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"NESTE CARRO NÃO SE FUMA": Evaluation and adaptation of a project promoting smoke-free environments implemented in Primary Schools.

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“NESTE CARRO NÃO SE FUMA”:
Evaluation and adaptation of a project promoting smoke-free environments implemented in Primary Schools.

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Abbreviations

CDC – Centers for Disease Control and Prevention

COPD - Chronic Obstructive Pulmonary Disease

CRI – Centro de Respostas Integradas

ETS – Environmental Tobacco Smoke´

EVALI - E-cigarette or Vaping Product Use-Associated Lung Injury

FEV 1 – Forced Expiratory Volume in the 1st second

HDL – High Density Lipoproteins

ISPUP – Instituto de Saúde Pública da Universidade do Porto

sICAM-1 - Soluble intercellular adhesion molecule-1

SIDS - Sudden Infant Death Syndrome

THC - Tetrahydrocannabinol

VOCs - Volatile Organic Compounds

Resumo

Ao longo do tempo a investigação científica demonstrou que os riscos para a saúde associados à exposição tabágica não se limitam aos efeitos no fumador. A exposição ambiental ao fumo do tabaco inclui o tabagismo em segunda mão (“secondhand smoke”), o tabagismo em terceira mão (“thirdhand smoke”) e a aerossolização dos produtos proveniente dos cigarros eletrónicos.

O tabagismo em segunda mão (“secondhand smoke”) refere-se à exposição involuntária de fumo de tabaco provocada pelo fluxo de fumo produzido pelo cigarro aceso e pelo fumador quando exala. Quando um fumador usa tabaco, há a deposição de compostos provenientes do tabaco em superfícies como sofás, mesas e assentos estofados. Tabagismo em terceira mão (“thirdhand smoke”) corresponde à exposição a metabolitos de fumo de tabaco e a partículas que se acumulam nas superfícies por absorção cutânea, inalação e ingestão. Este tipo de exposição ocorre mais frequentemente em casa e no carro.

Partindo do contexto escolar para mudar as atitudes dos adultos, o projeto "NESTE CARRO NÃO SE FUMA" surgiu em 2019 com o objetivo de promover a capacitação das crianças para que sejam capazes de evitar a exposição ao tabaco e aos produtos derivados do tabaco, promovendo a não utilização desses produtos dentro de veículos particulares.

O projeto "NESTE CARRO NÃO SE FUMA" baseia-se na capacitação dos professores para a realização de atividades com alunos e pais/encarregados de educação. O projeto é implementado em escolas do primeiro ciclo e começa com uma sessão de formação de 3 horas para os professores, seguindo-se um segundo momento em que os pais/encarregados de educação são convidados a assinar um compromisso de não utilizar tabaco nos veículos da família e recebem um selo autocolante como sinal desse compromisso. Durante o projeto, cabe aos professores a realização de atividades em sala de aula e a promoção de atividades em casa para reforçar esse compromisso.

No ano letivo de 2021/2022, foi implementada uma fase piloto, em 6 escolas dos seis agrupamentos de escolas do município de Valongo que concordaram participar no projeto.

Esta tese é um projeto de investigação cujo objetivo foi avaliar o projeto piloto "NESTE CARRO NÃO SE FUMA" realizado durante o ano letivo 2021/2022, de forma a identificar as melhorias necessárias para melhorar o desenho da intervenção.

Para a avaliação do estudo piloto, foi utilizada uma abordagem multimétodo qualitativa, através da realização de entrevistas qualitativas semiestruturadas e de um grupo focal com docentes que assistiram à formação inicial do projeto “NESTE CARRO NÃO SE FUMA”. Foram realizadas seis entrevistas e um grupo focal (constituído por seis docentes de uma mesma escola), perfazendo um total de 12 participantes no estudo. A recolha de dados, realizada através das entrevistas e grupo focal, e a análise de conteúdo decorreram em simultâneo de forma a verificar a existência de saturação dos resultados obtidos. A análise de conteúdo temático foi realizada de acordo com o protocolo de Braun and Clarke, 2006.

De acordo com os resultados obtidos, a formação dos professores foi eficaz na consciencialização e motivação dos docentes, mas os participantes sugeriram explorar os tópicos com mais profundidade. A maioria dos professores já tinham conhecimento prévio, enquanto outros aprenderam novos conceitos. A componente organizacional da formação suscitou opiniões mistas sobre os materiais fornecidos, que tanto foram considerados suficientes e adequados como foram também criticados por serem pouco didáticos e não terem sido disponibilizados a todas as turmas. Os formatos da formação, presencial *vs* online, tiveram vantagens e desvantagens, pois por um lado consideram que assim facilitou a articulação com o restante horário de cada professor, mas que, por outro lado, se tornou menos promotora de discussão entre pares. O nível de implementação do projeto variou entre turmas, com atividades ocasionais na maioria das turmas e integração regular em uma escola. Como fatores facilitadores da implementação do projeto foram mencionados pelos participantes o caderno de atividades fornecido pela equipa do projeto, a elevada relevância do projeto e o envolvimento dos alunos e seus educandos no decorrer das atividades. As barreiras relativas à implementação do projeto incluíram a falta de acompanhamento aos docentes por parte da equipa de implementação do projeto, dificuldade de calendarização, falta de disponibilidade de tempo dos professores para implementar as atividades e o envolvimento limitado dos pais/ encarregados de educação. Estratégias para superar as barreiras foram sugeridas. As sugestões de melhoria incluíram aumentar a proposta de atividades no caderno de atividades, criar atividades virtuais e interativas, aumento do acompanhamento, medidas para envolver mais os pais/encarregados de educação, calendarização da formação mais próxima da implementação, realização de uma proposta estruturada de calendarização em vez de deixar a implementação ao critério dos docentes e revisão do processo de avaliação.

Deste modo, conclui-se que o projeto "NESTE CARRO NÃO SE FUMA" tem potencial na consciencialização dos riscos da exposição ao fumo ambiental do tabaco e o estudo realizado permitiu a realização de elações que permitirão a melhoria do projeto no futuro.

Abstract

Over time, scientific research has demonstrated that health risks associated with tobacco exposure are not limited to the effects on the smoker. Environmental exposure to tobacco smoke includes secondhand smoke, thirdhand smoke, and the aerosolization of products from electronic cigarettes.

Secondhand smoke refers to the involuntary exposure to tobacco smoke caused by the flow of smoke produced by a lit cigarette and exhaled by the smoker. When a smoker uses tobacco, compounds from the tobacco are deposited on surfaces such as sofas, tables, and upholstered seats. Thirdhand smoke corresponds to exposure to tobacco smoke metabolites and particles that accumulate on surfaces through skin absorption, inhalation, and ingestion. This type of exposure often occurs at home and in cars.

Transitioning from the school context to changing adult attitudes, the "NESTE CARRO NÃO SE FUMA" project was launched in 2019 with the aim of empowering children to avoid exposure to tobacco and tobacco-derived products, promoting the non-use of such products inside private vehicles. The project is implemented in primary schools and begins with a 3-hour training session for teachers, followed by a second moment where parents/guardians are invited to sign a commitment not to use tobacco in their family vehicles and receive a sticker as a sign of that commitment. During the project, teachers are responsible for conducting activities in the classroom and promoting activities at home to reinforce this commitment.

During the academic year 2021/2022, a pilot phase was implemented in six schools from the six school clusters in the City of Valongo that agreed to participate in the project.

This thesis is a research project whose objective was to evaluate the pilot project "NESTE CARRO NÃO SE FUMA" carried out during the academic year 2021/2022, in order to identify necessary improvements to enhance the intervention's design.

For the evaluation of the pilot study, a qualitative multimethod approach was used, through the realization of semi-structured qualitative interviews and a focus group with teachers who attended the initial training of the "NESTE CARRO NÃO SE FUMA" project. Six interviews and one focus group (composed of six teachers from the same school) were conducted, totaling 12 participants in the study. Data collection, carried out through interviews and the focus group, and content analysis took place simultaneously to verify the existence of result saturation. Thematic content analysis was performed following the protocol of Braun and Clarke, 2006.

According to the results obtained, teacher training was effective in raising awareness and motivating the teachers, but participants suggested exploring the topics in more depth. Most teachers already had prior knowledge, while others learned new concepts. The organizational component of the training elicited mixed opinions about the provided materials, which were considered sufficient and appropriate by some, while criticized by others for being not very didactic and not made available to all classes. The formats of the training, face-to-face vs. online, had advantages and disadvantages. On one hand, it facilitated the articulation with the teachers'

schedule, but on the other hand, it was considered less conducive to peer discussion. The level of project implementation varied among classes, with occasional activities in most classes and regular integration in one school. Facilitating factors of project implementation mentioned by the participants included the activities workbook provided by the project team, the high relevance of the project, and the involvement of students and their families during the activities. Barriers to project implementation included lack of follow-up with teachers by the project implementation team, difficulties in scheduling, lack of time availability for teachers to implement the activities, and limited involvement of parents/guardians. Strategies to overcome these barriers were suggested. Improvement suggestions included increasing the number of proposed activities in the activities workbook, creating virtual and interactive activities, increasing support and follow-up, measures to involve parents/guardians more, scheduling the training closer to implementation, structuring a proposed activity calendar instead of leaving implementation at the discretion of the teachers, and revising the evaluation process.

In conclusion, the "NESTE CARRO NÃO SE FUMA" project has the potential to raise awareness of the risks of environmental tobacco smoke exposure, and the study conducted allowed the identification of insights that will enable the improvement of the project in the future.

Background

Environmental exposure to tobacco - concepts and epidemiological

The harmful effects associated with tobacco consumption are widely known, being the subject of scientific investigation in recent decades. This knowledge has supported the efforts that have been carried out to promote the reduction of consumption of this substance. (1)
Over time, scientific research has shown that the health risks associated with tobacco exposure are not closely limited to effects just on the smoker.(2)
Environmental exposure to smoke from Tobacco includes second-hand smoke, third-hand smoking and the aerosolization of products from electronic cigarettes. (3)
Second-hand smoke refers to involuntary exposure to smoke of tobacco caused by the flow of smoke produced by the lit cigarette and by the smoker when exhale. (3) This exposure occurs in different environments, with the home being the environment with the highest risk at this pediatric age.
Thirdhand smoke corresponds to the exposure to tobacco smoke metabolites and particles that accumulate on surfaces after cigarette use. (3) When a smoker uses tobacco, these compounds are deposited on surfaces such as fabric-covered sofas, chairs, carpets, child seats, and upholstered seats, and contact with these surfaces can result in dermal absorption, inhalation, and ingestion of tobacco smoke metabolites and particles. (3)This type of exposure occurs most frequently at home and in cars. (3)

It is estimated that globally, approximately one-third of the population aged 15 years and older smoke, and one-third of the adult population and 40% of children are regularly exposed to tobacco smoke passively. (4)

And when we focus closely on the United States of America, there is approximately 58 million non-smokers that are exposed to second-hand smoke, considering all age groups. (3) According to data obtained from the National Health and Nutrition Examination Survey (NHANES), between 1999 and 2012, there was a prevalence of children's exposure to environmental tobacco smoke ranging from 27% to 44%. (5, 6)

Now, focusing on Portugal, recent data collected also indicate concern about environmental tobacco exposure. (1) In recent years, according to data obtained in 2010 from the National Asthma Survey, which included a sample of 6003 participants, the exposure to environmental tobacco smoke (ETS), defined in this study as exposure to at least one smoker at home among individuals aged 3 to 18 years, was 36.7%. (1, 7) A second national study, commissioned by the Directorate-General of Health and conducted in 2016 by Precioso et al., in a national sample of 2396 children aged 0 to 10 years, showed a prevalence of ETS exposure of 18.4% (14.4% at home, 10.1% in the car, and 5.4% with dual exposure). (1, 8)

Meanwhile, the most recent report from the portuguese Directorate-General of Health was published in 2020. It shows that the prevalence of smokers, with daily or occasional habits, aged 15 or over, decreased in Continental Portugal from 20% to 17% between 2014 and 2019. The Northern region recorded a relative reduction from 19% to 16%. (1)This reduction was observed

in all regions of the country, with regional asymmetries remaining. The Autonomous Region of the Azores continues to have the highest prevalence of consumption (23.4% of smokers), followed by the Alentejo region (19.1%). (1)The same report published by the Directorate-General of Health also states that although a reduction in tobacco use was observed among young people, there has been an increase in the consumption of water pipe tobacco and heated tobacco. (1)

According to the data shown in the previously mentioned studies, it is necessary to reflect on the reasons that lead people to smoke in the car. It is most likely that this happens unconsciously and involuntarily, that is, without fully realizing that this option is exposing children to smoke. One of the reasons is that most smoking parents believe that their children do not suffer consequences, or do not know the full extent of the harmful effects of environmental tobacco smoke.(9) Smoking parents who do not smoke at home appear to be more aware of the risks of smoking to their children's health, while parents who smoke at home do so mainly out of convenience and ignorance of the negative consequences of this behavior. (10) For example, 22.6% of parents believe that "If I open a window or turn on a fan, I can get rid of tobacco smoke," and 11.6% are unaware that "exposure to environmental tobacco smoke causes heart attacks in adults". (11)

Without a clear anti-tobacco policy, it is not easy to reduce exposure to tobacco smoke in the environment, all European Union countries have made efforts to protect citizens' health from the harmful effects of tobacco.

In Europe, 14 countries have banned smoking in all workplaces and enclosed public places. (12) Of these, eight countries such as Cyprus, Finland, France, Ireland, Luxembourg, Malta, Slovenia, and the United Kingdom have also prohibited smoking in cars when children are present. (13) In Italy, it is also forbidden to smoke in a vehicle if a pregnant woman is present.

In comparison, in Portugal, although there are a some measures to reduce tobacco consumption and also several strategies to reduce the negative impact of environmental tobacco smoke, smoking is still allowed in private vehicles without restrictions.(14, 15) Since 2008, it has been prohibited to smoke inside most establishments with public use, with some exceptions (Law no. 37/2007 of August 14). Exceptions include restaurants under 100m2, which have the right to be entirely for smokers, and those above 100m2, which can have spaces reserved for smokers. (16) In 2020, the deadline for owners to adapt to the new rules of locations with smoking areas ended.

After 2020, smoking areas must comply with stricter rules aimed at controlling the levels of concentration and exposure to smoke. The 2017 law limits the use of tobacco in outdoor places frequented by minors, such as summer camps or playgrounds (Law No. 63/2017 of August 3). According to this law, all existing restrictions on traditional tobacco were expanded to new tobacco products (e-cigarettes or heated tobacco) in Portugal. (17)

There was also a proposition, from the director of the National Tobacco Control Program to prohibit smoking in private vehicles with children present, but it was not incorporated into this law revision. (18)

To protect children from exposure to environmental tobacco smoke, it is important to ensure tobacco-free environments, which means never smoking cigarettes, pipes, cigars, or e-cigarettes inside the house or any other place where the child is present. Even if not smoking in the presence of the child, it is necessary to remember that spaces where smoking occurs can contain compounds from tobacco, so the most appropriate protection is to never smoke in places frequented by the child.(18)

It is important to emphasize that raising awareness among parents and the general population about the risks of secondhand smoke is crucial for the adoption of healthier behaviors. It is necessary to disseminate information and scientific evidence that proves the harmful effects of passive smoking on children, and to sensitize the population to the need to protect the health of future generations. Additionally, it is important to highlight that the implementation of effective public policies that regulate the use of tobacco in public spaces is essential to protect the health of all citizens, especially children.(18)

Measures to reduce children's exposure to environmental tobacco smoke

Tobacco smoke can penetrate homes from outside, so it is important not to allow smoking near doors, windows, or ventilation systems. Opening windows, smoking on the balcony, using air purifiers, and ventilating buildings do not eliminate exposure to environmental tobacco smoke. Although it is possible, in most cases, to eliminate the smell and reduce the concentration of some pollutants, it is not possible to remove all toxic pollutants.(19)

It is also important to check if the child travels in smoke-free cars. Not allowing smoking in the car and avoiding situations where the child travels with someone who allows smoking in the car are essential measures to reduce children's exposure to environmental tobacco smoke.

In addition to the family's house and car, this concern should be extended whenever possible to other places, such as friends' and relatives' houses, hotels, restaurants, amusement parks, and other public places. It is important to avoid restaurants, cafes, and other places with designated smoking areas, especially in enclosed environments. In fact, in a restaurant where at least one person smokes, all visitors, including customers in the non-smoking area, are exposed to tobacco. (18)

There are no "safe levels" of secondhand smoke exposure for non-smokers. Establishing a completely smoke-free environment is the only effective way to fully protect non-smokers from secondhand smoke, as even brief exposure can cause immediate harm. (20-22)

Risks associated with exposure to environmental tobacco smoke

Although passive smoking is considered less harmful than active smoking, its impact is still significant, especially because it often occurs without people, whether adults or children, being aware of this exposure and therefore unable to protect themselves.

Despite current legislation attempts to protect non-smokers, the number of people exposed to environmental tobacco smoke is greater than the number of smokers. While the effect on each individual may be smaller, the effect on the population as a whole is enormous and affects all age groups. As per the largest study on the effects of passive smoking, conducted in 2004, this exposure was responsible for the deaths of 603,000 people worldwide, including 166.000 children (28%) who did not smoke. (23)

According to the latest estimates by the Institute for Health Metrics and Evaluation (IHME), in Portugal, in 2019, more than 13.500 people died due to diseases caused by tobacco, with an estimated 1.771 deaths resulting from exposure to environmental tobacco smoke (561 for cerebrovascular diseases, 425 for respiratory infections, 312 for chronic respiratory disease, 242 for type 2 diabetes mellitus and 220 for cancer). These effects occur because non-smokers exposed to cigarette smoke also absorb some tobacco substances, such as nicotine, carbon monoxide, formaldehyde and other substances, although in smaller amounts, as well as smokers. (4)

Environmental tobacco exposure has consequential effects in all different stages of life.

During adulthood, inhaling the chemical compounds present in environmental tobacco smoke increases the risk of lung cancer by 20 to 30% and coronary heart disease by 25 to 30%, compared to non-smokers. Long-term exposure to tobacco smoke also increases the risk of acute myocardial infarction by 20 to 30%. In addition, adults who are exposed to environmental tobacco smoke are more likely to develop asthma and have more frequent symptoms of respiratory diseases. (24)

During pregnancy, the effects of exposure to environmental tobacco smoke can be even more harmful to the fetus, affecting its growth. Exposure of non-smoking mothers to environmental tobacco smoke increases the risk of pregnancy complications, such as premature birth, low birth weight, stillbirth, and placental abruption. (25) Non-smoking pregnant women exposed to secondhand tobacco smoke also have a higher risk of intrauterine death compared to those who are not exposed. (26)

Newborn babies are even more susceptible to the effects of secondhand smoke. Regular exposures to this type of smoke are linked to a higher risk of Sudden Infant Death Syndrome (SIDS), which is the sudden and unexplained death of a baby under one year of age. (27) The risk of SIDS due to environmental tobacco smoke exposure is specifically related to parental smoking and has resulted in over 100.000 deaths in the past 50 years. (27)

Newborns exposed to this agent could have smaller cranial volumes, particularly in the frontal and cerebellar lobes. (28) Signs of high levels of stress, hypertonicity, and irritability are observed in infants exposed to tobacco smoke during the prenatal period. (29)

Other postnatal risks associated with maternal smoking during pregnancy include a higher incidence of respiratory infections, bronchiolitis, asthma, atopy, infant colic, short stature, cognitive deficits, behavioral problems, childhood obesity, and various neurological problems. (24)
In addition, exposure of children to secondhand smoke can reduce lung function and impair lung development, increasing the risk of bronchitis, pneumonia, and other respiratory infections. This exposure also increases the risk of middle ear infections. For children with asthma, exposure to secondhand smoke can intensify symptoms of the disease, resulting in more frequent and severe asthma attacks than those who are not exposed. (24)

In childhood, there is also physiological immaturity of the circulatory, respiratory, immune, and neurological systems, making this population more susceptible to tobacco exposure and, therefore, at greater risk of morbidity and mortality. (30)

The effects of new tobacco products

Nowadays, there are concerns about the potential health effects of secondhand exposure to e-cigarettes (vaping) or heated tobacco products, but this is a controversial and still poorly studied topic.

One study found carcinogenic compounds, such as formaldehyde, acetaldehyde, and acrolein, in the smoke from heated tobacco devices (IQOS®), although in smaller quantities compared to conventional cigarettes. (31) As for e-cigarettes, they are currently recommended to be considered a source of aerosols, volatile organic compounds (VOCs), and particles whose health risks have not been fully evaluated for indoor environments. (32)

Experts are also concerned about the growing popularity of new tobacco products among young people. In 2019, the prevalence of e-cigarette experimentation (22%) among 13 to 18-year-olds approached that of traditional cigarettes (29%). (33) The World Health Organization raised concerns that due to the lower perceived risk associated with e-cigarette use, this behavior could be a gateway to the consumption of traditional tobacco products. (34)

It is difficult to claim that **heated tobacco systems** are less harmful to health, as there is limited scientific data available. Although studies show that the concentration of harmful substances is lower when the cigarette is heated compared to conventional smoking, this does not necessarily mean a reduced risk. The overall exposure is the key factor in the development of diseases, and not just the reduction of the dose at each moment. To ensure the safety of these systems, studies are needed to evaluate their effects on the development of diseases such as cancer, acute myocardial infarction, or stroke. Currently, there are few studies on the impact of heated tobacco on health, which have mainly been conducted on cell cultures and animals, not humans. (35)

A systematic review published in 2021 by Znyk, M., Jurewicz, J. and Kaleta, D, aimed to identify relevant studies on the health effects of heated tobacco products between 2015 and 2021, considering 25 studies (independent and sponsored by the tobacco industry). Biomarker analysis of exposure and cardiovascular and respiratory biomarkers showed differences between regular cigarette smokers and heated tobacco product users. Improvements in clinically relevant risk markers, especially cholesterol, sICAM-1, Prostaglandin F2α, Urinary 11-dehydrothromboxaneB2, HDL, and FEV1, were observed compared to regular cigarette smokers. On the other hand, exposure to IQOS® was reported to alter mitochondrial function, which could further exacerbate airway inflammation, airway remodelling, and lung cancer development.

These products have the potential to increase oxidative stress and increase respiratory tract infections by increasing microbial adherence to the respiratory tract. Thus, the analysis suggests that heated tobacco products may be reduced-risk products for chronic diseases, including respiratory and cardiovascular diseases and cancer, compared to traditional smoking. However, when compared to non-smokers, they may still pose a risk for their occurrence. Further research seems to be necessary to evaluate the frequency of heated tobacco product use and their potential negative health effects.(35)

Heated tobacco systems provide the human body with approximately the same amount of nicotine as a regular cigarette. Although nicotine is not the primary tobacco agent that causes health damage, it can have negative effects on fetal development. For this reason, pregnant women should not use heated tobacco systems, as well as other tobacco-containing products. (36) However, it is important to note that tobacco is dangerous in any form.

E-cigarette vapor was believed to be less harmful by most experts, in the summer of 2019. (37)

Researchers who observed participants in a study for three years concluded that e-cigarette smokers had a higher risk of being diagnosed with lung disease (chronic bronchitis, emphysema, asthma, or chronic obstructive pulmonary disease (COPD)) than non-smokers, but that this risk remained lower than that of traditional cigarette smokers. (38)
This result can be explained by the fact that e-cigarette vapor does not contain tar or carbon monoxide and that the amount of harmful compounds present in vapor smoke is much lower.

On the other hand, it seems that other components of e-cigarette vapor can cause health damage: propylene glycol at high temperatures can form propylene oxide, a likely carcinogen, and glycerin produces an acrolein toxin. In addition, e-cigarette vapor can contain carcinogenic agents such as formaldehyde and acetaldehyde. The level of these and other substances depends on the device's power: the higher the temperature, the more toxins are released. It has also been discovered that the composition of some fragrances with a sweet smell (such as cinnamon and cherry) can further harm the respiratory system. (39)

In fact, the attitude towards e-cigarettes dramatically changed in late summer of 2019 when several cases of lung illness associated with e-cigarette use emerged in the United States. Between January 2018 and August 2019, 80% of patients had used e-liquids containing

tetrahydrocannabinol (THC) and 17% used nicotine exclusively. (40) Most patients were healthy teenagers and young adults. Since then, over 2800 cases have been reported to the Centers for Disease Control and Prevention (CDC), resulting in at least 68 deaths. (41) The most common symptoms of this illness included cough, shortness of breath, chest pain, nausea, vomiting, diarrhea, fatigue, fever, tachycardia (fast heart rate), tachypnea (rapid and shallow breathing), headache, lethargy, and mental confusion. This illness is now referred to as EVALI (E-cigarette or Vaping Product Use-Associated Lung Injury). (42) Although official information suggests that vitamin E acetate may be associated with EVALI, researchers have not identified any other ingredients that may be equally implicated. It is unclear under what conditions the disease develops, nor why, in the most severe cases, the lungs stop functioning completely. (43)

Importance of intervening at School

Health Promotion and Education in school settings is a continuous process that provides children and young people with the development of skills that will enable them, in the future, to positively confront themselves, build life projects and make individual, conscious and responsible choices. It also allows for the creation of environments that facilitate these choices, stimulating critical thinking for the exercise of active citizenship. (44)

Furthermore, the promotion of healthy habits is crucial for young people, as it is during this phase of life that self-discovery occurs. They gradually enjoy increasing autonomy in decision-making and adopting lifestyles that will also have long-term implications for their own health. (45)

According to scientific evidence, tobacco prevention in school settings, with a focus on families, is effective. (46) Interventions targeting parents are recommended in the essential document developed by WHO and UN, which promotes standards and guidelines for tobacco and drug prevention at the international level. (47)

A national example of such interventions is the implementation of the "100% Smoke-Free Homes" program in Portuguese schools. In this program, teachers promote a series of activities with students so that, through the information they bring home, they can try to change their parents behavior regarding tobacco use inside homes and cars. Although no changes in tobacco consumption at home by the parents of the students were observed, the program was associated with a decrease in the prevalence of smoking mothers whose children were involved in the program. (48)

In addition to assessing health effects, it is crucial to understand the potential mechanisms through which education affects health, to identify effective interventions for specific education and health domains. Researchers should consider the probable causal pathway of education as a source of empowerment with implications for health outcomes, an area that has been understudied. (49)

Unfortunately, the sustainability of school-based health interventions after the depletion of external funds or other resources it’s a prominent reality and has received relatively little attention. Even if effective, interventions are discontinued, resulting in new practices not being able to reach a wider student population and investment in implementation being wasted.

A systematic review published by Lauren Herlitz, tried to find what evidence existed regarding the sustainability of school-based public health interventions and what was the barriers and facilitators that affect the sustainability of public health interventions in schools in high-income countries. (50) The review included 24 studies of 18 interventions out of the 9677 unique references identified through database searching and other search strategies. None of the interventions were sustained in their entirety, as all had some components that were sustained by some schools or staff, except for one that was completely discontinued. The relationship between

evidence of effectiveness and sustainability was not discernible. Key facilitators for sustainability included commitment/support from senior leaders, staff observing a positive impact on students' engagement and wellbeing, and staff confidence in delivering health promotion and belief in its value. Contextual barriers included the norm of prioritizing educational outcomes under time and resource constraints, insufficient funding/resources, staff turnover, and a lack of ongoing training. Adaptation of the intervention to existing routines and changing contexts appeared to be part of the sustainability process. (50)

The key to implementation and sustainability at the teacher-level was student engagement. Educators play a central role in engaging students, and interventions that did not capture students interest were unlikely to be sustained by staff. In some cases, sustainability was prompted by students requests for the intervention, while support from parents for healthy activities outside of school further motivated staff to continue, highlighting the complexity of schools as adaptive systems where multiple networks of agents interact with each other. (50)

Additionally, the need to adapt intervention materials and activities to accommodate other curriculum requirements and the diversity of children's backgrounds and development was particularly significant for schools. The dynamic context of schools suggests that intervention developers should anticipate the need for adaptation, even for interventions that are effective, well-implemented, and well-funded, to ensure sustainability. (50-52)
By fostering the development of social, coping, and problem-solving skills, schools equip children with valuable tools that can be readily applied in their everyday interactions. (53)

In conclusion, for this many reasons, school is a privileged place for educating and growing. Until adulthood, children and young people spend most of their time in school, and their development is naturally influenced by the context. Therefore, it’s clear that schools should also be a priority space for health education.

The “NESTE CARRO NÃO SE FUMA” Project

The project emerged in 2019 as a tool to contribute to two of the strategic objectives of the Municipal Health Plan of the City of Valongo - Objective 1: reduce tobacco use; Objective 7: improve health communication and literacy. (54) The purpose and relevance of the project called “NESTE CARRO NÃO SE FUMA” is also related to its alignment with the Sustainable Development Goals of the WHO - SDG3: Good Health and Well-being. The project's specific objective is to reduce involuntary exposure to tobacco and tobacco products by promoting non-use of these products inside private vehicles.(55)

The project “NESTE CARRO NÃO SE FUMA”” was based on strategies involving training teachers to promote activities with students, specifically children between the ages of 6 and 10 years old, at class and with parents/guardians to increase literacy regarding environmental tobacco smoke (ETS) exposure and thereby reduce children's exposure to this agent.

After a commitment with the family, a sticker is offered to be placed in the vehicle to signal the commitment not to use tobacco and tobacco products inside private vehicles.

In the 2021/2022 academic year, a pilot phase was implemented in the school context, in six clusters of first-cycle schools in the City of Valongo that agreed to participate in the project.

Objectives of this Research Project

The objective of this research project was to evaluate the pilot project "NESTE CARRO NÃO SE FUMA" conducted during the academic year 2021/2022 and identify necessary improvements.

General Methodology

Evaluation of the Pilot Project carried out during the academic year 2021/2022

In July 2021, six public schools in the City of Valongo expressed interest in participating in the "NESTE CARRO NÃO SE FUMA" project. The geographic distribution of the schools that agreed to participate covers just a small part of population area of City of Valongo, as can be observed in **Figure 1**.

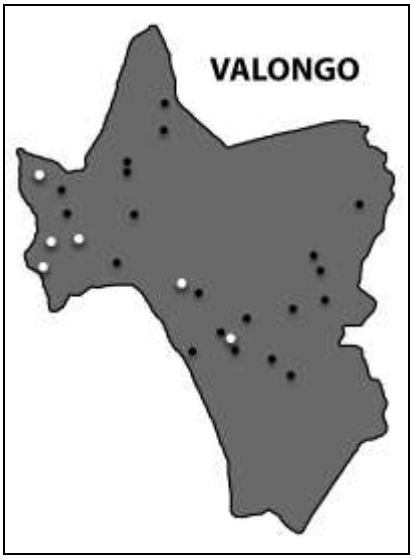

Figure 1- Geographic distribution of the schools that participated in the pilot project.
The white dots represent the first-cycle schools that participated in the project, and the black dots represent the remaining schools in the municipality that did not participate in the project.

In Portugal schools are organized as cluster of schools, each school cluster has a health coordinator who served as the link of connection the project implementation team (composed of the CRI do Porto Oriental, Valongo Municipal Council, and ISPUP) and the teachers at the 1st cycle schools.

To implement the project, the first step was to contact the director of each school cluster and respective health coordinator to present the project. After approval from the director and organizing with the health coordinator, training sessions were conducted with the teachers with teachers who expressed interest in learning about the project.

The proposed session, facilitated by the project implementation team, lasted for 3 hours and was conducted in an online format due to the pandemic situation. The training section was divided into three parts. The first part consisted of an explanatory session where theoretical content about the harmful effects of environmental exposure to tobacco smoke was presented. In the second part of the session the project itself was presented. Finally, there was a third part dedicated to discussion and clarification of doubts and suggestions. In this session it is reinforced that the

project aims to avoid secondhand and thirdhand exposure to tobacco and not to promote smoking cessation.
After the training session on the project, the teacher of each class connected with parents/guardians, presenting the project and inviting them to sign a commitment not to use tobacco and tobacco products in the family vehicle(s) or those the child usually uses and were asked to carry out activities with the students and parents/guardians throughout the year.
Since the teachers are responsible for implementing the project with the students, they will be the target population for the pilot study evaluation.

Heterogeneity in project implementation was observed among the different schools, with only two delivering seals and signed contracts. The description of the pilot project implementation in the participating school is presented in **Table 1.**
Based on the implementation description, two groups were considered: a) **partial implementation** (isolated occasional activities, not contextualized) or **organized according to the extracurricular activities plan** (when they describe the application of activities organized to achieve the project's objectives, even if not fully implemented); b) **no implementation** (if no implemented activities are described).

Table 1- Description of the work between participating schools (n=6)

School	Level of implementation	
1	There was no specific dedicated work for this project.	b)
2	The topic was addressed with the 3rd grade during commemorative events and also within the scope of the curriculum program.	a)
3	No information on the level of implementation.	-
4	Some activities were carried out, and 20 Certificates and 20 Seals were delivered.	a)
5	Some activities were organized, and 14 Certificates and 14 Seals were delivered.	a)
6	No information on the level of implementation.	-

Study Design and Participants

For the evaluation of the pilot study, a qualitative multimethod approach was used, including semi-structured qualitative interviews and a focus group with teachers who attended the initial training of the "NESTE CARRO NÃO SE FUMA" project.
A total of 68 individuals participated in the training, including health coordinators, non-teaching staff, and teachers. Only the teachers who would be responsible for the leadership and implementation of the activities were eligible among the individuals who participated in the training. Health coordinators were excluded from this sample, despite attending the training,

their role is not the implementation of the project, and therefore, they could not provide firsthand information about the barriers and facilitators of its implementation.
Therefore, out of the 68 individuals, 6 were coordinators, 11 were non-teaching staff, and thus only 51 were eligible and invited to participate.

So, to begin with, all health coordinators were contacted by the project implementation team, by phone or email, in order to invite the teachers of their schools who attended the training for the "NESTE CARRO NÃO SE FUMA" to participate in the individual semi-structured qualitative interviews.

All teachers who volunteered were subsequently contacted via email by the research team of the study. Out of the 51 eligible teachers, 12 accepted to participate.
In the case of the other 39 eligible teachers, 3 expressed interest to their coordinator in participating in the interviews but later never responded when contacted by the research team of the project. Regarding the remaining 36 teachers, we did not receive any information from their respective coordinators.

In one of the schools, individual interviews as originally planned were not possible. Therefore, the project was adapted to include a focus group with those teachers as an alternative.

Annex I present the interview guide and **Annex II** presents the focus group guide.

Ethics

At all stages, current ethical guidelines in research were ensured. Throughout the project, the protection of collected data was guaranteed, ensuring the confidentiality of participants in all materials collected during different stages of the research. All personally identifiable information was appropriately coded in a database accessible solely to the researcher.

The recruitment and data collection process began only after approval from the Ethics Committee of the Institute of Public Health, University of Porto (approval number CE22226). Data were collected, processed, and analysed in strict accordance with European privacy and data security law, the GDPR (General Data Protection Regulation) (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, repealing Directive 95/46/EC), and other applicable laws on personal data processing.

Legally, ISPUP (Institute of Public Health of the University of Porto) is responsible for data processing regarding personal data processed within this study. The collected information was used exclusively to fulfill the described objectives, and no personal information was disclosed.
Informed consent was obtained from the participants before conducting the interviews. Eligible teachers were provided with detailed information about the objectives of the study and the interview model through email communication. Additionally, they were requested to carefully read and sign a consent form, indicating their willingness to participate in the research project.

The consent form served to ensure that the teachers understood the purpose of the study, their role in it, and to obtain their voluntary agreement to take part in the interviews.
Upon receiving the signed consent forms, the research team proceeded to conduct the interviews with those teachers who had agreed to participate. The consent process was an essential step in the research to protect the participants' rights and ensure that they were fully informed and willing participants in the study.

As the project involves different formats of teachers' participation in the study, different types of informed consent were required.

- Teachers who participated in semi-structured qualitative interviews: In this case, teachers agreed to participate in individual interviews, where open-ended and exploratory questions were asked on a specific topic.
- Teachers who participated in the focus group: In the case of the focus group, teachers agreed to participate in a group discussion, moderated by a facilitator.

In summary, the difference lies in the format of teachers' participation, with individual interviews for personalized exploration and the focus group for group discussion with multiple participants.

Participation in the interviews or in the focus group was only possible after signing an informed consent form, explaining that participation was voluntary and that there were no repercussions for non-participation. They sent the signed consent form back via email. During the interview, it

was read again to the participants, and they provided their verbal consent to proceed with the interview.

A contact was provided to the participants for clarification of any unanswered questions or any other issues that arose during the study.

The researchers declare no conflicts of interest.

The manuscript

"NESTE CARRO NÃO SE FUMA": Evaluation and adaptation of a project promoting smoke-free environments implemented in Primary Schools.

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Abstract

Introduction

Evidence shows that children are a particularly vulnerable population to environmental tobacco smoke exposure and this exposure occurs more frequently in in their own homes and cars.
In 2019, the pilot of the project "NESTE CARRO NÃO SE FUMA" (NO SMOKING IN THIS CAR) was launched, aiming to reduce involuntary exposure to tobacco and tobacco products by promoting their non-use inside private vehicles.

Objective
The objective of this study was to evaluate the pilot project " NESTE CARRO NÃO SE FUMA" conducted during the academic year 2021/2022, in order to identify the necessary improvements to enhance the reduction of children's exposure to second- and third-hand smoke.

Methodology
For the evaluation of the pilot study, a qualitative multimethod approach was used, including semi-structured qualitative interviews and focus group with teachers who attended the initial training of the "NESTE CARRO NÃO SE FUMA" project. Six interviews and one focus group (consisting of six teachers from the same school) were conducted, resulting in a total of twelve participants.

Results
The study utilized a qualitative multimethod approach to analyze the findings, which were categorized into five themes, categories and subcategories. The purpose of the "NESTE CARRO NÃO SE FUMA" project was to raise awareness among children and parents/guardians about tobacco smoke exposure risks and promote not smoking inside vehicles. Teacher training was effective in raising awareness, but participants suggested exploring the topics further. Some teachers had prior knowledge, while others learned new concepts. The organizational component had mixed opinions on the provided materials. In-person and online training formats had advantages and disadvantages. The implementation of the project varied, with occasional activities in most classes and regular integration in the classes of one school. Barriers included lack of monitoring, timing issues, teacher time availability, and limited parental involvement. Strategies to overcome barriers were suggested. Improvement suggestions included virtual and interactive activities, increased monitoring, create measures to involve parents/guardians more in the project, conducting training closer to the implementation period, structuring a proposed activity calendar instead of leaving implementation at the discretion of the teachers, and revised evaluation processes. The study's qualitative multimethod approach provided valuable insights for refining and improving the project in the future.

Conclusions
This study shows the potential of the project to raise awareness about the risks of tobacco smoke exposure. However, certain areas require improvement to enhance its effectiveness so that the project can better achieve its objectives and contribute to promoting a smoke-free environment for children and their families.

Introduction

The harmful effects associated with tobacco consumption are widely known, and this knowledge has supported the efforts that have been carried out to promote the reduction of consumption of this substance. (1)
However, the health risks associated with tobacco exposure are not limited to effects on the smoker. (2) Environmental exposure to smoke from Tobacco includes second-hand smoke, third-hand smoking and the aerosolization of products from electronic cigarettes. (3) Second-hand smoke refers to involuntary exposure to smoke of tobacco caused by the flow of smoke produced by the lit cigarette and by the smoker when exhale. (3)
When a smoker uses tobacco, these compounds are deposited on surfaces such as fabric-covered sofas, chairs, carpets, child seats, and upholstered seats, and contact with these surfaces can result in dermal absorption, inhalation, and ingestion of tobacco smoke metabolites and particles. (3) Thirdhand smoke corresponds to the exposure to the metabolites and particles that accumulate on surfaces after cigarette use. (3)

It is estimated that globally, approximately one-third of the population aged 15 years and older smoke, and one-third of the adult population and 40% of children are regularly exposed to tobacco smoke passively. (4) In the United States of America, there is approximately 58 million non-smokers that are exposed to second-hand smoke, considering all age groups. (3)
According to data obtained from the National Health and Nutrition Examination Survey (NHANES), an American study, between 1999 and 2012, there was a prevalence of children's exposure to environmental tobacco smoke ranging from 27% to 44%. (5, 6)

According to data obtained in Portugal in 2010 from the National Asthma Survey, the exposure to environmental tobacco smoke (ETS), defined in this study as exposure to at least one smoker at home among individuals aged 3 to 18 years, was 36.7%. (1, 7) A second national study, commissioned by the Directorate-General of Health and conducted in 2016 by Precioso et al., in a national sample of 2396 children aged 0 to 10 years, showed a prevalence of ETS exposure of 18.4% (14.4% at home, 10.1% in the car, and 5.4% with dual exposure). (1, 8)

Risks associated with exposure to environmental tobacco smoke

Although passive smoking is considered less harmful than active smoking, its impact is still significant, especially because it often occurs without people, whether adults or children, being aware of this exposure and therefore unable to protect themselves.

Environmental exposure to tobacco smoke constituents during the prenatal, childhood, and adolescent periods contributes to a myriad of adverse health effects in the pediatric population. (3) Exposure of children to secondhand smoke can reduce lung function and impair lung development, increasing the risk of bronchitis, pneumonia, and other respiratory infections. This exposure also increases the risk of middle ear infections. For children with asthma, exposure to secondhand smoke can intensify symptoms of the disease, resulting in more frequent and severe asthma attacks than those who are not exposed. (9,10) In childhood, there is also physiological immaturity of the circulatory, respiratory, immune, and neurological systems, making this

population more susceptible to tobacco exposure and, therefore, at greater risk of morbidity and mortality. (11)

Importance of intervening at School

In schools, promoting health education also allows for the creation of environments that facilitate healthy choices, stimulating critical thinking for the exercise of active citizenship. (12) According to scientific evidence, tobacco prevention in school settings, with a focus on families, is effective and interventions targeting parents are recommended in the document developed by WHO and UN, to promote standards and guidelines for tobacco and drug prevention at the international level. (13,14)

The "NESTE CARRO NÃO SE FUMA" Project

The project emerged in 2019 as part of the Municipal Health Plan of the City of Valongo (15) The project's specific objective is to reduce involuntary exposure to tobacco and tobacco products by promoting non-use of these products inside private vehicles.

The project "NESTE CARRO NÃO SE FUMA" strategy involves training teachers to promote activities with students, specifically children between the ages of 6 and 10 years old, and parents/guardians to increase literacy regarding environmental tobacco smoke (ETS) exposure and thereby reduce children's exposure to this agent.

In the 2021/2022 academic year, a pilot phase was implemented in the school context, in six clusters of first-cycle schools in the City of Valongo that agreed to participate in the project.

Methodology

Evaluation of the Pilot Project carried out during the academic year 2021/2022

In July 2021, six public schools in the City of Valongo expressed interest in participating in the "NESTE CARRO NÃO SE FUMA" project.

In Portugal schools are organized as cluster of schools, each school cluster has a health coordinator who served as the link of connection the project implementation team (composed of the CRI do Porto Oriental, Valongo Municipal Council, and ISPUP) and the teachers at the 1st cycle schools.

To implement the project, the first step was to contact the director of each school cluster and respective health coordinator to present the project. After approval from the director and organizing with the health coordinator, training sessions were conducted with the teachers with teachers who expressed interest in learning about the project.

The proposed session, facilitated by the project implementation team, lasted for 3 hours and was conducted in an online format due to the pandemic situation. The training section was divided into three parts. The first part consisted of an explanatory session where theoretical content about the harmful effects of environmental exposure to tobacco smoke was presented. In the second part of the session the project itself was presented. Finally, there was a third part dedicated to discussion and clarification of doubts and suggestions. In this session it is reinforced that the project aims to avoid secondhand and thirdhand exposure to tobacco and not to promote smoking cessation.

After the training session on the project, the teacher of each class connected with parents/guardians, presenting the project and inviting them to sign a commitment not to use tobacco and tobacco products in the family vehicle(s) or those the child usually uses and were asked to carry out activities with the students and parents/guardians throughout the year.

Since the teachers are responsible for implementing the project with the students, they will be the target population for the pilot study evaluation.

Heterogeneity in project implementation was observed among the different schools, with only two delivering seals and signed contracts. The description of the pilot project implementation in the participating school is presented in **Table 1.**

Based on the implementation description, two groups were considered: a) **partial implementation** (isolated occasional activities, not contextualized) or **organized according to the extracurricular activities plan** (when they describe the application of activities organized to achieve the project's objectives, even if not fully implemented); b) **no implementation** (if no implemented activities are described).

Table 1- Description of the work between participating schools (n=6)

School	Level of implementation	
1	There was no specific dedicated work for this project.	b)
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4	Some activities were carried out, and 20 Certificates and 20 Seals were delivered.	a)
5	Some activities were organized, and 14 Certificates and 14 Seals were delivered.	a)
6	No information on the level of implementation.	-

Study Design and Participants

The evaluation of the pilot study utilized a qualitative multimethod approach, involving semi-structured qualitative interviews and a focus group with teachers who attended the initial training of the "NESTE CARRO NÃO SE FUMA" project. A total of 68 individuals participated in the training, which included health coordinators, non-teaching staff, and teachers. However, only the teachers responsible for leading and implementing the activities were eligible for the interviews. Health coordinators were excluded as their role did not involve project implementation.

Out of the 68 participants, 6 were coordinators, 11 were non-teaching staff, leaving 51 eligible teachers invited to participate. The health coordinators were contacted to invite the eligible teachers for individual interviews.

So, to begin with, all health coordinators were contacted by the project implementation team, by phone or email, in order to invite the teachers of their schools who attended the training for the "NESTE CARRO NÃO SE FUMA" to participate in the individual semi-structured qualitative interviews.

All teachers who volunteered were subsequently contacted via email by the research team of the study. Out of the 51 eligible teachers, 12 accepted to participate. In the case of the other 39 eligible teachers, 3 expressed interest to their coordinator in participating in the interviews but later never responded when contacted by the research team of the project. Regarding the remaining 36 teachers, we did not receive any information from their respective coordinators.

In one of the schools, individual interviews as originally planned were not possible. Therefore, the project was adapted to include a focus group with those teachers as an alternative.

Data Collection

The interview and focus group guides were constructed based on the specific objectives of the project, including the following topics: perception of the quality and interest in the training and provided materials, strategies used to implement the activities, and facilitators and barriers identified by teachers regarding the project's implementation. In the case of teachers who did not initiate the implementation, the focus was on identifying the reasons for non-implementation. **Table 2** presents the main topics covered in the interviews and focus group, considering the two levels of intervention.

Table 2 - Interviews/Focus Group Main Topics

The project " NESTE CARRO NÃO SE FUMA"
1.What do you think is the main purpose of the project?
Training
2.How did participating in the training allow you to gain new knowledge? 3.In your opinion, what should be improved in this training? 4.And what is your opinion regarding the materials provided? 5.After the training, what activities did you carry out with your students or parents/guardians related to this topic? (Note: If no or very few activities are described - isolated activities without context - **proceed to question 6.** If the project was fully or partially implemented, **move on to question 7**.)
6. Isolated activities without context:
6.1. Barriers 6.1.1. [NO ACTIVITY] Based on your experience, what were the main reasons that hindered the implementation of the planned activities? 6.1.2. [ISOLATED ACTIVITY] Based on your experience, what were the main reasons that hindered the implementation of more activities? 6.2. Facilitators 6.2.1. What conditions do you consider essential to be able to fully implement this project? 6.2.2. Suggestions
7. Full or partial implementation of the project
7.1. Facilitators 7.1.1. What reasons motivated you to implement the project? 7.1.2. What activities did you carry out as part of this project? 7.1.3. What conditions allowed or facilitated the implementation of these activities? 7.1.4. What were the main difficulties you faced? What strategies did you use to minimize the difficulties encountered? 7.1.5. What conditions do you consider essential to be able to fully implement this project? 7.2. Barriers 7.2.1. Based on your experience, what were the main reasons that hindered the implementation of other activities? 7.2.2. Suggestions

The interviews and focus group were conducted by the same researcher and took place online by zoom, according to the participants' availability. After explaining the purpose of the interview or focus group and obtaining signed informed consent for data collection and analysis, the sessions were recorded (audio) to enable transcription. As a complement to verbal consent, the informed consent must have been sent to them via email.

A code was assigned to each participant to ensure data confidentiality. The interviews were fully transcribed, and after transcription, the audio files were destroyed. All names mentioned in the interviews and focus group were replaced by alias.

Content Analysis

Data collection and analysis were conducted simultaneously to verify theoretical saturation of the collected information. Thematic content analysis was performed following the protocol established by Braun and Clarke (2006). In the initial phase, quotes with similar meanings were inductively synthesized into categories based on the teachers' perspectives on each topic in the interview guide. Subsequently, utilizing the researcher's theoretical sensitivity and referring to relevant literature on the subject, categories and their subcategories were grouped into broader themes. The most illustrative quotes from each category were selected to be presented in the results. The analysis of qualitative data was conducted using Microsoft Excel® software.

Results

Qualitative Multimethod Approach

The obtained results were organized into five themes (The Project, Teacher Training, Level of Implementation of the Project, Factors influencing implementation and Suggestions for Improvement), disaggregated into categories and subcategories as presented in **Table 3**.

Table 3 - Categorization of content analysis (Codebook)

Themes	Categories	Subcategories
A. The Project	1.Purpose and Objectives	a. Avoidance of Exposure
		b. Smoking Cessation
B. Teacher Training	1.Theoretical Components	a. Content
		b. No knowledge acquisition
		c. Knowledge acquisition
	2.Organizational Components	a. Material
		b. Format
		c. Time
C. Level of Implementation of the Project	1.Implementation	a. Isolated occasional activities
		b. Activities according to extracurricular activity schedule
		c. Regularity of activities
	2.No implementation	
D. Factors influencing implementation	1. Facilitators	a. Activities Workbook
		b. Relevance of the Project
		c. Student Engagement
		d. Parents
	2. Barriers	a. Project Monitoring
		b. Time Interval between Training and Project Implementation
		c. Availability
		d. Stickers
		e. Parents Involvement
		f. Motivation
		g. Activities Workbook
		h. Pandemic
		i.Strategies Adopted to Overcome Barriers
E. Suggestions for Improvement	1. Activities Workbook	
	2. Project Monitoring	
	3. Parents Involvement	
	4.Training	
	5. Scheduling	
	6. Process Evaluation	

The majority of the participants, when asked about the **purpose and objectives** of the "NESTE CARRO NÃO SE FUMA" project, mentioned that "the main purpose is to raise awareness among children and parents about the risks associated with tobacco smoke exposure and aims to promote awareness about not smoking inside vehicles." (Professor #3) It was also considered, by a minority of the participants, that the project aimed to promote smoking cessation.

Table 4 - The Project (A): Illustrative quotations of the interview results.

A. The Project (reflecting participant's opinions about the "NESTE CARRO NÃO SE FUMA" project)	
1.	Purpose and Objectives
1.a	"The main purpose is to raise awareness among children and parents about the risks associated with tobacco smoke exposure. We also aim to promote awareness about not smoking inside vehicles." (Professor #3) "To raise awareness among children and parents about the harmful effects of tobacco and smoking in enclosed spaces." (Professor #8)
1.b	"I think the purpose of the project is very good because we have children from preschool age already learning about the harmful effects of smoking and the advantages of not smoking. I believe it is important for us to include this message in our curriculum and teachings." (Professor #9)

From the **theoretical components** of teacher training, considerations emerged, as described next, regarding the topics covered and the possibility of acquiring knowledge. The prevailing opinion was that the contents addressed in the training fulfilled the purpose of raising awareness among teachers, and it was generally mentioned by the participants that "the topics [of the training] should be further explored" (Professor #1).

Several teachers believed they already had sufficient background information in the field; however, they also acknowledged the lack of memory regarding the knowledge acquired during the training:

> "I don't remember it [teacher's training] very well. (…) Specifically saying what I learned, I'm not sure, I don't remember." (Professor #9)

> "I believe I already had sufficient prior knowledge in the field before the training. However, it was still interesting and informative." (Professor #10)

On the other hand, in some interviews, it was mentioned that the training stated some prior knowledge about certain concepts and allowed learning about the new concept of third-hand smoke. "That was the new learning I gained from the training." (Professor #3) It was also mentioned that the training enabled them to become "more aware of certain aspects" and "was interesting and it broadened my perspective." (Professor #11)

> "I don't remember it [teacher's training] very well. (…) Specifically saying what I learned, I'm not sure, I don't remember." (Professor #9)

> "I believe I already had sufficient prior knowledge in the field before the training. However, it was still interesting and informative." (Professor #10)

From the **organizational component of the training,** two groups of opinions emerged regarding presented and available material. It was mentioned that, "considering the age group they work with, they encountered some difficulty in using the provided materials as they were in the classroom context." The activities "need to be more playful in nature, such as coloring pictures depicting individuals in enclosed spaces." (Professor #1)

Others mentioned that the materials shown in the training were not made available as they were promised to be.

The majority of the interviewees mentioned that in-person training could bring advantages for learning and dynamics among participants ("I feel that I learn more in that format." - Professor #11; "In-person sessions do provide more interaction and a better dynamic among participants." - Professor #12). Nevertheless, they also note that being online allowed for greater participation due to the convenience of being able to be done anywhere and was easier to organize with personal lives.

Regarding the duration of the training, some teachers considered that "what is stipulated seems good to me" (Professor #3), while others believed that the training could have more time to "allow for a more comprehensive examination of the content." (Professor #1).

Table 5 - The Teacher Training (B): Illustrative quotations of the interview results.

B. Teacher Training (participant's considerations regarding the initial formation of the project provided to them)	
1.	Theoretical Components
1.a	"In terms of content, I think it was in line with expectations. Perhaps these topics should be further explored (…)." (Professor #1) "(…) I remember finding it [the content of teacher's training] interesting to hear about the studies that have been conducted on why smoking indoors is not allowed. Concrete evidence on the number of people exposed and at risk was particularly compelling." (Professor #12)
1.b	"I don't remember it [teacher's training] very well. But here's the thing, we gather bits and pieces of knowledge from here and there, so I end up passing on some of the things I learn to my students. Sometimes we integrate the new concepts with the ones we already have. Specifically saying what I learned, I'm not sure, I don't remember." (Professor #9) "I believe I already had sufficient prior knowledge in the field before the training. However, it was still interesting and informative." (Professor #10)
1.c	"(…) I already had some knowledge about certain concepts, but, for example, I was not familiar with the concept of third-hand smoke, which was new to me. We often hear about second-hand smoke and the distinction between active and passive smokers. That was the new learning I gained from the training." (Professor #3) "The training was useful, as it made me more aware of certain aspects that I might have overlooked before. It was interesting and it broadened my perspective." (Professor #11)
2.	Organizational Components
2.a	"Considering the age group [students between 6 and 10 years old] we work with, we encountered some difficulty in using the provided materials as they were in the classroom context. We had to make some adaptations. (…) The activities need to be more playful in nature, such as coloring pictures depicting individuals in enclosed spaces. (…) Implementing the activities but applying them directly as they were provided to us, proved to be quite challenging." (Professor #1) "(…) I remember receiving a sticker to put on my car, and since I don't smoke, I placed the sticker. However, I had the impression that we would receive more stickers to give to parents, but they didn't reach us. (…)" (Professor #2) "Regarding that [the materials provided], I think the actions were appropriate. There was still the freedom to adapt them to the classroom context, and I felt that it was suitable. I didn't encounter any difficulties in that

	regard.” (Professor #3)
2.b	“I would have preferred it to be in person as well. I feel that I learn more in that format.” (Professor #11) “In-person sessions do provide more interaction and a better dynamic among participants. However, the online format allows for more people to attend and is easier to organize with personal lives. For example, it makes a significant difference for me. It's much easier to gather online, and it can be done at any time.” (Professor #12)
2.c	“(...) the training should have more hours to allow for a more comprehensive examination of the content.” (Professor #1) “What is stipulated seems good to me. (…)” (Professor #3)

The **implementation mode of the project** was highly heterogeneous. The majority of the interviewees described occasional isolated activities that were carried out when opportunities arose, either in the classroom with the students or during commemorative events in the presence of the parents:

> “We did the crossword puzzle, the contract on Family Day, made some posters with eva paper at the school gate on No Smoking Day, watched some videos, conducted the awareness-raising action for parents about the project organization and to discuss some concepts, and well, some activities that were proposed by you, by the local council.” (Professor #3)

> “I remember taking from there [the activity book] the ones that I thought were most appropriate at the time.” (Professor #10)

The results demonstrated that in one school, it was possible to adapt the "NESTE CARRO NÃO SE FUMA" project to the extracurricular plan of the classes and work on the project regularly with all the classes. The increased involvement of the coordinator, not just the teacher, led to achieving this outcome:

> “Usually, as a coordinator and assistant teacher, I work with all the classes, and in that sense, some of my colleagues asked me to use that time to work on the project with the classes, and so I did. Whenever I went to the classes, I addressed the topic, trying to do those activities. It worked because I knew all the children, so I could adapt them to the classes.” (Professor #1)

A small number of interviewees mentioned that it was not possible to implement the project, either due to institutional reasons such as the mobility of the teacher in question ("I attended the training and then changed schools in September" - Professor #8) or due to the influence of the pandemic on the dynamics of schools ("I showed the videos and not much else. Last year there was still a lot of COVID, and that greatly influenced everything." - Professor #12).

Table 6 - Level of Implementation of the Project (C): Illustrative quotations of the interview results.

C. Level of Implementation of the Project (regarding the project in each participant's respective schools)	
1. Implementation	
1.a	"We did the crossword puzzle, the contract on Family Day, made some posters with eva paper at the school gate on No Smoking Day, watched some videos, conducted the awareness-raising action for parents about the project organization and to discuss some concepts, and well, some activities that were proposed by you, by the local council." (Professor #3) "I remember taking from there [the activity book] the ones that I thought were most appropriate at the time. I remember doing word search puzzles. I also did one where there were problem situations and they had to think as a group about what they would do if they were in that situation. Oh, and I also remember doing a dynamics activity about the sticker, and they actually put it on their parents' cars because I would see them on the parking lot later on. But honestly, I don't remember anything else." (Professor #10)
1.b	"In the first cycle, the activities are more interactive and playful, using drawings and paintings, and it was mainly in this context that we tried to promote the project. In the activity book, you had some activities to do with parents that we were able to implement, but only with the 4th-grade students. (…) In addition to these activities, we sent some posters that parents, along with their children, had to identify the incorrect behavior in the images. (…) They [the students] were the ones who explained to their parents that the image did not represent correct behavior. (…) We also did an activity to wrap up the project at school, in which some parents and grandparents participated. We organized a series of activities and even showed a movie that was part of your project, the one about the past, the story of the grandfather, which the parents found quite amusing." (Professor #1)
1.c	"Usually, as a coordinator and assistant teacher, I work with all the classes, and in that sense, some of my colleagues asked me to use that time to work on the project with the classes, and so I did. Whenever I went to the classes, I addressed the topic, trying to do those activities. It worked because I knew all the children, so I could adapt them to the classes." (Professor #1) "(…) Especially during commemorations such as No Smoking Day, Family Day, among others. We also did crosswords with them or other simple activities. I can't say that it was a project that had a regular schedule, like every two weeks, no, it was whenever there was an opportunity. (…)" (Professor #3)
2. No implementation	
	"What happened to me in this project is that I attended the training and then changed schools in September. So, it didn't have any follow-up afterwards. But raising awareness is something that can be done. I think the project is useful." (Professor #8) "(…) I showed the videos and not much else. Last year there was still a lot of COVID, and that greatly influenced everything." (Professor #12)

All the teachers mentioned **facilitating factors and barriers** that influenced the implementation of the project in their classes and schools.

The following factors were considered by the participants **as facilitators** for the implementation of the project with a high degree of importance: the activities workbook ("the materials provided by you made the project approach much easier" - Professor #3), the relevance of the project ("we found it interesting because it aligned with what we had been discussing among ourselves, about the children coming to school smelling like tobacco" - Professor #1), student engagement ("another facilitator was my class" - Professor #3), and the involvement of parents in the project

("we had an occasion here at the school that I think was very good and appealed to the parents' sense of responsibility" - Professor #10).

The interviewees revealed equally relevant **barriers** to the implementation of the project. Most of the interviewees highlighted the lack of project monitoring as a barrier. "It would be helpful if someone provided us with proposals for us to develop [with a timeline] (...) and teachers can provide feedback on what is being worked on" (Professor #11).

Most of them also mentioned that the long-time interval between training and project implementation hindered the progression of the proposed activities:

> "I think the biggest barrier, (...) was the timing issue. We were in June/July, and then the holidays came, followed by a reorganization of classes. Teacher Paula even left to go to another school, which led to some forgetfulness in implementing certain tasks". (Professor #9)

Other barriers were also mentioned by participants, including: the availability of teachers throughout the school year to implement the project ("we have so many requests that it becomes impossible to do everything" - Professor #2), inconsistent access to stickers ("We talk about the sticker and its importance but then we didn't have access to them to give to the parents. As a result, there was less visibility and participation from the parents" - Professor #3) and the lack of parental involvement ("It can be challenging to make them reflect on what was said. However, I do know that we had two parents who actively changed their attitudes. But there is always room for improvement" - Professor #3).

Another emerging barrier was the lack of motivation among teachers, students, and parents ("Teachers to actively participate in projects like this, as they already have various other projects in the school to coordinate alongside the curriculum. Balancing multiple projects with the pedagogical plan can be difficult." – Professor #1).

The activities workbook was also mentioned by some participants as a barrier due to the lack of alignment of the proposed activities with the students or the implementation site. "There wasn't a common thread or continuity" (Professor #11).

The influence of the COVID-19 pandemic on the project's progress also appeared as a barrier due to curriculum delays, parents' limited access to the school, and student absences due to isolation. "It's an interesting project, but as I mentioned earlier, it wasn't feasible in any other way at that time" (Professor #2).

However, strategies were mentioned to overcome the barriers encountered:

> "Usually, as a coordinator and assistant teacher, I work with all the classes, and in that sense, some of my colleagues asked me to use that time to work on the project with the classes, and so I did. Whenever I went to the classes, I addressed the theme, trying to do the activities" (Professor #1).

"(...) commemorative dates like No Smoking Day, Family Day, among others. (...) It was more opportunistic, whenever there was an opportunity" (Professor #3).

Table 7 – Factors Influencing Implementation (D): Illustrative quotations of the interview results.

D. Factors influencing implementation (that influenced how the project implementation took place)
1. Facilitators
"The materials provided by you made the project approach much easier. (…)" (Professor #3)
"We found it interesting because it aligned with what we had been discussing among ourselves, about the children coming to school smelling like tobacco. In our school, we have a large group of underprivileged students, and we know that their parents constantly smoke in enclosed spaces. Therefore, we saw this project as an opportunity to reach out to families and try to change this habit. That is, not smoking in enclosed spaces in this case." (Professor #1)
"I consider another facilitator was my class, which works very well, and that also makes all the difference. And children are a reflection of their parents." (Professor #3)
"The interaction with parents. We had an occasion here at the school that I think was very good and appealed to the parents' sense of responsibility." (Professor #10)
2. Barriers
"It would be helpful if someone provided us with proposals for us to develop [with a timeline]. It's not that teachers don't know how to approach the topic if necessary, but if it's a project, we expect to be given proposals. "This month we will work on this, this month we will work on that," and teachers can provide feedback on what is being worked on. We were expecting a doctor, pulmonologist, or someone who knows more about the subject to bring videos or images, things different from what a teacher does." (Professor #11)
"We have so many requests that it becomes impossible to do everything." (Professor #2)
"One thing that I also found important was to provide stickers for the parents. That would be a way to involve them. Because in the end, we talk about the sticker and its importance, but then we didn't have access to them to give to the parents. As a result, there was less visibility and participation from the parents." (Professor #3)
"It [educate the parents] can be challenging to make them reflect on what was said. However, I do know that we had two parents who actively changed their attitudes. But there is always room for improvement." (Professor #3)
"Indeed, it can be challenging for some teachers to actively participate in projects like this, as they already have various other projects in the school to coordinate alongside the curriculum. Balancing multiple projects with the pedagogical plan can be difficult." (Professor #1)
"Yes, but then they didn't send enough materials for each student. If I remember correctly, they sent one notebook for each teacher with just one example of a sticker inside. Well, with only one sticker, we couldn't do much. And besides, we had to work on the subjects and then give the sticker to the children. There wasn't a common thread or continuity." (Professor #11)
"I think the biggest barrier, (…), was the timing issue. We were in June/July, and then the holidays came, followed by a reorganization of classes. Teacher Paula even left to go to another school, which led to some forgetfulness in implementing certain tasks." (Professor #9)
"It's an interesting project, but as I mentioned earlier, it wasn't feasible in any other way at that time." (Professor #2)
"Usually, as a coordinator and assistant teacher, I work with all the classes, and in that sense, some of my colleagues asked me to use that time to work on the project with the classes, and so I did. Whenever I went to the classes, I addressed the theme, trying to do the activities. (…)" (Professor #1) "(…) commemorative dates like No Smoking Day, Family Day, among others. (…) It was more opportunistic, whenever there was an opportunity." (Professor #3)

Lastly, the interviewees made several **improvement suggestions** for the future of the project.

The most prominent improvement suggestion was the proposal of virtual and more interactive activities in the activities workbook:

> "Virtual activities. That would also be very important. For example, in my class, each student has a computer on their desk. (...) So in this class, they can definitely do activities of that kind. Provide them with video links for them to watch in class" (Professor #3).

> "I think it would be more interactive if more digital materials were used" (Professor #6).

A significant number of teachers identified the need for increased project monitoring by the project promoter:

> "For the project to be more fruitful, there should be closer monitoring and involvement from the project's responsible members. It would be beneficial if, after each activity and throughout the year, they would inquire about the progress of the project, remind us of the next activity to be done, and provide guidance throughout the process" (Professor #10).

Increased parental involvement in the project also emerged as a suggested improvement, proposing "an activity where parents come to participate alongside their children, but there could also be a separate activity specifically aimed at adults, scheduled after working hours" (Professor #11). It was mentioned that "by coming to the school, parents truly become aware of the problem" (Professor #1).

Participants also suggested that the training for teachers be conducted closer to the time when the project will be implemented (Professor #10). Others suggested the existence of a proposed agenda of activities throughout the school year: "Yes, it [a schedule] would be helpful. It would provide better guidance and direction. Time is limited, but at least we would know which activities we could prioritize in the little time we have" (Professor #12).

Changes in the evaluation process were also suggested by participants, “preferably conducted shortly after the project, with only a short time interval elapsed” (Professor #10), and that "someone should go to the school to gather feedback and present a questionnaire" (Professor #11).

Table 8 - Suggestions for Improvement (E): Illustrative quotations of the interview results.

E. Suggestions for Improvement	
1. Activities Workbook	
	“What I also suggest is that the training for teachers be conducted closer to the time when the project will be implemented. Instead of having it in July, for example, it could be scheduled for September so that everything is fresher in our minds.” (Professor #10)
2. Project Monitoring	
	“Yes, it [a schedule] would be helpful. It would provide better guidance and direction. Time is limited, but at least we would know which activities we could prioritize in the little time we have. (…)” (Professor #12)
3. Parents Involvement	
	“Virtual activities. That would also be very important. For example, in my class, each student has a computer on their desk. (…) So in this class, they can definitely do activities of that kind. Provide them with video links for

	them to watch in class." (Professor #3) "I think it would be more interactive if more digital materials were used." (Professor #6)
4. Training	
	"I think these interviews are very positive, but it would be better if they were conducted sooner, with only a short time interval elapsed after the project implementation." (Professor # 10) "To evaluate the activities, someone should go to the school to gather feedback and present a questionnaire. For me, it cannot be a situation where the project is launched and then no follow-up is given." (Professor #11)
5. Scheduling	
	"(...) For the project to be more fruitful, there should be closer monitoring and involvement from the project's responsible members. It would be beneficial if, after each activity and throughout the year, they would inquire about the progress of the project, remind us of the next activity to be done, and provide guidance throughout the process." (Professor #10) "I believe it would be more interesting if someone who is actively facilitating the project came to the school to talk about the project or engage in activities. It would capture the students' attention and interest because it would be something new and exciting for them." (Professor #12) "(…) I believe that having project members here to present the project could have a greater impact." (Professor #2)
6. Process Evaluation	
	"Parents become more responsible and engaged when they are part of this project. Last year, we could only have them involved at the end of the project. On that day, I witnessed such a high level of motivation and dedication from the parents that I thought if that continued, it would certainly yield more results. (…) The parents felt involved. That's when they saw the significance of the project itself. What I would like to emphasize is that the project becomes much more meaningful if we can involve parents in the school context, having more activities with them at school rather than at home. By coming to the school, parents truly become aware of the problem." (Professor #1) "(...)There could be an activity where parents come to participate alongside their children, but there could also be a separate activity specifically aimed at adults, scheduled after working hours. If it were up to me, I would implement both types of activities to ensure they are engaging and not monotonous." (Professor #11)

Discussion

Participants from this study provided valuable insights into the "NESTE CARRO NÃO SE FUMA" project, its implementation, and areas for improvement. The number of interviews was sufficient to achieve theoretical saturation considering the two implementation groups (partial implementation or organized according to the extracurricular activities plan and no implementation).

The purpose of the project, as identified by the majority of the teachers, was to raise awareness among children and parents about the risks of tobacco smoke exposure, particularly in vehicles. The project's relevance was recognized, and there were suggestions to enhance its impact by focusing on smoking cessation as well.

Regarding teacher training, the theoretical components were generally perceived as fulfilling the purpose of raising awareness. However, some teachers mentioned challenges in recalling the

acquired knowledge, while others highlighted the value of learning about new concepts such as third-hand smoke. Suggestions were made to explore the topics further in future training sessions.

The organizational component of the training revealed mixed opinions about the provided materials. Some teachers found them difficult to adapt to their classroom context, suggesting the need for more playful and age-appropriate activities. Others expressed disappointment with the unavailability of promised materials. Preferences regarding training format varied, with some teachers favouring in-person sessions for increased interaction, while others appreciated the flexibility of online training. The duration of the training was deemed appropriate by some, while others believed it could be extended for more comprehensive content exploration.

The implementation of the project varied among schools, with some teachers conducting occasional isolated activities and others integrating the project into their regular classes. Factors facilitating implementation included the activities workbook, project relevance, student engagement, and parental involvement.

Barriers included the lack of project monitoring, lack of availability of teachers throughout the school year to implement the project, institutional challenges, the timing gap between training and implementation, limited access to stickers, and the impact of the COVID-19 pandemic. Strategies to overcome identified barriers included opportunistic implementation during relevant events and utilizing existing class time.

Participants provided valuable improvement suggestions for the project's future. Key recommendations included incorporating virtual and interactive activities in the activities workbook, increasing project monitoring by project promoters, create measures to involve parents/guardians more in the project, structuring a proposed activity calendar instead of leaving implementation at the discretion of the teachers, and revising the evaluation process.

Limitations

The time interval between the pilot project and this project’s evaluation was approximately one year, which hindered the accuracy of the given responses.

The implementation of a focus group was not initially planned in the study design but arose out of necessity due to the participants' limited availability. Moreover, this interview condition may influence how participants respond to questions, resulting in less spontaneity in some of the answers given.

Conclusion

This qualitative multimethod approach study allowed for the evaluation of the " NESTE CARRO NÃO SE FUMA" project, demonstrating its potential to raise awareness about the risks of tobacco smoke exposure.
However, certain areas require improvement to enhance its effectiveness so that the project can better achieve its objectives and contribute to promoting a smoke-free environment for children and their families.
The barriers identified and the improvement suggestions that emerged in the study are crucial for enhancing the potential of this project in the future.

Declaration of Competing Interest

None.

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General conclusion and further directions

To protect children from exposure to environmental tobacco smoke it is important to ensure tobacco-free environments. Even if not smoking in the presence of the child, it is necessary to remember that spaces where smoking occurs can contain compounds from tobacco, so the most appropriate protection is to never smoke in places frequented by the child. (9) As we saw, the car was one of the places where most frequently occurs the tobacco smoke exposure,

This research project has demonstrated the potential of the " NESTE CARRO NÃO SE FUMA" project in raising awareness about the risks of tobacco smoke exposure.

The author of the research project plans to remain involved in the "NESTE CARRO NÃO SE FUMA" project and aims to participate in the implementation of the new edition of the project, expected to take place in the academic year 2023/2024. The instruments for evaluating the process and effects of the new edition of the project have already been approved by the Ethics Committee.

Therefore, two new specific objectives have been outlined:

1. Evaluate the implementation process of the project in the academic year 2023/2024.
2. Evaluate the effect of the intervention carried out in the academic year 2023/2024 in reducing children's exposure to second and third-hand smoke.

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Annexes

I. Semi-structured Interview Script

Evaluation of the Pilot Project " NESTE CARRO NÃO SE FUMA (2020/2021)"
Estimated duration: 30 minutes.

Project Overview:
In 2019, the " NESTE CARRO NÃO SE FUMA" Project was launched with the aim of reducing involuntary exposure to tobacco and tobacco products by promoting their non-use inside private vehicles.
The current objective of the researcher is to evaluate the process and effect of the " NESTE CARRO NÃO SE FUMA" project. To address this objective, three specific objectives have been outlined: evaluate the pilot project carried out during the academic year 2020/2021 and identify necessary improvements to be applied later, assess the implementation process of the project in the academic year 2023/2024, and evaluate the effect on reducing children's exposure to secondhand and thirdhand smoke.
To address the first specific objective of the project, semi-structured qualitative interviews will be conducted with participating teachers of the pilot project, and through the analysis of these interviews, the motivation for implementing or not implementing the project on the field and the barriers or limitations encountered will be evaluated.
The entire interview will be audio-recorded, and its content will be transcribed in full.
The data will be temporarily stored on the researcher's individual-use computer, to which no other individuals have access, until the transcription and coding of the interview, at which point the audio files will be deleted.
The interview will commence after addressing any remaining questions and obtaining the informed consent signature.

Interview:

The project " NESTE CARRO NÃO SE FUMA"
1.What do you think is the main purpose of the project?
Training
2.How did participating in the training allow you to gain new knowledge?
3.In your opinion, what should be improved in this training?
(Note: If the person only answers one of the topics, remind them of the ones they missed: content, format, duration)
4.And what is your opinion regarding the materials provided?
(Note: Support materials for teacher knowledge and materials to facilitate activities)
5.After the training, what activities did you carry out with your students or parents/guardians related to this topic?
(Note: If no or very few activities are described - isolated activities without context - **proceed to question 6.** If the project was fully or partially implemented, **move on to question 7**.)

6. Isolated activities without context:

6.1. Barriers

6.1.1. [NO ACTIVITY] Based on your experience, what were the main reasons that hindered the implementation of the planned activities?

6.1.2. [ISOLATED ACTIVITY] Based on your experience, what were the main reasons that hindered the implementation of more activities?

(Note: Verify the relevance of not having a fully defined schedule or a fully designed/programmed set of activities, and the lack of an activities manual to implement)

Examples:

Inadequate training (did not allow for autonomy to plan/facilitate activities)

The physical classroom space did not allow for the implementation of activities.

The students showed no interest.

6.2. Facilitators

6.2.1. What conditions do you consider essential to be able to fully implement this project?

6.2.2. Suggestions

In your opinion, what could be improved in the project?

7. Full or partial implementation of the project

(completed all proposed activities or at least a set of activities)

7.1. Facilitators

7.1.1. What reasons motivated you to implement the project?

7.1.2. What activities did you carry out as part of this project?

(Note: Ask for a brief description of the activity(ies) that was/were implemented)

7.1.3. What conditions allowed or facilitated the implementation of these activities?

7.1.4. What were the main difficulties you faced? What strategies did you use to minimize the difficulties encountered?

7.1.5. What conditions do you consider essential to be able to fully implement this project?

7.2. Barriers

7.2.1. Based on your experience, what were the main reasons that hindered the implementation of other activities?

(Note: Verify the relevance of not having a fully defined schedule or a fully designed/programmed set of activities or the lack of an activities manual to implement)

Examples:

Inadequate training (did not allow for autonomy to plan/facilitate activities)

The physical classroom space did not allow for the implementation of activities.

The students showed no interest in the topic.

7.2.2. Suggestions

In your opinion, what could be improved in the project?

End of the interview.

Thank you for your time.

II. Focus Group Guide

Location: Virtual Meeting (via Zoom®)
Date: March 17, 2023
Start time: 6:30 PM
Number of participants: 6
Participants: Teachers from Escola Básica Nova de Valongo

Part A

Presentation:
• Full reading of the introduction letter.
Evaluation of the Pilot Project " NESTE CARRO NÃO SE FUMA (2020/2021)"

Estimated duration: 60 minutes.

Project Overview:
In 2019, the “NESTE CARRO NÃO SE FUMA " Project was launched with the aim of reducing involuntary exposure to tobacco and tobacco products by promoting their non-use inside private vehicles.
The current objective of the researcher is to evaluate the process and effect of the "NESTE CARRO NÃO SE FUMA" project. To address this objective, three specific objectives have been outlined: evaluate the pilot project carried out during the academic year 2020/2021 and identify necessary improvements to be applied later, assess the implementation process of the project in the academic year 2023/2024, and evaluate the effect on reducing children's exposure to secondhand and thirdhand smoke.
To address the first specific objective of the project, semi-structured qualitative interviews will be conducted with participating teachers of the pilot project, and through the analysis of these interviews, the motivation for implementing or not implementing the project on the field and the barriers or limitations encountered will be evaluated.
The entire interview will be audio-recorded, and its content will be transcribed in full.
The data will be temporarily stored on the researcher's individual-use computer, to which no other individuals have access, until the transcription and coding of the interview, at which point the audio files will be deleted. .

I will begin the focus group after addressing any remaining questions and obtaining the signed informed consent.

• Recording begins.

Part B

1. Introductory Part

What is the level of implementation of the project? That is, whether it was implemented or not. (This question is asked with the aim of dividing the focus group into smaller groups.)

Which school do you currently teach at?

2. The following topics will be addressed during the session: Degree of project implementation; Purpose of the project; Acquisition of knowledge during the training; Suggestions for improving the training (e.g., format, duration, content, etc.); Description of activities carried out after the training; Barriers encountered in the implementation of activities; Facilitators for project implementation; Suggestions for improving the project.

Ask the following questions:

The " NESTE CARRO NÃO SE FUMA" project

1. What seems to be the main purpose of the project?

Training

2. How did participating in the training allow you to gain new knowledge?
3. In your opinion, what should be improved in this training?

(Note: If the person only responds to one of the topics, remind them of the ones they missed: content, format, duration)

4. And regarding the materials provided, what is each person's opinion?

(Note: Support materials for teacher knowledge and materials to facilitate activities)

Implementation of the Project

5. After the training, what activities did each of you teachers carry out with your students or parents/guardians related to this topic?

(Note: If no or very few activities are described - isolated activities without context - **proceed to question 6.** If the project was fully or partially implemented, **move on to question 7**)

6. Specific Activity without Context:

6.1. Barriers

6.1.1. **[If no activities were carried out]** Based on your individual experiences, what were the main reasons that hindered the implementation of planned activities?

6.1.2. **[If isolated activities were carried out]** Based on your individual experiences, what were the main reasons that hindered the implementation of more activities?

(Note: Assess the relevance of not having a fully defined schedule or a set of completely designed/programmed activities and the lack of an activity manual to implement)

Examples:

Inadequate training (did not allow autonomy to plan/facilitate activities).

The physical classroom space did not allow for the execution of activities.

Students showed no interest.

6.2. Facilitators

What conditions do you consider essential for implementing this project in its entirety?

6.3. Suggestions
In your opinion, what could be improved in the project?

7. Full or Partial Implementation of the Project
(Did you carry out all the planned activities or at least a set of activities)
7.1. Facilitators
7.1.1. What were the reasons that motivated you to implement the project?
7.1.2. What activities did you carry out as part of this project?
(Note: Ask for a brief description of the activity(ies) implemented)
7.1.3. What conditions enabled or facilitated the execution of these activities?
7.1.4. What were the main difficulties you encountered? What strategies did you use to minimize these difficulties?
7.1.5. What conditions do you consider essential for implementing this project in its entirety?
7.2. Barriers
7.2.1. Based on your experience, what were the main reasons that hindered the implementation of other activities?
(Note: Assess the relevance of not having a fully defined schedule or a set of completely designed/programmed activities or the lack of an activity manual to implement)
Examples:
Inadequate training (did not allow autonomy to plan/facilitate activities).
The physical classroom space did not allow for the execution of activities.
Students showed no interest in the topic.
7.3. Suggestions
In your opinion, what could be improved in the project?

End of the interview.

Thank you for your time.

• **Recording ends.**