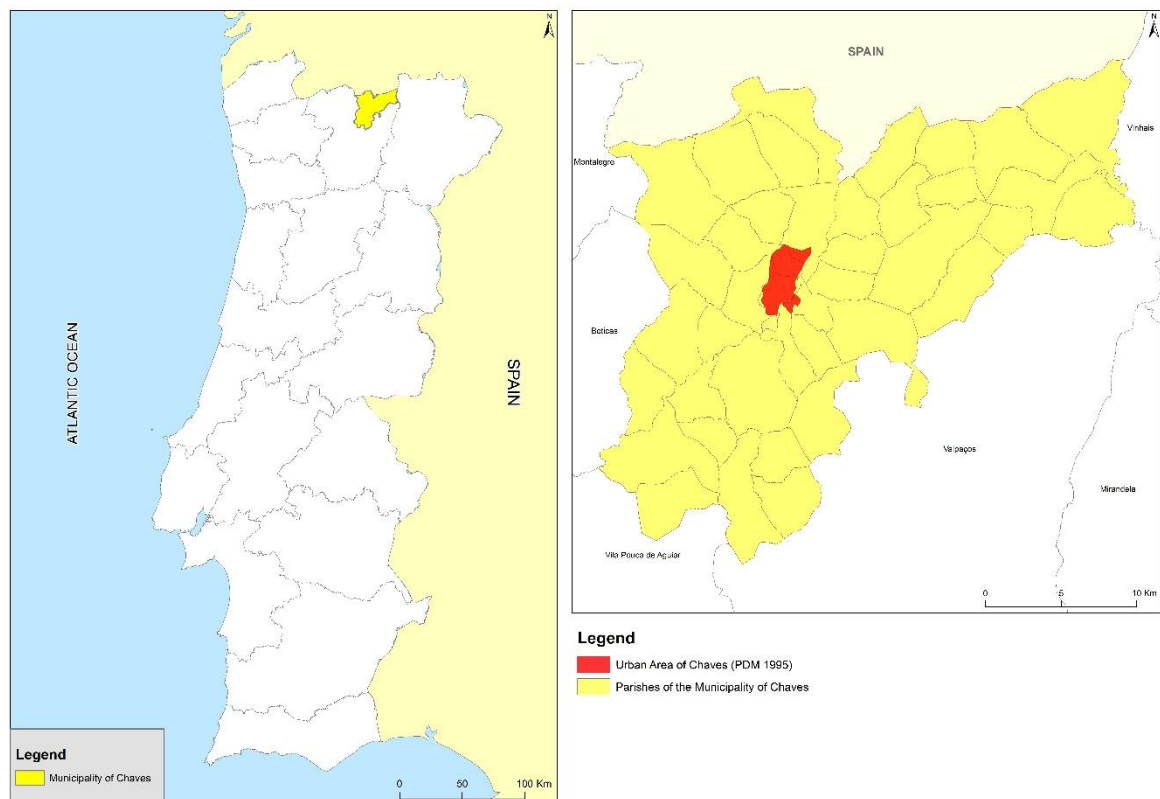


Figure 1 - Chaves Framework

The region is characterized by its depopulation, demographic ageing and an economy predominantly based on the tertiary sector (1703_2024.Pdf, 2024.). These factors directly influence the population's quality of life, access to public services and mobility within the territory.

According to the 2021 Census, Chaves has a resident population of 37,623 inhabitants, a decrease of 8.8% compared to the 41,243 inhabitants registered in 2011. This decline reflects migration to larger urban centers such as Braga and Porto. At the same time, the natural decrease in the population is significant, with low birth rates (5.8%) and high death rates (12.3%) contributing to the ageing trend (*Relatório de Fundamentação de Avaliação Da Execução Do Plano Diretor Municipal de Chaves e de Identificação Dos Principais Fatores de Evolução Do Município*). The municipality has the highest ageing index in the region, with 347.8 elderly people for every 100 young people (*Retorno de Informação Aos Respondentes - Municípios*, 2024), indicating a rising imbalance between the younger and older people.

The urban center of Chaves is home to around 12,000 inhabitants, while the rest of the population is spread across 49 rural parishes. This demographic distribution indicates a significant rural presence, and the dispersed population pattern is typical of the region, where the residents often live in small communities under an open-field farming system. However, rural depopulation has intensified in recent decades, leading to the abandonment of agricultural land and a shift in land use towards forest and nature conservation areas (*Relatório de Fundamentação de Avaliação Da Execução Do Plano Diretor Municipal de Chaves e de Identificação Dos Principais Fatores de Evolução Do Município*).

At the economic level, thermal and heritage tourism plays a fundamental role, but its seasonal nature limits its economic impact throughout the year (*Ari Rosa.Pdf*, 2023). The Chaves thermal complex is key asset, attracting both national and international visitors. Despite this, infrastructure improvements are needed to enhance tourism experiences and extend visitor stays

This is followed by the secondary sector, which includes small granite processing industries and agri-food production, with a modest presence. Finally, the primary sector, made with agriculture and stockbreeding, is in decline due to the fragmentation of farms and the lack of generational renewal (*Retorno de Informação Aos Respondentes - Municípios*, 2024).

Additionally, initiatives such as the Eurocidade Chaves-Verín aim to strengthen cross-border cooperation and economic opportunities between the two regions. Established in 2007, this initiative promotes joint planning in areas such as mobility, tourism, culture, and public services, fostering regional integration. By eliminating administrative barriers and encouraging shared resources, the Eurocidade enhances economic development and improves the quality of life for residents on both sides of the border.

The high rate of young emigration is the result of significant limitations in the labor market, since the per capita income is lower than the national average, negatively influencing access to essential infrastructures and services. In terms of healthcare, the local hospital is the main unit in the region, but the lack of specialties forces patients to travel frequently to Vila Real and Porto.

Education has been significantly affected by the demographic decline, particularly in rural areas, where many schools have closed due to the decrease in students. This forces children from more remote villages to travel longer distances to attend school in the city, often relying on family transportation or poor public transport.

According to municipal data, Chaves had 127 schools in 1995, a number that fell to 66 due to the reorganization of the school network (*Relatório de Fundamentação de Avaliação Da Execução Do Plano Diretor Municipal de Chaves e de Identificação Dos Principais Fatores de Evolução Do*

Município). Although this reorganization was intended to improve educational resources, it also exacerbated accessibility challenges for rural students. Many now face long commutes, with inadequate transportation services that don't always coincide with school timetables. The absence of safe walking and cycling routes further restricts their ability to get around on their own. In addition, the geographical distribution of educational establishments presents other obstacles to autonomous mobility. Although primary and secondary schools are concentrated in the city center, institutions such as the Escola Profissional and the Escola Superior de Enfermagem Dr. José Timóteo Montalvão Machado are located on the periphery, making access to them much more complicated. This isolation limits students' ability to reach them through active mobility, reinforcing their dependence on private transport.

All these factors tend to promote the use of the car, making it a necessity for residents.

3.1.2 INFRASTRUCTURES AND ROAD MOBILITY OF CHAVES

In recent decades, Portugal has invested significantly in improving its transport infrastructure, especially its highways (Pereira & Andraz, 2007). As a result, Chaves is connected to the rest of Portugal and Spain via various highways, the main ones being the A24, which links the city to Vila Real (District Capital) and Viseu, ensuring efficient regional connectivity. The EN-2, which starts in Chaves and extends to Faro, plays an important role in national mobility. In addition, regional roads such as the EN-103 (to Braga), the EN-213 (to Valpaços) and the ER-314 (to Carracedo de Montenegro) facilitate circulation in the Alto Tâmega region (Carreira, 2020).

Although these road networks improve accessibility, they also increase car dependency, resulting in a higher volume of traffic on the roads, which in itself can limit children's capacity to travel independently.

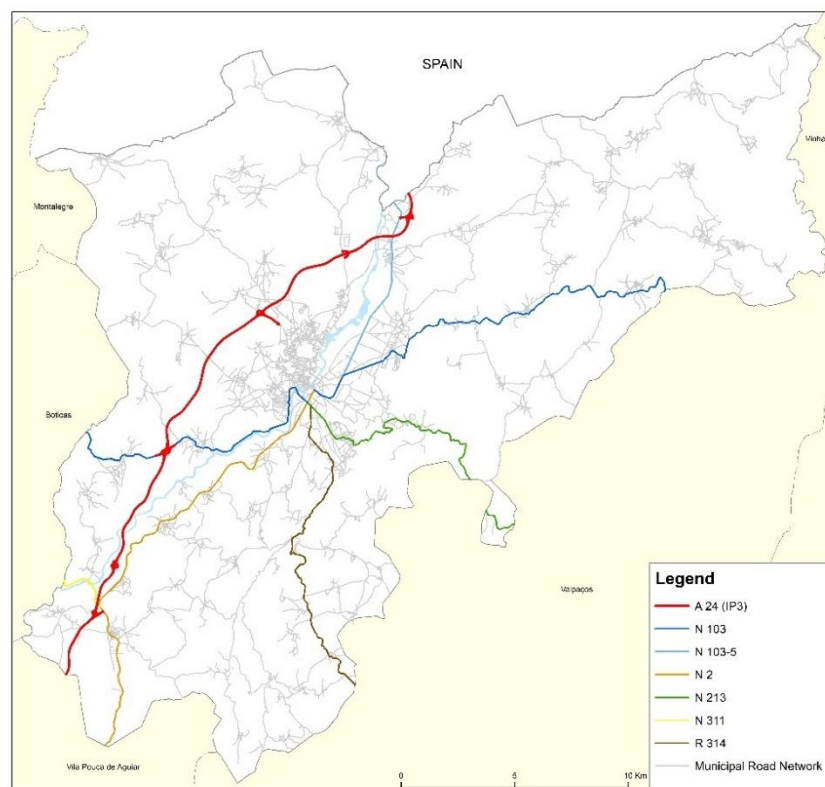


Figure 2 - Road Network of Chaves Municipality

3.1.3 PUBLIC TRANSPORT AND SUSTAINABLE MOBILITY

Public transport and sustainable mobility initiatives play a vital role in reducing car dependency and improving accessibility (Teran-Escobar et al., 2022). In Chaves, public transport services are limited and, although it is a city with a relatively flat urban centre and there have been several efforts to promote sustainable mobility, there are still deficits in the infrastructure, which can restrict children's ability to move around independently.

Nowadays, public transport in Chaves consists of regional and interurban bus services. Although regional buses provide connectivity between Chaves and other municipalities, intra-city transport remains inadequate, particularly for residents in rural parishes, where direct routes and timetables are limited. This lack of accessible public transport has a direct impact on children's mobility, making them more dependent on private vehicles and on their parents, reducing their opportunities for independent travel.

Since 1990, with the closure of the Corgo Line, Chaves no longer has an active railway system, and this lack of a railway system further increases dependence on the car for daily journeys, reducing the connectivity of residents in rural areas (Carreira, 2020).

The former railway line has been converted into a cycle path, with the aim of promoting more sustainable mobility options. It currently stretches for almost 13 kilometres, starting in Vidago and ending in Curalha, but unfortunately it doesn't cross the city centre, so it doesn't provide a direct advantage for children on their way to school.

In the early 2000s, in an attempt to reduce car dependency and improve independent mobility, particularly for younger residents, the municipality of Chaves submitted its application to the Polis Programme, which introduced significant improvements to urban mobility, focusing on making the city more pedestrian-friendly. The Polis Programme in the city of Chaves included revitalising the banks of the river Tâmega, creating pedestrian and cycle routes, renovating the historic centre, reducing car traffic and improving the ease of getting around on foot, and creating new green spaces and public areas, encouraging outdoor activity and safer movement for children (Carreira, 2020).

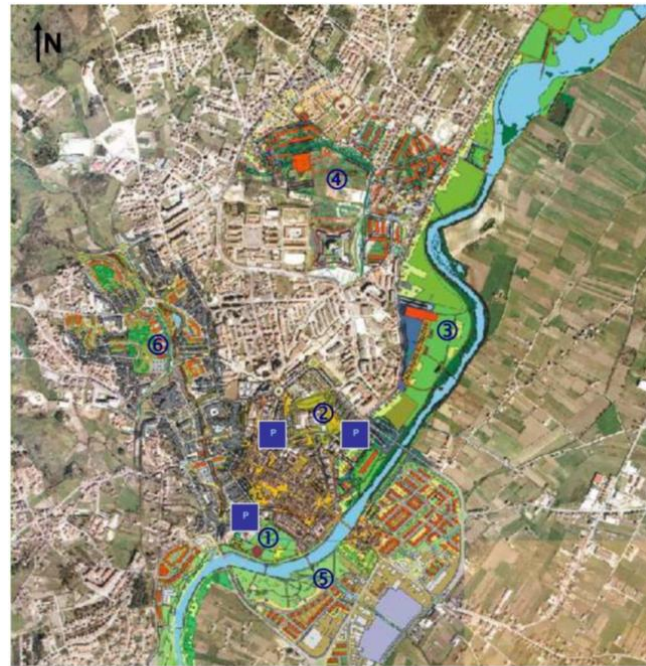


Figura 66 - Ortofotomapa da área de intervenção
Fonte: Adaptado de ChavesPolis, S.A.

Legenda:

- ① - Remodelação urbanística e tecnológica da área tercal
- ② - Arranjo urbanístico da envolvente do Forte de S. Francisco
- ③ - Futuro Parque Urbano da Galinheira (piscinas, campos de jogos, ciclovia, áreas de lazer, etc.)
- ④ - Arranjo urbanístico do Forte de S. Neutel e futuro Parque Multiusos de Santa Cruz
- ⑤ - Reabilitação dos ecossistemas da Ribeira do Caneiro e margem esquerda do rio Tâmega
- ⑥ - Reabilitação dos ecossistemas da Ribeira de Rivelas
- - Áreas verdes urbanas a criar através do Programa Polis
- - Parques de estacionamento

Figure 3 - ChavesPolis Nascimento (2008)

3.2 ESCOLA BÁSICA NADIR AFONSO

The Escola Básica Nadir Afonso is located on Avenida Irmãos Rui e Garcia Lopes, 5400-019 Chaves, and is an institution for basic education, with only 5th and 6th grades. Named after the artist and architect Nadir Afonso, this school is located in the urban area of Chaves and is part of the parish of Santa Maria Maior.

The school is in a relatively central area, allowing easy access to different infrastructures and services. Its surroundings are characterized by a mix of residential and commercial areas and public facilities (*Relatório de Fundamentação de Avaliação Da Execução Do Plano Diretor Municipal de Chaves e de Identificação Dos Principais Fatores de Evolução Do Município*). Avenida Irmãos Rui and Garcia Lopes is a major road that connects several areas in the city and its surroundings are marked by their proximity to medium and high flow roads, increasing traffic in the area at peak times.

The school has a total of 268 students, of which only 100 have autonomous exit permits. This means that the greater part of the students depends on an adult to travel between home and school, a reality that may be related to safety concerns, distances traveled and the culture of mobility in the city.

Among the students who have permission to leave, there is a predominance of articulated music education students. This greater flexibility in their movements can be explained by the proximity between the school and the Music Academy, thus making their independent mobility a practical

necessity, which may indicate greater acceptance on the part of parents and guardians within this specific group.

In addition to its proximity to the Music Academy, the school benefits from its proximity to the Chaves Municipal Stadium and the Chaves Municipal Sports Pavilion, increasing the possibilities for independent mobility to go to extracurricular activities.



Figure 4 - Sports and Cultural Facilities Near the School

Currently, the Transportes Urbanos de Chaves (TUC) have several stops in the area around the school, as well as the proximity to the Auto Viação Do Tâmega, Lda bus station, allowing a great capacity for mobility by bus not only in the urban area (through the TUC) but also to rural areas (through Auto Viação Do Tâmega, Lda).



Figure 5 - Public Transport Network Near the School

Therefore, the Escola Básica Nadir Afonso is strategically located in an area that offers opportunities and challenges for children's autonomous mobility. Although its proximity to key infrastructures such as the Music Academy, the Chaves Municipal Stadium and the Sports Pavilion facilitates students' access to extracurricular activities, concerns about traffic flow and safety remain significant barriers to greater autonomy.

4

METODOLOGY

4.1 RESEARCH DESIGN

This research aims to analyze the home-school commuting patterns of children in Chaves, as well as the fears and concerns associated with autonomous mobility, from the perspective of parents and children. To this end, a mixed methods approach was adopted, which integrates both quantitative and qualitative research methods. This combination is particularly effective in mobility studies, as it allows for a more comprehensive analysis by capturing both statistical trends and personal experience (Johnson et al., 2007).

While quantitative methods provide measurable data on travel patterns and parental concerns, qualitative methods offer deeper insights into children's perceptions, emotions, and lived experiences. By triangulating these two types of data, the studies seeks to get a deeper understanding of the topic and significantly increases the quality of the research, as it provides an opportunity to analyze issues using both numbers and words, compensating for the inherent weaknesses of individual methods while enhancing their respective strengths (Almalki, 2016; Creswell et al., 2011).

The study has two main instruments:

- **Quantitative Data Collection:** A questionnaire was sent via email to all parents at Escola Básica Nadir Afonso. This survey aimed at collecting quantitative data on their children's commute to school, as well as the concerns and factors that influence their decisions regarding their children's independent mobility. This data provided measurable insights into parents' perceptions of safety, urban infrastructure and their willingness to allow their children to travel independently (Rudner, 2012).
- **Qualitative Data Collection:** At the same time, an participatory activity was conducted with 5th and 6th graders, the main exercise was the realization of a “fear ranking exercise”. During this activity, children were asked to rank a list of potential fears related to traveling alone to school, from least to most frightening, which analyzed their fears regarding independent mobility on their home-school route and allowed them to express their opinion by capturing their experiences and perspectives, as well as proposing improvements to their mobility environment, recognizing them as active participants in society with the ability to analyze and understand their surroundings (Chagas, 2014).

Therefore, the combination of quantitative data from parents' questionnaires and qualitative data from children's group activities allowed this research to compare the differences between parents' and children's views when it comes to the dangers and concerns of independent mobility provides valuable

information that can contribute to promoting safer and more autonomous mobility for children in Chaves.

4.2 DATA COLLECTION TOOLS

4.2.1 QUESTIONNAIRE FOR PARENTS

This study relied on an existing questionnaire as the foundation for data collection, specifically adapting the instrument developed by (Cadima et al., 2024) for the context of Chaves. Their study explores parents' decision-making processes regarding children's independent mobility in the Portuguese context, combining a questionnaire with focus groups and interviews with school principals. Their discoveries show that parents' concerns are heavily influenced by an automobility-centered culture, where urban planning prioritizes adult commuting, often making streets feel unsafe for children to navigate independently. Parents identified major barriers such as traffic risks, lack of pedestrian infrastructure, and social fears, which significantly limit children's active and independent travel (Cadima et al., 2024). This is in line with the literature which states that the remarkable reduction in children's independent mobility in recent decades is due to parents' concerns about safety and potential dangers (Carver et al., 2014), concerns about traffic risks, crime and the built environment are evident and play a critical role in limiting mobility licenses (Aranda-Balboa et al., 2021; Lopes et al., 2014).

Taking this as a starting point, the questionnaire used in this research was adapted to reflect the specific urban and social dynamics of Chaves. While maintaining the core structure of the original instrument, adjustments were made to better capture the fears and concerns of parents at the Escola Básica Nadir Afonso. For example, based on preliminary discussions with teachers, a question was introduced regarding parents' concerns about the "weight of backpacks", a topic frequently raised during parent-teacher meetings as a factor of concern. In addition, although some questions from the original study have been included, these are not directly analyzed in this thesis but have been retained to allow for potential future comparative analysis within the wider research project.

The Escola Básica Nadir Afonso was chosen for the questionnaire due to various strategic factors. Studies show that it is around the age of 10 to 12 that children begin to develop skills that allow them greater independent mobility (Shaw et al., 2015), making it beneficial for the study to choose a 2nd cycle basic elementary school. As one of the three schools offering 5th and 6th grade education in the city (*Retorno de Informação Aos Respondentes - Municípios*, 2024), Nadir Afonso provides a representative sample for understanding parents' perceptions of their children's autonomy in this urban context, as it is located in the city centre, making it a strategic point for assessing how Chaves' urban environment influences children's independent mobility.

In total, 56 responses were obtained, which represents approximately 20.9% of the school's 268 students. Since the school is only for fifth and sixth graders, the study sample includes children aged 10 to 12. Among them, 51.8% are 10 years old, 42.9% are 11 years old, and 5.3% are 12 years old. The gender distribution is relatively balanced, with 53.6% of the participants being male and 44.6% female.

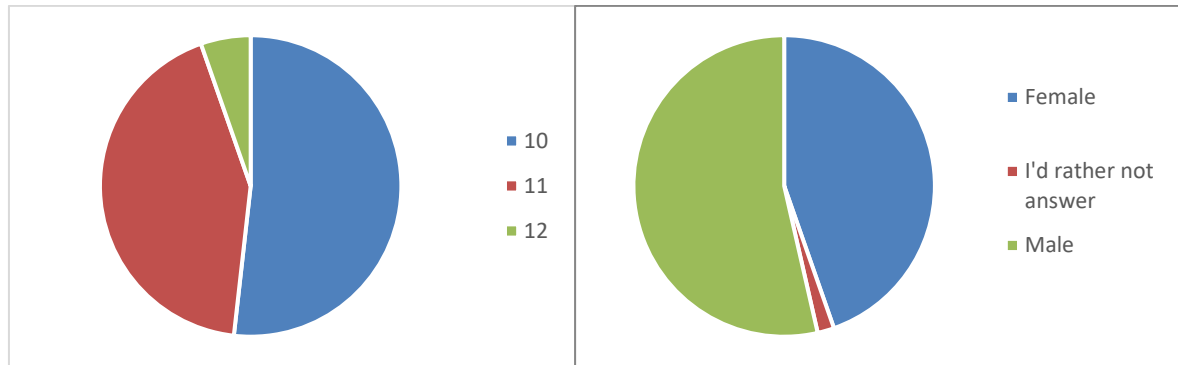


Figure 6 – Age (a) and Gender (b) Distribution of Children

The profile of the parents who answered the questionnaire provides essential information about their influence on children's independent mobility. The majority of respondents were female (95%), which is in line with research suggesting that women often take primary responsibility for children's school commutes (van der Kaap- Deeder et al., 2016). The role of gender in mobility decisions may also reflect traditional care norms, where mothers tend to express greater concerns about safety on the school journey.

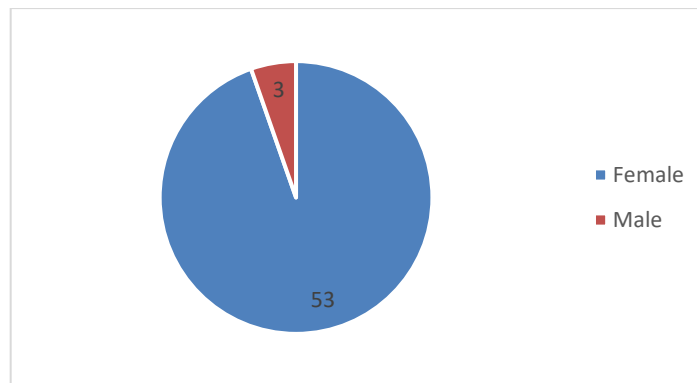


Figure 7 - Gender Distribution of Parents

Parents' ages were concentrated between 30 and 50, representing the typical age range of those responsible for children in the 5th and 6th grades. Age variation can influence decision-making on mobility, since older parents may have more conservative views on independent travel, while younger parents may be more open to children's autonomy. In terms of educational background, the majority of parents had secondary or higher education. Higher levels of education may be associated with greater awareness of urban mobility and child development, resulting in more flexible approaches to independence in the home-school commute.

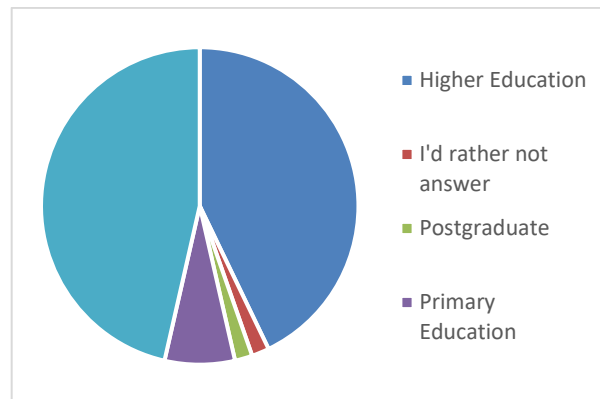


Figure 8 - Parental Education Levels

With the main objective of understanding children's home-school journeys, as well as parents' concerns about safety, the questionnaire was divided into four sections.

The first section, "Child Demographics," gathered information on the child's gender and age, providing essential background data to contextualize mobility patterns. The second section, divided into two parts, initially explored children's journeys to school, addressing factors such as the distance between home and school, the usual mode of transport (walking, bus, bicycle, scooter, car), and whether the child traveled alone or accompanied. The second part of this section, "Parents' Safety Concerns," assessed parents' perceptions of risks related to independent mobility, asking them to rate their level of concern regarding various issues. The level of concern was measured on a scale from 1 to 5, with 1: no concern, 2: some concern, 3: concern, 4: a lot of concern, and 5: extreme concern. These concerns were grouped into three main categories: personal safety concerns, traffic-related dangers, and physical and environmental challenges, as summarized in the following table.

Table 1 - Parents' Safety Concerns

Category	Parental Concerns
Personal Safety Concerns	Violence (robbery, physical attack, etc.)
	Contact with garbage on the floor
	Lack of street lighting
Traffic-related dangers	Being hit by a car while crossing the road
	Hit by a scooter on a sidewalk
	Hit by a bicycle on a sidewalk
	The speed of cars
	Car accidents
	The absence of sidewalks or crosswalks to school
Physical and Environmental Challenges	Bad weather conditions
	Backpack weight

Table 2 - Scale of Concern Level

Concern Level	Numeric Value
No concern	1
Some Concern	2
Concern	3
A lot of concern	4
Extremely concern	5

The third section was about children's leisure time activities, where parents were asked about the estimated number of hours their children spent on electronic devices, doing sports and playing (inside and outside their home area). The final section, "Parental Demographics," collected socio-demographic data about the parents, such as their gender, age, educational background, and nationality. Since research indicates that these variables influence parental decision-making regarding children's mobility (Lopes et al., 2014), this section was crucial for understanding potential patterns in responses.

The questionnaire was distributed by email through the school administration to all parents of 5th and 6th graders enrolled at the school. The study faced initial challenges due to the low response rate and it was necessary to send reminders to parents several times to encourage participation. A possible explanation for this low involvement, as suggested by the literature, is the lack of time, as well as the fact that parents consider the topic of children's independent mobility a lower priority compared to other daily responsibilities, in parallel concerns about how the answers could be interpreted or unwillingness to reflect on mobility habits may also have contributed to the limited response rate (Barratt et al., 2013).

To analyze the data collected through the questionnaire, Microsoft Excel was used, since it is a versatile and accessible software for organizing, cleaning and performing descriptive statistical analyses of the survey data. Its functionalities allow for efficient data visualization, including graphs and tables, which facilitate the identification of patterns and trends in parental perceptions of children's independent mobility.

4.2.2 ACTIVITY WITH STUDENTS (5TH AND 6TH GRADES)

The activity carried out in two classes, one from the 5th grade and one from the 6th grade, aimed to capture their perceptions, as well as obtain information about their experiences and concerns regarding autonomous mobility on their home-school route. By encouraging their participation in this "game", the children's participation was more spontaneous and genuine, since playing is an activity that is instinctive for children, so they tend to express themselves more spontaneously and genuinely when compared to taking formal questionnaires (Bornat & Shaw, 2019). This methodology made it possible to identify the subjective factors that shape their opinions and mobility choices, emphasizing discussion and reflection on their fears and the urban environment. To this end, a participatory and accessible setting was created, allowing students to share their experiences in a more natural and engaging way.

These two classes were selected by the teachers in charge of the school. The 5th grade class was a regular education class, made up of 14 students (8 boys and 6 girls), while the 6th grade class had 21 students (13 boys and 8 girls). This sixth-grade class was mixed, including 10 regular education students and 11 students from the Articulated Music Education program.

Each session began with a brief introduction and explanation of the aim of the activity. To initiate the discussion, students were asked a series of questions by a show of hands to reflect on their daily journeys to school:

- “Who comes to school on foot?”
- “Who comes to school by car?”
- “Who comes to school by bus?”
- “Who comes to school by bicycle or scooter?”
- “Who likes riding a bike?”
- “Who has ever felt afraid or uncomfortable on the way to school?”

Throughout the questions, some of the cards were presented in order to help students understand the type of fears they would be analyzing (e.g., “*This card says, ‘I’m afraid of traffic’. Has anyone ever felt like that on their way to school?’*”).

Then, using a random method of creating groups, each class was divided into smaller groups (approximately 4 students per group), choosing a spokesperson to present their conclusions to the class at the end.

Each group was given a set of 13 cards showing the various situations that could cause fear, as well as a board with a route to put them in order. Most of the fears on the cards were derived from the questionnaire given to the parents and existing literature. However, some additional fears were included to deepen the children's perception of independent mobility, considering factors that, although not previously discussed with parents, could be particularly significant from the children's point of view such as “getting lost”, “street without people”, “unleashed animals” and “taking the bus alone”. Among these, the fear of “unleashed animals” was added based on reports from students prior to the activity. This concern is especially relevant in Chaves, where there is a high number of large, abandoned dogs that form packs in the urban area—an issue not as common in other cities. Similarly, “carrying a heavy backpack” was included based on reports from teachers, who noted that this was a frequent complaint among parents regarding their children’s mobility experiences.

This approach made it possible to capture more subjective fears linked to the children's direct experience of the urban environment, enriching the analysis and providing a more complete view of the challenges they perceive when moving around independently.

The cards were created with the help of Artificial Intelligence to make them more visual and appealing; the boards were handmade from A1 paperboard.



Figure 10 - Deck of Cards 1

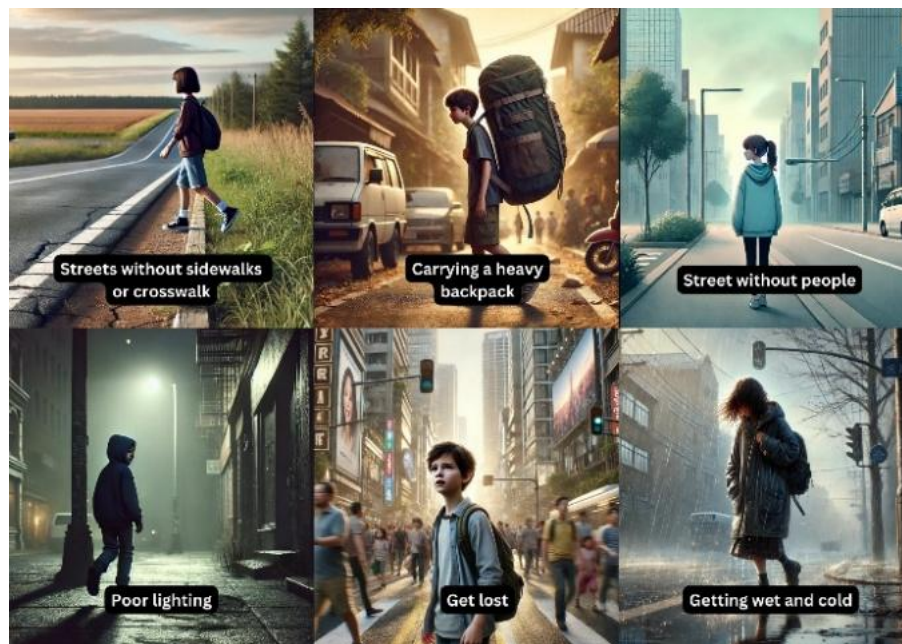


Figure 9 - Deck of Cards 2

After carefully analyzing all the cards, students were asked to imagine that they were walking alone from home to the school and consider how frightening each situation on the cards would feel to them. They were then instructed to rank the fears from the least to the most frightening. To complement this, each group was given an extra blank card to add any additional fears or worries they felt were missing.

The fears identified were grouped into three main categories to make them easier to analyze: personal safety concerns, traffic-related dangers and other fears. The following table shows the cards present in each deck.

Table 3 - Distribution of Playing Cards Across Fear Categories

Category	Fear Cards
Personal Safety Concerns	Street without people
	Getting Lost
	Poor lighting
	Strange people
	Unleashed animals
Traffic-related dangers	Streets without sidewalks or crosswalk
	Being hit by a car while crossing the street
	Lots of traffic
	Hit by a scooter or bicycle on the sidewalk
Other Fears	Taking the bus alone
	Getting wet and cold
	Carrying a heavy backpack

After 15 minutes of discussing and sorting the cards, each spokesperson shared with the class and explained the three main fears they had selected. Despite the choice of a spokesperson, all the students were also allowed to give their opinion and share situations that had occurred to them.

To conclude the activity, a reflection exercise was carried out in that each student received a post-it note in which they had to answer the question “If you could change one thing on your way to school to make you feel safer, what would it be?” This final step allowed the students to express their individual reflections and propose specific improvements.

The activity followed ethical guidelines to ensure a safe and respectful environment for discussion. Prior to the study, discussions were held with two teachers in charge of the school, who confirmed that parental authorizations had been obtained for participation. With their approval, audio recordings of the group discussions were made in order to complement the analysis, and the teachers took photographs as part of the documentation process.

The anonymity of the students was guaranteed as no sensitive personal data was collected, only the means of transportation to school and the approximate duration of the journey were requested. The interactive and voluntary nature of the activity encouraged participation, while respecting the students' comfort levels.

5

RESULTS

5.1 RESULTS OF THE QUESTIONNAIRE FOR PARENTS

5.1.1 CHILDREN'S MOBILITY PATTERNS AND HABITS

In this analysis, there was a clear preference for using the car as a means of transportation to school, with 69.6% of students traveling by car, compared to 12.5% who take the bus and 17.9% who walk, and no participants reported using bicycles or scooters.

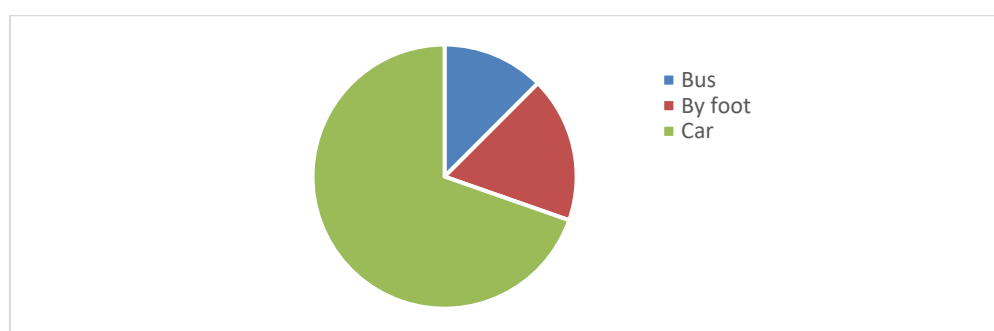


Figure 11 - Children's School Transportation Methods

The choice of means of transport tends to be strongly influenced by the distance between home and school, as has been recognized in previous research. Studies indicate that children who live less than 1 km from school tend to adopt active modes of transportation, such as walking or cycling (Macdonald et al., 2019). This pattern was confirmed in the present study, in which 8 out of 10 students living in this range walk to school (4 unaccompanied, 3 accompanied by colleagues and 1 accompanied by an adult).

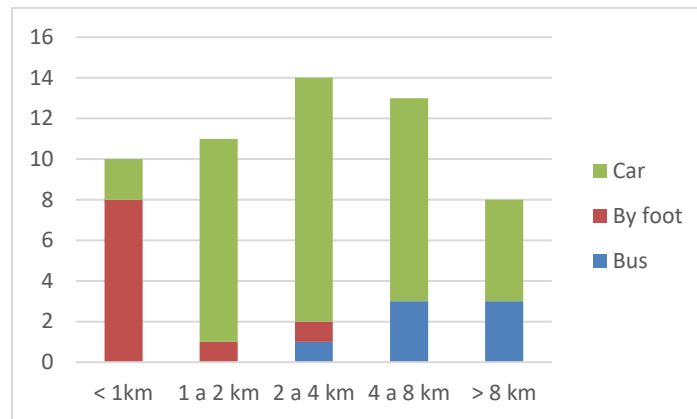


Figure 12 - Mode of Transport by Distance Between Home and School

Overall, only 16.1% of children travel to school alone, while the majority (83.9%) are accompanied, either by an adult (75%) or by classmates (8.9%). Age also plays a role in these dynamic, as older children tend to gain more independence, reflecting parents' increasing confidence in their ability to travel on their own.

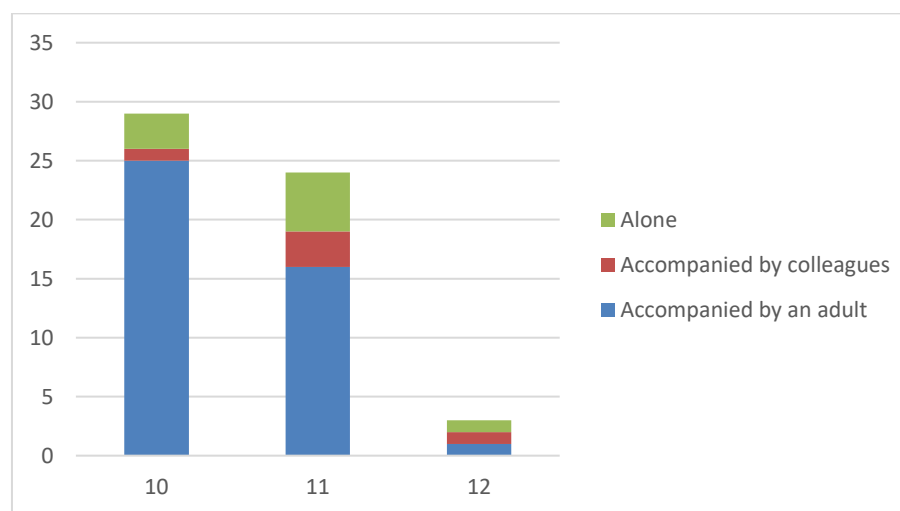


Figure 13 - Children's School Travel: Level of Independence by Age

Regarding children's free time, the study indicates significant variations in physical activity levels. While 75% of children engage in at least 2 hours of sports per week, 41% participate in 4 hours or more of physical activity. However, there remains a portion (16%) who practice less than 1 hour of sports weekly or none at all, revealing a disparity in engagement in physical activities

When examining the relationship between mode of transport and levels of physical activity, a slight trend can be noticed. Children who walk to school tend to take part in more sporting activities, with a significant proportion practicing 4 hours or more per week. This suggests that active mobility not only contributes to physical well-being through walking itself, but is also associated with a generally more active lifestyle. On the other hand, among people who commute by car, there is a greater variation in activity levels, with some children frequently taking part in sports, while others do little or no physical activity.

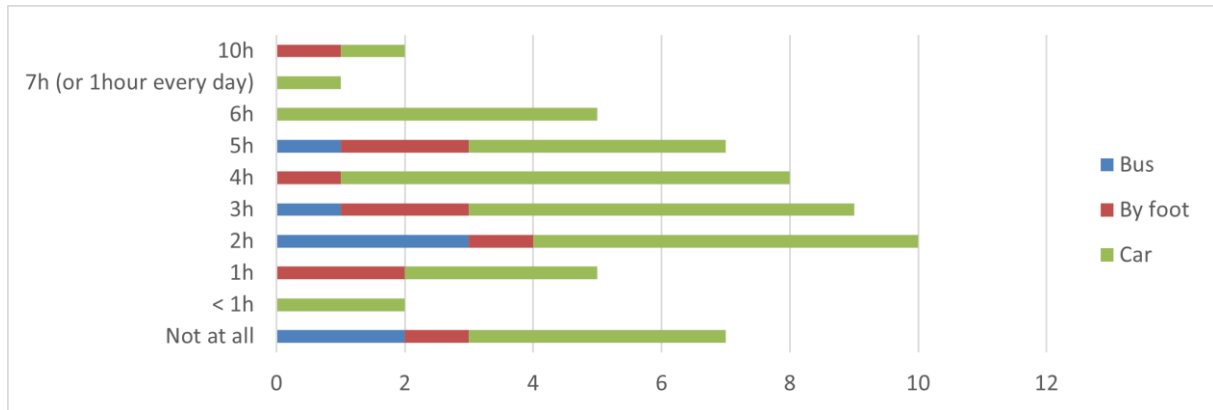


Figure 14 - Relationship Between Mode of Transport and Physical Activity Levels

Initially, it seemed that outdoor time and independent mobility were strongly related. However, contrary to the initial expectation that outdoor time and independent mobility were strongly related, the findings suggest that children with greater autonomy in their daily commutes do not necessarily engage more in outdoor play.

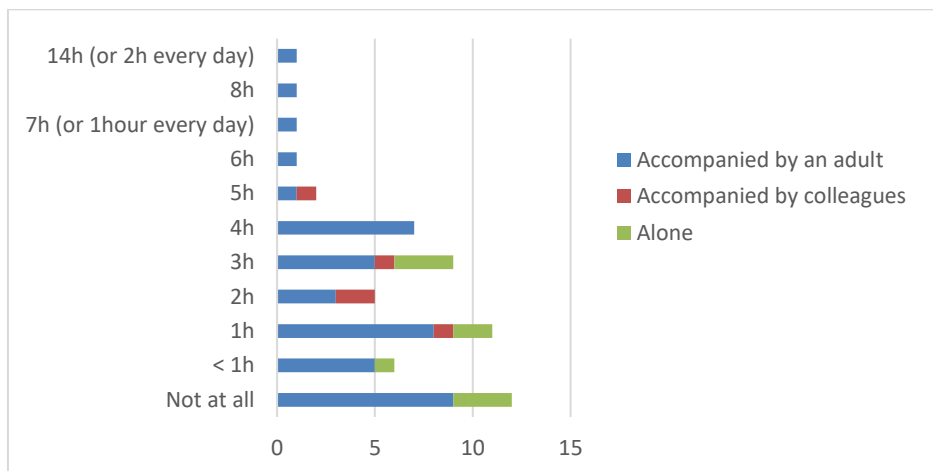


Figure 15 - Relationship Between Independent Mobility and Outdoor Play Time

Parents' opinions also reinforce these trends. One parent shared the following observation in the comments:

“He rarely plays in the street. Mostly because he doesn't have company. To my great regret, and his too, it's only during the summer and Easter vacations that he's joined by friends to ride his bike along the banks of the Tâmega river. And even then, only a few times.”

Despite this limitation in outdoor activities, an individual analysis of this response reveals that his son walks to school on his own, which indicates a certain level of independence in daily mobility. However, the lack of opportunities to play and explore public spaces may condition the development of autonomy in other aspects of daily life.

This reinforces the importance of encouraging outdoor activities, as they contribute not only to physical development but also to the autonomy and socialization of children (Taylor et al., 2024).

As the literature has shown, there is an influence of parents' characteristics on their children's mobility. A cross-analysis of parents' age and children's transportation habits shows that older parents (over 40) are significantly more likely to take their children to school by car, with 26 out of 34 parents in this age group choosing this option, while this choice is less significant among parents aged 40 or under (13 out of 22).

On the other hand, when we look at more active modes of transport, such as walking or taking the bus, there are no significant differences between the two groups of parents. Both parents over 40 and younger parents show a similar distribution when it comes to allowing their children to walk or use the bus. One possible explanation is that older parents may have more established routines and a greater tendency to prioritize comfort and safety, taking their children by car. Younger parents, on the other hand, although they also use the car a lot, show slightly more flexibility in allowing autonomous travel or travel by public means.

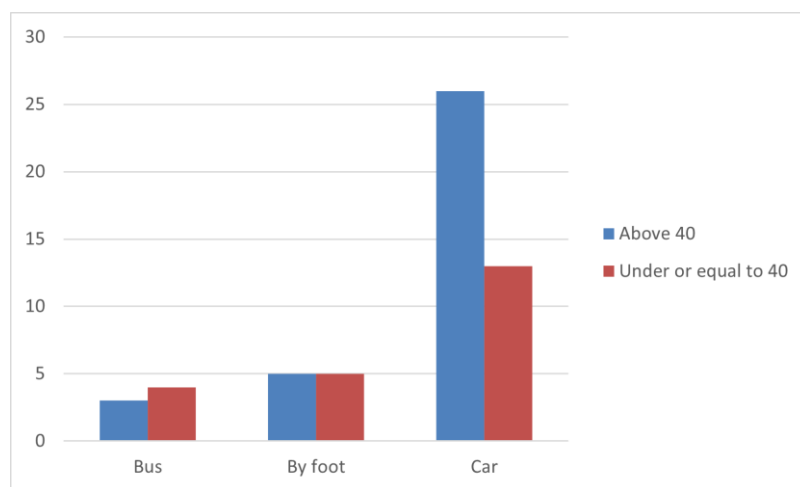


Figure 16 - Parental Age and Children's Mode of Transport to School

5.1.2 PARENTS CONCERNS AND FEARS

When analyzing the levels of concern that parents showed about the various dangers associated with children's independent mobility, it was revealed that the dominant fears revolved around violence and road safety.

In order to better understand these concerns, in addition to studying the scale of concern presented in the questionnaire, it was also decided to study the “total high concern”, which is the combination of the categories “a lot of concerned” and “Extremely concerned”.

The results of the survey show that the most worrying concern in the eyes of parents is “Violence”, including theft and physical attacks, which 71% of parents classified as a “high concern”, of which 48% said it was a topic of “extreme concern”. This is followed by concerns about the possibility of being “Hit by car while crossing the road” (63%) and “The speed at which cars drive” (63%), reinforcing the perception that urban environments are dangerous for children traveling independently. This concern is not only limited to parents' lack of confidence in their children's abilities but is essentially associated with external factors such as road safety and non-enforcement of traffic regulations. As previous studies have shown, parents point out that their main concern is not with their children's ability to get around on their own, but with the challenges they face in urban areas.

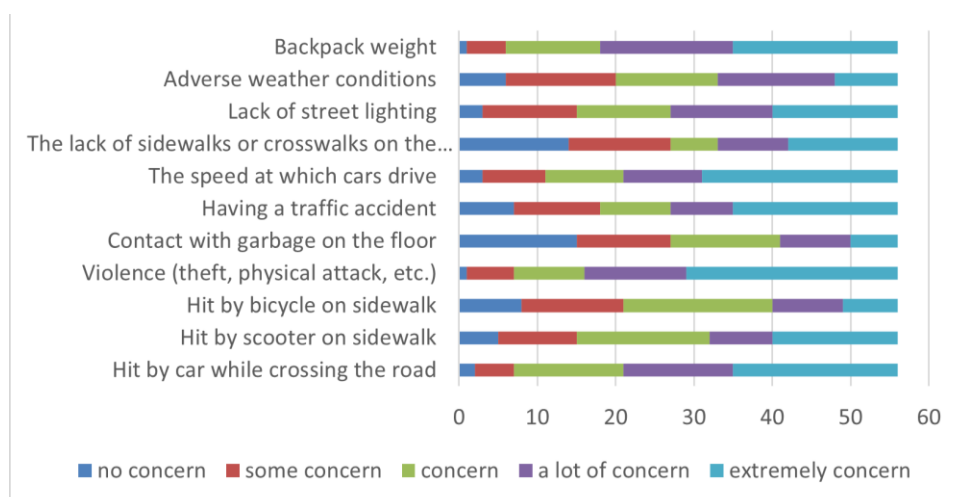


Figure 17 - Parental Concerns

One parent expressed his frustration in the questionnaire's optional comments regarding the lack of respect for pedestrians' rights, saying:

“My biggest concern is crossing the roads. Although I've taught and trained my son to cross carefully at crosswalks, I notice that a large proportion of drivers here in the city don't respect pedestrian priority or drive according to the established speed limits.”

This testimony proves that this is a structural problem that goes beyond children's individual capacities and demonstrates that drivers' negligence in obeying traffic rules directly compromises children's autonomy, consequently creating a weakness in the system for guaranteeing the safety of the most vulnerable in traffic, which in itself limits children's opportunities to develop independence in their daily journeys.

Concern about the weight of the backpacks, as expected from the information obtained by the teachers at the meeting, emerged as a significant issue, with 68% of parents considering it a “high concern”. On this topic, two parents felt it appropriate to comment on the form, highlighting their frustration at this situation.

“The weight that children carry in their backpacks is harmful, we urgently need to think about it and find a more practical and healthy solution” and *“Children should not carry too much weight in their backpacks”*.

These concerns indicate a wider need to address the practical aspects of children's mobility beyond safety factors, also focusing on children's well-being, comfort and health.

With lower percentages than those mentioned so far, but still highly relevant, there are concerns related to the lack of appropriate conditions for pedestrians. “The lack of sidewalks or crosswalks on the way to school” is an important issue, with 41% of parents expressing “high concern”, as is “the lack of street lighting”, with 52% expressing high concern.

With similar values, the risk of being “hit by a scooter on the sidewalk” generates a 43% rate of “high concern”. It is important to highlight the difference in relation to the risk of being “hit by a bicycle on the sidewalk”, which has a lower rate of 29%. This disparity may be associated with several factors, including the growing popularity of electric scooters as a means of transport in urban centers due to their quick and effortless operation. Compared to bicycles, electric scooters reach higher speeds faster

and are heavier and more rigid than conventional bicycles, which can increase the perception of danger. In addition, the uptake of scooters is relatively recent, which may contribute to greater uncertainty about their impact on pedestrian safety. While bicycles tend to be used more frequently on cycle paths and on the road, electric scooters are often ridden on sidewalks, increasing the risk of direct conflicts with pedestrians. In addition, regulations on the use of scooters in these spaces are still poorly defined or barely enforced, which can increase parents' apprehension about their children's safety. Given this scenario, the creation of segregated infrastructure for scooters and bicycles, combined with awareness campaigns and stricter enforcement, could help to reduce these fears and promote a safer urban environment for children. However, despite the high level of concern expressed by parents, it would be essential to analyze statistics on real incidents involving scooters and bicycles, in order to understand whether this fear reflects an objective risk or whether it is a subjective apprehension resulting from a lack of familiarity with this means of transport.

To better analyze parents' concerns in relation to their children's means of transport, the answers were converted into numerical values according to the following scale:

The results indicate that, regardless of mode of transport, the biggest concern continues to be the risk of violence (theft and physical aggression), with an average level of concern of over 4 across all modes of transport. Parents of children who travel by car and on foot are the most concerned about road safety issues, namely the fear of being run over when crossing the road and the speed at which cars drive. On the other hand, parents of children who travel by bus show slightly lower levels of concern about these dangers. The weight of backpacks also emerges as a significant concern, especially among parents of children who walk to school.

5.2 RESULTS OF THE ACTIVITY WITH STUDENTS

The interactive sessions held with the 5th and 6th graders provided their perspective on independent mobility and how they perceive the space around them, allowing us not only to analyze and better understand their major fears and concerns, but also to consider their suggestions for improvements to increase their safety in Chaves. This game-like activity not only allowed the children to debate but also helped to contrast their concerns with those expressed by their parents in the questionnaire.

As mentioned earlier in Chapter 4, in order to facilitate the analysis of the fear classification activity, it was decided to group the fears present in the deck into three main categories: personal safety concerns, traffic-related dangers and other fears (table x). Regarding the blank card, in the vast majority of groups, especially in the 6th grade class, the fear added was “being kidnapped”.

Table 4 - Additional Fears Identified by Students

Fear Category	Specific Fear	No. Of Mentions	Grade
Personal Safety	Being kidnapped	6	6th (4), 5th (2)
	Being followed by an armed man	1	6th
	Walking in abandoned streets	1	6th
Environmental Fears	Falling into a hole in the middle of the street	1	5th
	Having something heavy fall on me	1	5th
Other Fears	Fear of Romani	1	5th

With the 13 cards, each group debated and decided on the order to assign the cards according to their perceptions of fear on the way home from school alone.

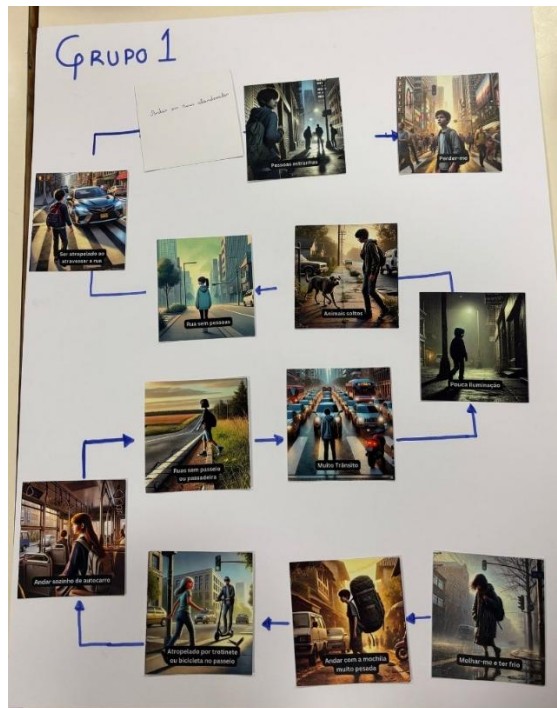


Figure 18 - Example Fear Perception Order

The following tables shows each group's choice (each number represents the position that fear occupied in the group's order, with 1 being the most frightening and 13 the least frightening).

Table 5 - Fear Perception Order by Group (6th Grade)

6th Grade						
Category	Fear Cards	Group 1	Group 2	Group 3	Group 4	Group 5
Personal Safety Concerns	Street without people	5	5	11	12	8
	Getting Lost	1	8	4	8	3
	Poor lighting	7	7	5	10	5
	Strange people	2	12	3	3	2
	Unleashed animals	6	11	6	9	7
Traffic-related dangers	Streets without sidewalks or crosswalk	9	4	9	7	6
	Being hit by a car while crossing the street	4	1	2	1	4
	Lots of traffic	8	9	7	6	11
	Hit by a scooter or bicycle on the sidewalk	11	3	8	4	9
Other Fears	Taking the bus alone	10	6	12	5	10
	Getting wet and cold	13	10	10	11	12
	Carrying a heavy backpack	12	13	13	13	13

Table 6 - Fear Perception Order by Group (5th Grade)

5th Grade					
Category	Fear Cards	Group 1	Group 2	Group 3	Group 4
Personal Safety Concerns	Street without people	2	6	11	12
	Getting Lost	6	1	2	2
	Poor lighting	4	5	4	8
	Strange people	3	3	3	1
	Unleashed animals	9	4	5	4
Traffic-related dangers	Streets without sidewalks or crosswalk	10	8	9	11
	Being hit by a car while crossing the street	5	7	6	5
	Lots of traffic	7	11	7	10
	Hit by a scooter or bicycle on the sidewalk	11	9	8	7
Other Fears	Taking the bus alone	12	10	12	9
	Getting wet and cold	8	13	10	13
	Carrying a heavy backpack	13	12	13	6

5.2.1 PERSONAL SAFETY CONCERNS

One of the most prevalent fears and with the highest level of concern among the students was that of meeting strangers and the possibility of being kidnapped. Many students associated this fear with specific visual triggers, specifically mentioning “suspicious-looking individuals” or “white vans”, reflecting narratives often portrayed in the media. (Payne, 1988). One example of this influence was that of a 5th grade girl who said that in her view “*kidnapping leads to death*”, claiming to have this idea because of television.

However, some of the students' testimonies revealed more than abstract concerns, presenting real stories in which they felt afraid or uncomfortable. A sixth-grade boy shared with his groupmates a particularly stressful experience in which he saw a slow-moving van driven by a group of individuals he identified as “*romani*”, making eye contact with him and trying to approach him. He described feeling “*very anxious*” as he ran home, constantly looking back while calling his mother.

Another student shared with the whole class a shocking testimony of a real near abduction experience. He said that he lives quite far from school and that he takes the same route every day. Although he couldn't explain where he lived, he said that he walked for about 25/30 minutes and that one day he was approached by a man in a van who had stopped a few meters away, trying to get his attention. Acting on instinct, he ran away and said that while he was walking to school he used to talk to his mother on the phone, warning her of the danger. In addition to his story, this young boy commented that he had left his backpack behind because “*it was heavy and wouldn't let me run so fast*”.

When analyzing these two stories, it was possible to associate their feelings of fear and insecurity with the instinct to call and alert their parents straight away. This very understandable dependence on parental intervention shows limitations in their confidence when it comes to dealing with uncertain

and spontaneous situations on their own (Wolf et al., 2024). Another example of this uncertainty was a student who reported that he was walking down the street next to the school and saw a man grabbing a woman by the neck. Faced with this situation, he said he didn't know what to do and chose to take out his phone and film it so that he could *"have proof to show an adult"*.

Fear of strangers was shown to go beyond direct encounters, as the feeling of being watched by strangers was also reported as a source of discomfort. One girl told her colleagues that she avoided a particular street near her home because she always felt uncomfortable walking past a café where older men watched her pass by. *"They're always staring, I don't like going through there alone"* she said. This allows us to analyze how certain spaces that are part of children's daily environments despite not presenting a direct risk to children, can be psychologically defined as dangerous.

Furthermore, this feeling of danger associated with certain places was also present when poorly lit streets and street without people were identified as high-risk places where children felt particularly vulnerable. Two students mentioned taking the long way round when going to the music academy to avoid a "deserted street". This choice on the part of children to take the route that is considered safer despite being longer has already been proven in literature, showing that when it comes to children's navigational choices, they, unlike adults, think about other factors that go beyond choosing the 'quickest' route (Ikeda et al., 2018; Moran et al., 2018).

Interestingly, a group of students put "abandoned streets" on the blank card, stating that in their opinion there was a big difference between "a street without people" and "an abandoned street", since the sense of neglect and decay of the area increased the risk factor, explaining that it could be frequented by *"worse people"*.

An important conclusion from these results is the way in which children actively assess and classify their surroundings based on their perception of risk, demonstrating a differentiated awareness of their environment. Instead of only fearing direct threats, they also recognize more subtle signs - such as signs of abandonment or being watched - as indicators of potential danger. This suggests that their sense of security does not only depend on external protection measures, such as the presence of the police, but also on the general state and social dynamics of the spaces they circulate through on a daily basis. Addressing children's safety concerns therefore requires not only physical interventions, but also an understanding of how urban environments influence their perception of risk.

5.2.2 TRAFFIC-RELATED DANGERS

After fears related to personal safety, fears related to traffic were the most frequent and appeared to be very present in the students' daily lives. The traffic insecurity was particularly evident among 6th graders, who said that almost all of them had been nearly hit by a car. The place most frequently mentioned was precisely the crosswalk in front of the school, where many students reported that cars don't stop or drive at excessive speeds. One of the students emphasized this by saying: *"Here at school, cars go by very fast, it seems like they don't even see the crosswalk."*

When this was mentioned, a student who uses the bus shared that he was afraid to cross the crosswalk next to the bus stop for the same reason, since there is a high flow of traffic in the morning and he is afraid that the cars won't see him passing *"I don't like where the bus stops because it's very confusing, the cars come very fast and sometimes they don't stop."* This kind of fear demonstrates how the lack of effective traffic calming measures in school zones jeopardizes the students' safety, highlighting the need for urban interventions to ensure safe crossings.

Concern about electric scooters and bicycles evolved interestingly over the course of the activity. Initially, many students saw the possibility of being run over by a scooter as funny and even ridiculous. However, as the discussion developed and students shared personal experiences, perceptions changed. More than one student admitted to having been scared by scooters on the sidewalk.

The high speed of traffic, drivers' lack of respect for crosswalks and the unregulated presence of scooters in pedestrian zones in the areas surrounding the school create a hostile environment for children's independent mobility. These concerns are consistent with previous studies that highlight traffic as one of the main factors restricting children's autonomy (Sharmin & Kamruzzaman, 2017). Therefore, implementing measures such as speed bumps, light signals, reduced speed zones and stricter enforcement could mitigate the dangers reported by students and provide a safer route to school (Rothman et al., 2022).

5.2.3 OTHER FEARS

At the bottom of the ranking of fears, students included aspects of the weather, the weight of their backpack and riding the bus alone, fears that they considered to be not very scary. This classification was made when compared to dangers related to their safety and traffic, since they pose no direct risk to their lives.

Among the less popular fears, feeling cold or getting wet emerged as a minor concern, as the students indicated that they are part of everyday life and immediately came up with quick solutions “*If it rains a lot, you use an umbrella*” commented one student, “*no one is going to die from getting wet*” said another, minimizing the relevance of the problem. However, despite not being seen as a problem, this type of discomfort can have an impact on students' well-being, especially on winter days, when the temperatures in Chaves are quite low.

Carrying heavy backpacks was presented by the students as an extremely common occurrence in their daily lives. Many recognized it as tiring, especially on days with many subjects. Some reported tiredness when carrying school materials and instruments to places like the music academy after school. Curiously, one student reported having weighed his backpack with the help of his father: “*7 kilos, it shouldn't be allowed*” he says. Despite not being a direct threat to safety, this discomfort could be mitigated with solutions such as accessible school lockers or a better distribution of subjects throughout the week, as stated by some students. Throughout this study, the arrival of children at school was analyzed on several occasions and it was interesting to note that in the vast majority of cases, it is the person who accompanies the child who carries the backpack to the entrance. This may suggest that the weight of backpacks is not just a discomfort, but a factor that influences their daily routine and even the need for adult assistance on the way to school.

Riding the bus alone was a fear mentioned only by a small number of students as frightening, but when we analyse how familiar students are with using this means of transport, we can see that this is a matter of a lack of knowledge on the part of the majority. For the most part, the experience of travelling by bus unaccompanied by an adult was not a common one, and many had never travelled by bus outside the context of study trips, therefore not being able to identify possible dangers.

The position of these fears on the list of concerns indicates that, although they are perceived as less threatening, they can still affect children's daily lives and mobility, demonstrating the importance of also considering discomfort and well-being when planning school journeys.

5.2.4 DIFFERENCES BETWEEN GRADE LEVELS AND BACKGROUNDS

Although the age difference was quite small, it was quite noticeable during the activity. The younger students (5th grade) were slightly more childish and tended to focus on more abstract or hypothetical fears, such as “falling into a hole” or “having a heavy object fall on you”, while the older students (6th grade) expressed more concrete and realistic fears, such as “accidents” and being “approached by strangers”. It is therefore possible to see that 5th graders have a more creative imagination, which is often driven by a lack of knowledge or experience in independent mobility situations. This development in risk perception is in line with research which claims that as children get older and their exposure to the outside environment increases, there is a noticeable improvement in their understanding of risks (Rissotto & Tonucci, 2002).

It was also possible to see that there were differences in concerns between students from urban areas and those living in rural areas on the outskirts of the city. During the activity, one of the groups got involved in a particularly interesting debate about which card was scarier: “too much traffic” or “streets without people”. One student living in the city argued that empty streets felt more threatening to him, giving off a sense of insecurity. In contrast, his classmate, from a village, replied naturally: *“Oh, in my village there's never anyone in the street and I walk around freely”*, showing how familiarity with the environment influences the perception of risk. This contrast exemplifies how everyday life shapes children's concerns, reflecting not only geographical differences, but also different ways of interpreting the public space and its potential dangers.

Another example that shows this difference between the two environments is the fear of “stray animals”, which was found to be more frequent among urban students compared to students from rural areas, who said they were used to living with loose animals and didn't consider them a threat. As expected, many talked about the increased fear of dogs roaming in packs in the city. Many of these dogs are large and can have a less groomed appearance, which can intensify feelings of insecurity. Although this situation is gradually being managed by the municipal authorities, it remains a concern for students who move around the city independently.

5.2.5 SUGGESTED IMPROVEMENTS

At the end of the activity, the students were asked to reflect not only on the work they had done but also on their day-to-day experiences and come up with solutions to improve their safety. Among the most recurrent proposals was the need to improve pedestrian infrastructure, such as more visible crosswalks and the creation of more speed bumps near schools to reduce vehicle speeds. In addition, one student pointed out the importance of installing traffic lights in the area near the Júlio Martins secondary school, where crossing the street is a constant risk for young people coming by bus.

Police presence and the installation of surveillance cameras in strategic locations, such as near schools, were also frequently mentioned solutions. The students believe that more active surveillance could not only reduce the speed of traffic, but also increase their sense of security, probably because it would allow them to have a trusted adult to turn to in stressful and unexpected situations. The repeated mention of police presence suggests that children consider active surveillance to be a key factor in their safety. This may be due to direct experiences of feeling unsafe or a wider perception that police officers act as a reassuring presence in public spaces.

Some students suggested innovative solutions, such as installing motion-activated solar lights near the school. The circulation of scooters and bicycles in pedestrian spaces was also a concern, leading to the

proposal to create more cycle paths in the city, as well as the implementation of clearer rules restricting the use of these vehicles on pavements.

Interestingly, while most concerns revolved around traffic and mobility, two students brought up issues related to weapons—one suggesting the legalization of weapons for self-defense, while another explicitly stated that weapons should not be sold. These opposing viewpoints may reflect different perceptions of safety among children, with some feeling the need for personal protection and others expressing concern about the dangers posed by the availability of weapons. This highlights the importance of not only improving road safety but also addressing broader concerns about personal security and community well-being.

Another unusual but relevant concern raised by students was the presence of stray animals, particularly dogs. Some students expressed fear of encountering these animals on their way to school, suggesting measures to ensure safer pedestrian routes free from potential dangers.

In addition, although the excessive weight of school backpacks was not identified as a significant fear, several students suggested measures such as better distribution of materials throughout the week or setting a weight limit for backpacks, reducing the daily weight load.

In summary, the students' suggestions can be grouped into four main categories:

- Police Presence and Surveillance;
- Infrastructure and Mobility;
- Rules and Regulations
- Other Concerns

These findings highlight the need for a holistic approach to children's mobility that goes beyond traffic-related issues.

Table 7 - Children's Suggestions

Category	Suggestions	No. of Students	Mode of Transport
Police Presence and Surveillance	More police in the City	9	7 (car); 2 (Walking)
	Surveillance cameras	5	5 (car)
Infrastructure and Mobility	Construction of bike lanes	2	1 (car); 1 (walking)
	More traffic lights in key locations	4	3 (car); 1 (bus)
	Improvement of sidewalks	2	2 (car)
	More speed bumps on the road	1	1 (car)
	More streetlights that activate with movement	1	1 (car)
Rules and Regulations	Ban scooters on sidewalks	2	1 (car); 1 (bus)
	Require scooters and bicycles to follow traffic lights	1	1 (bus)
	Set a weight limit for school backpacks	1	1 (car)
Other Concerns	Reduce the number of stray dogs	2	1 (car); 1 (walking)
	Ban the sale of weapons	1	1 (car)
	Legalize weapons for self-defense	1	1 (car)

5.3 COMPARATIVE ANALYSIS AND FINAL CONSIDERATIONS

The comparative analysis between parents' perceptions and children's experiences of independent mobility in Chaves reveals significant differences in the way each group assesses the risks and challenges of moving independently. Parents emphasize specific dangers, such as being hit by cars, urban violence and the speed of vehicles, resulting in a tendency to restrict their children's autonomy. Children, on the other hand, express more subjective and situational concerns, such as fear of deserted streets, strangers and the presence of loose animals, often adjusting their routes to avoid such situations.

Urban infrastructure emerges as a common point between the two groups, although with different levels of emphasis. Parents identify structural flaws, such as poor lighting, a shortage of crosswalks and the absence of traffic calming measures, as barriers to safe mobility. Children, in turn, reinforce this view by mentioning discomfort in poorly lit streets and difficulties crossing busy roads, demonstrating that the perception of safety is influenced by the surrounding physical environment.

An additional point of divergence is the excessive weight of school bags. Parents highlight this as a major concern, pointing out the discomfort and possible impact on children's health. In turn, some children said that the weight of their backpacks made it difficult to move around, making the school journey more tiring, but they did not consider it to be a significant obstacle to their mobility.

The comparison shows that although parents and children identify similar obstacles to independent mobility, the way in which these obstacles are interpreted and experienced differs considerably. While parents base their concerns on external and structural factors, children shape their behavior from direct

perceptions and individual experiences. These differences need to be considered for a more complete understanding of the challenges that influence children's independence in urban space.

To answer the questions raised in the beginning of the dissertation, based on the analysis of the results, the answers could be as follows:

- What are the most common ways in which children travel to school?

The results show a clear preference for using the car, with 69.6% of children being transported this way. Only 17.9% walk and 12.5% use the bus, with no records of the use of bicycles or scooters.

- What are parents' main concerns about children's independent mobility?

Parents' biggest concerns are related to personal and road safety. The threat of “violence” (including robberies and physical attacks) was highlighted as an extreme concern for 48% of parents. Traffic-related issues, such as being run over when crossing the road (63%) and the speed of cars (63%), also stood out. In addition, the “weight of backpacks” was a significant concern, with 68% of parents expressing a high level of concern.

- How do children perceive their safety and freedom on the home-school journey?

The activity carried out with the students revealed that the children have specific fears, such as streets without people, loose animals and heavy traffic. Categorizing their concerns into “personal safety”, “traffic dangers” and “other fears” helped to identify the factors that most influence their sense of security and autonomy.

The results indicate a discrepancy between the perceptions of parents and children, especially when it comes to feelings of safety in public spaces and trust in urban infrastructures. This difference underlines the importance of involving both groups in discussions about urban planning and strategies to promote more independent and safer mobility for children.

Thus, this research provides valuable insights but also highlights the need for broader investigations to fully understand the challenges and opportunities related to children's independent mobility in Portugal.

6

CONCLUSION

6.1 REFLECTION OF THE RESULTS

The results of this study provide information about children's autonomous mobility in Chaves. The research used a mixed methodology, combining a questionnaire addressed to parents with interactive activities with 5th and 6th graders at the Nadir Afonso Primary School. This approach made it possible to compare parental perspectives with children's perceptions, offering a broader and more well-founded analysis of the subject.

The results confirmed that parents, as the main decision-makers regarding their children's mobility, express substantial fears related to road safety and urban violence. The majority indicated concerns about being run over, excessive vehicle speed and the lack of safe infrastructure. In addition, the fear of physical violence or kidnapping was widely mentioned, although statistically rare in Portugal. This study does not allow us to draw conclusions about an increase in safety incidents, but it does demonstrate parents' perception of the risks associated with their children's autonomous mobility.

On the other hand, the children showed different fears, more associated with subjective perceptions and personal experiences. As well as sharing concerns about traffic, they reported fear of being alone in deserted streets, of getting lost and of meeting strangers. One of the most interesting findings was the influence of family and media discourse on the construction of these fears, especially with regard to kidnapping situations. However, this activity does not allow for generalizable conclusions, but it does provide indications of children's feelings about mobility in the city.

These results show that the presence of continuous sidewalks, safe crosswalks and adequate lighting are determining factors for the perception of safety (Lopes et al., 2014), reinforcing the need for urban planning that goes beyond simply regulating traffic. Improving pedestrian infrastructure would mitigate these concerns, which could promote children's autonomous mobility. Given this scenario, the creation of segregated infrastructures for scooters and bicycles, combined with awareness campaigns and stricter enforcement, could help to reduce these fears and promote a safer urban environment for children.

6.2 CONTRIBUTION TO THE LITERATURE AND STUDY LIMITATIONS

This study provides an overview of children's independent mobility in Chaves, focusing on the perceptions of parents and children. The findings highlight that mobility decisions are strongly influenced by parents' concerns, in particular about traffic risks, pedestrian safety and public space conditions.

Despite contributing to the discussion on children's independent mobility in Portugal, this research is limited in terms of scope and depth. Future studies could extend the research to include a larger sample of schools, longitudinal approaches and comparisons between different cities.

Several opportunities for future research were identified:

- Expanding the sample to include a larger number of schools would allow for a more comprehensive analysis and potentially more generalizable results for different regions of Portugal.
- Complementing the methodology with direct observations and spatial analysis could enrich the understanding of the relationship between urban factors and children's mobility. A more detailed and visual analysis of the area surrounding the school could provide valuable insights into the environmental factors that influence children's mobility.
- Including quantitative data on the frequency and duration of children's commutes could help to develop a more detailed understanding of mobility patterns.
- Incorporating more detailed household information through parents' questionnaires could enhance the analysis of the influence of family structure on independent mobility.

Further considerations for future research include:

- Enhancing the alignment of research instruments: Developing the parents' questionnaire and students' activities simultaneously could improve the comparability of perspectives and contribute to more holistic insights.
- Exploring family structure in more depth: Analyzing factors such as the presence of siblings, other caregivers, and parents' professional backgrounds could offer a more nuanced understanding of how family dynamics influence children's autonomy.
- Broadening the analysis of children's mobility: Including not only the home-school journey but also trips to extracurricular activities and leisure spaces could provide a fuller picture of children's mobility patterns.
- Integrating empirical assessments of the urban environment: Observing physical infrastructure, such as sidewalk conditions, lighting, and safe crossings, could complement perception-based data and provide a more objective evaluation of safety and accessibility.
- Conducting comparative studies with other schools: Expanding the research to additional schools in Chaves and nearby cities could help identify broader mobility patterns and support more robust conclusions.

To mitigate these limitations, future studies could include complementary methods such as ethnographic observations, interviews with different social actors and comparative analyses between different urban and rural regions.

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