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Step by Step towards a Greener Future: The Role of Plogging in Educating Tomorrow's Citizens

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Abstract: The climate crisis remains a paramount challenge that contemporary society and forthcoming generations will grapple with. The significance of instilling sustainability awareness during formative years, particularly during adolescence, is underscored due to the potential for personality consolidation during this phase. In the educational context, physical education emerges as a valuable avenue to further the cause of a sustainable world by fostering student competencies across the three dimensions of sustainable development. Within this domain, activities such as plogging—an outdoor exercise that intertwines physical activity with litter collection—directly enhance environmental quality. However, a discernible gap exists in previous literature regarding high school students' perspectives on this practice. Thus, this research aimed to integrate a plogging intervention within physical education lessons to assess student perceptions of this innovative activity. A cohort of 28 secondary school students (16 females and 12 males aged 15 ± 1.2 years) participated in this qualitative study. Semi-structured interviews consisting of nine questions were deployed to elicit narratives pertaining to their plogging experiences within an educational setting. Over four sessions, an active methodology rooted in plogging was employed, culminating in a hands-on excursion in a natural environment. The findings were bifurcated into two categories. The first pertained to reflections on the didactic experience, encapsulating its immediate impact and prospective implications. The second category offered a critical evaluation of plogging, underscoring predominantly affirmative views, especially those highlighting environmental benefits. Responses revealed high acceptance levels for plogging, a heightened awareness of littering, and a recognition of the tangible environmental benefits of such activities. For a sustainable future, it is imperative for adults to possess and impart profound environmental consciousness to younger generations. These insights can potentially catalyze further research on the integration of sustainability in physical education and the role of plogging as an instrumental classroom tool.

Keywords: climate awareness; physical education; sustainable practices; adolescent perspectives; plogging intervention

Citation: Martínez-Mirambell, C.; Boned-Gómez, S.; Urrea-Solano, M.; Baena-Morales, S. Step by Step towards a Greener Future: The Role of Plogging in Educating Tomorrow's Citizens. *Sustainability* **2023**, *15*, 13558. https://doi.org/10.3390/su151813558

Academic Editor: Changhyun Roh

Received: 10 August 2023
Revised: 7 September 2023
Accepted: 8 September 2023
Published: 11 September 2023

1. Introduction

1.1. What Are the Upcoming Challenges Society Must Confront?

"The complexity of the fundamental issues facing our societies demands new strategies of thinking, knowledge, and action" [1]. Present-day society confronts a range of intricately solvable issues that affect all levels: local, national, and global. These conflicts span a wide array of domains, encompassing politics, economics, health, technology, and the environment. Examples include economic inequality, the climate crisis, political polarization, discrimination and social injustice, lack of access to healthcare and education,

technology addiction, and cybersecurity, among others. All of these necessitate immediate attention and action for efficient addressing, leading to improvements. However, issues of significant magnitude like the climate crisis demand not only political solutions but changes that engage society as a whole [2]. This work aims to explore several of these issues and seeks to contribute to their prevention.

Upcoming, as a society, we will have to confront a series of challenges to ensure the prosperity of the planet, as well as that of its inhabitants. Among the main challenges is economic inequality. "The growing inequality, both in developing and wealthy countries, exacerbates social divisions and hinders economic and social progress" [3]. Observing the data presented by the UN in the aforementioned article, we ascertain that it shows how society is dividing into individuals with significant purchasing power and those with scarce resources. This issue is a global problem affecting societies classified as both third-world and first-world. Discrimination or social injustice is another key contemporary issue we face, despite institutions like Oxfam [4] advocating that all individuals have equal rights and freedoms, regardless of their religion, race, or gender. Every day we wake up to news that demonstrates that this equality has not yet been achieved. An example reflecting this disparity is the term "glass ceiling," which refers to the barriers preventing women from reaching high-level positions within organizations. In one of their recent articles, Camarena Adame and García [5] illustrate that of Mexico's top 500 companies, only 16 were led by women, representing a mere 4.5% of the total.

To conclude, we will discuss what is arguably one of the most pressing contemporary issues: the climate crisis. "Climate change can impact our health, the ability to cultivate food, housing, security, and employment" [6]. "Climate refugee," is a new term defining people compelled to leave their place of residence due to adverse climatic conditions that render it uninhabitable, conditions previously unprecedented [7]. The climate crisis will exacerbate several of the primary issues discussed in the preceding paragraph and many that have gone unmentioned. As Fischer [8] asserts, "The world is already unequal, and the disruptive power of climate change makes it even more so." Now, what do we know about climate change? As explained in one of their recent reports, the United Nations [6] states that "Climate change is a phenomenon referring to the long-term changes occurring in Earth's climatic variables". These alterations have been magnified by human activity, especially in recent decades, such as the increase in emissions of greenhouse gases that create a hole in the ozone layer. Climate change can lead to a series of adverse impacts on biodiversity, human health, agriculture, the availability of potable water, and other aspects of life on Earth. "It will massively affect human societies in complex and multifaceted ways. And it appears nearly uncontrollable in the near future," concluded the article by Alves et al. [9], which explained the causes and future consequences of climate change.

1.2. Global Solution: Sustainable Development

In relation to the issues discussed in the preceding paragraphs, a singular solution emerges that ensures an adequate quality of life, both presently and in the future. The United Nations, in their 1987 report, addressed sustainable development and defined it as "meeting the needs of the present without compromising the ability of future generations to meet their own needs." This document, nearly 50 years old, declared sustainable development as the only viable solution to secure the future of new generations. Global policy gravitated towards working in this direction, leading to the approval of an action plan. This project encompasses a multitude of socially significant themes, termed the Sustainable Development Goals (SDGs). "The purpose of the 17 SDGs is to ensure a sustainable, peaceful, prosperous, and just life on Earth for all, now and in the future" [10].

Presently, the UN continues to pursue heightened political and social impact; to achieve this, they have developed the Sustainable Development Goals, a roadmap for shared social objectives, sustainable human development, and global progress. This initiative is not solely directed at governments but also compels businesses and civil societies to be accountable and engaged at international, national, regional, and local levels. It is worth

noting that all the goals proposed in the SDGs would be unattainable for society if all its sectors did not contribute. Hence, the significance of education for sustainable development was highlighted, offering an opportunity to acquire knowledge, skills, and values linked to equitable lifestyle development, resulting in positive long-term social transformations [11]. The significance of education within this agenda is so substantial that it was allocated a distinct goal: Quality Education (SDG 4), aimed at enhancing the quality of education, ensuring its stability, and expanding its reach. The conclusion reached by Linsay and Darby [12] was that through quality education, students acquire the theoretical and practical knowledge necessary to promote development and sustainable lifestyles. Rieckmann et al. [10] further specified these competencies as: "Systems thinking, anticipation, normative competence, strategic competence, collaboration, critical thinking, self-awareness, and problem-solving" (p. 16). This form of education signifies a 180-degree shift from what has been taught globally in recent decades; nevertheless, the Sustainable Development Goals provide an opportunity to cultivate students who not only think individually about their knowledge but also possess a comprehensive worldview. In one of their recent articles, Baena-Morales and González-Víllora [13] state: "The aim should be to instill attitudes in students so they understand and begin to develop competencies that lead to a more sustainable world".

SDG 4 is pursued through initiatives like that of Sostenibilidad by Huertas Alcalá [14], which presents a methodological approach where the teacher "stimulates dialogue and guides debate" or "energizes group work and facilitates participation and a sense of belonging among all students" (p. 16). This perspective also introduces innovative challenges aimed at raising student awareness while familiarizing them with all the other SDGs. However, students are not the only ones who need to adapt to this new way of teaching; educators must also be equipped to deliver lessons in accordance with the standards set by the Sustainable Development Goals. This is why there are proposals with the purpose of training teachers to teach based on these objectives, such as "Sustainable Development Goals and the 2030 Agenda in initial teacher education" by Lorente et al. [15] and "Education for sustainability in teacher training for experimental sciences in Secondary Education" by Calero et al. [16].

1.3. Sustainable Development Goals and Physical Education: A Common Future?

Traditionally, physical education (PE) has been undervalued within the educational context. While it is true that in earlier times the professionals teaching PE were often lacking in both pedagogical training and subject knowledge, that phase is now part of the past. Currently, PE is an evolving subject that is adapting to future needs and holds incredible potential for aligning with the Sustainable Development Goals [17]. This is evidenced by results showing that 24 out of the 169 existing targets can be addressed within the framework of PE [18]. In our country, the LOMLOE [19], the current education law, has introduced a new requirement for PE to "cultivate attitudes and acquire knowledge related to sustainable development and the impacts of climate change and environmental, health, or economic crises, promoting health and healthy eating habits, while reducing sedentary behavior" (p. 41). This further highlights the pivotal role of PE in this new educational model.

PE offers an ideal framework for addressing the SDGs in all their facets: social, economic, and environmental, with the first two traditionally receiving greater attention. As Baena-Morales et al. [20] illustrate, "Beyond the health benefits of physical activity and exercise, PE creates a highly favorable context for fostering cooperation, respect, coeducation, and entrepreneurship; aspects closely tied to the development of the SDGs" (p. 14). This same author demonstrates how PE can address the social dimension (mental, physical, and social health), the economic dimension (employability skills), and the environmental dimension (self-construction of materials or sustainable mobility). This makes it a pioneering subject for sustainable development. Continuing along these lines of thought, the

Ibero-American Sports Council [21] produced a report linking sports, and consequently PE, with the SDGs and their targets (Table 1).

Table 1. Relationship between the SDG targets and sports. Own compilation based on the Ibero-American Sports Council (2019).

Goal	Summary Content Goal	Relationship
3.4	Reduction of premature mortality and promotion of mental health and well-being	→
3.5	Reduction of substance abuse	→
4.4	Enhancement of skills for accessing employment, decent work, and entrepreneurship	→
4.5	Reduction of gender disparities in education and equality for vulnerable individuals	←
4.7	Enhancement of knowledge to promote sustainable development (e.g., sustainable lifestyles)	←→
4.a	Improvement of school facilities	←→
4.b	Increase in the number of scholarships available for developing countries	←→
5.1	Elimination of discrimination against all women and girls	←
5.5	Women's participation and equal opportunities	←
5.c	Promotion of gender equality and empowerment of women and girls	←
10.2	Social, economic, and political inclusion of all individuals	←
10.3	Ensuring equal opportunities and reducing inequality in outcomes	←
11.3	Inclusive and sustainable urbanization	←→
11.7	Universal access to green areas and safe, inclusive, and accessible public spaces	←→
12.6	Adoption of sustainable practices in businesses	←→
16.1	Reduction of all forms of violence and related mortality rates worldwide	→
16.4	Combating all forms of organized crime	→
17.16	Promotion of effective partnerships in the public, public-private, and civil society spheres	←
17.19	Development of indicators for measuring progress in sustainable development	←

Note: Cause (→): sport can positively impact the achievement of the goal. Effect (←): the goal can positively impact the promotion of sport. Bidirectional (←→): sport can positively impact the achievement of the goal, and vice versa.

In addition to all the goals presented in the table created by the Ibero-American Sports Council (CID), there are several articles that support the crucial role of PE in these goals. Articles by Nakagawa et al. [22] and Cumillaf et al. [23] corroborate the fundamental role of PE in areas such as improving mental health or academic performance due to increased sports participation. To achieve all these goals, a high level of knowledge and commitment from teachers is required; they are convinced that the subject can contribute to the achievement of the SDGs [24]. However, teachers are calling for more training and guidance on how to implement this model in their classrooms [25]. Finally, there is a contradiction regarding the term "sustainable development". Again, Baena-Morales et al. [24] and Baena-Morales, Merma-Molina, et al. [25] mention that most PE teachers do not grasp the three aspects (social, economic, and environmental) encompassed by sustainable development and the SDGs, limiting their understanding to solely environmental concerns. Contrary to what one might expect, however, the environmental aspect has not been explored in as much depth, significantly limiting the available literature, as works have traditionally focused on social and economic aspects.

1.4. What If Plogging Is Part of the Solution We Are Seeking?

Currently, there are innovative sports practices that aim to combine sustainable development and the SDGs with physical activity and environmental awareness. An example of

this is plogging, an activity that was created in 2016 by Erik Ahlström. Upon moving from his hometown to Stockholm, he started picking up trash in the areas where he practiced his sport. The primary function is to collect litter while walking or jogging. The term "plogging" comes from the English word "jogging" (a form of exercise involving running at a moderate and steady pace) and the Swedish word "plocka upp," which means "pick up." Plogging is not exclusive to running; you can also do it while walking or cycling [26]. This sport is quite novel, thus there is no extensive literature analyzing its personal and environmental benefits. Only authors like Cornet [27] have looked into how bending down improves joint mobility in the hips, adductors, and ankles. Raghavan et al. [28] suggest adopting a squatting posture while plogging because the load on the lumbar region is lower compared with other positions. Plogging can be a breath of fresh air for society; in the words of its creator: "Plogga" (another term for plogging) is a way to educate people about the issue of litter and its impact on nature." Moreover, you do not need much equipment to start: sportswear, garbage bags, some gloves, and you are ready. The movement quickly gained popularity in Sweden and spread to other European countries and even to India. The word "Plogga" has already been added to English dictionaries.

The relationship between plogging and the SDGs is evident (Figure 1). In this regard, Baena Morales (2021) asserts that "It will favor the achievement of goals such as 13.3 (Enhance education, awareness, and human and institutional capacity for climate change mitigation, adaptation, impact reduction, and early warning), 15.4 (Ensure the conservation of ecosystems and biodiversity), or 15.1 (Ensure conservation, restoration, and sustainable use of terrestrial ecosystems)." On the other hand, SDG 3 "Good Health and Well-being" will also be indirectly addressed since engaging in physical exercise improves physical fitness, which can lead to better health. A deeper analysis of plogging reveals its potential to be a useful tool for enhancing students' environmental awareness and introducing new activities within Block 6: Efficient and Sustainable Interaction with the Environment. As stated in Decree 107/2022 [29], the aim is for students to acquire knowledge that enables them to adopt attitudes and values related to nature conservation, sustainable use, and lifelong autonomous learning. In summary, the main objective of this research is to evaluate the use of plogging in an educational context, specifically in a secondary education institution.

Figure 1. SDGs addressed in this study.

In an era of educational transformation, it is imperative that the methodologies and activities proposed in physical education classrooms renew and adapt to contemporary challenges. It is precisely in this context that the need arises to integrate innovative practices that not only promote physical activity but also instill sustainable values and habits in students. Plogging, beyond being a sports activity, represents a pedagogical approach that holistically addresses students' physical, mental, and civic development. By promoting environmental responsibility through physical activity, plogging has the potential to become a powerful educational tool that can be instrumentalized in physical education classes. This tool could not only improve students' perceptions of the importance of environmental care but also strengthen their connection with nature and their civic commitment to a more sustainable world. Therefore, by integrating plogging into the physical education curriculum, we are not only responding to the current demand for more holistic and relevant educational practices but also contributing to the development of citizens who are informed, active, and committed to addressing global challenges.

2. Method

2.1. Description of the Context and Participants

This research, in line with qualitative methodology approaches, does not employ a representative sample of the population; rather, it employs a theoretical sample to facilitate the exploration of the study's object. Thus, our study involved students from a 2nd-year group in Secondary Education (ESO) at IES Las Norias in Monforte del Cid. All students were informed about the research purpose and provided signed consent for the use of their data. Consequently, the final participants consisted of eighteen students, all belonging to a single experimental group. Within the total sample analyzed (28), there were 16 females and 12 males; 77.78% of the participants were 13 years old and 22.22% were 14 years old.

2.2. Instruments

To conduct the research, a single data collection instrument was used, following the development protocol for the semi-structured in-depth interview [30]. The interview questions were designed by the research team to obtain the students' perspectives on the use of plogging in the educational context. To this end, a prior review of the literature in this field was carried out. Among others, the studies by Colio et al. [31], Chae et al. [32], Lee and Choi [33], Raghavan et al. [28], and Yoon et al. [34] were consulted. From this initial study, four thematic axes that the interview should address were identified:

- Participants' prior knowledge of plogging: This section aimed to examine the knowledge and previous experiences that students had regarding the practice of plogging.
- Impact of the developed educational experience: Through this topic, the aim was to identify the effect that the practice of plogging had on the participants.
- Benefits derived from plogging practice: This thematic core sought to recognize students' perspectives on the personal, social, and environmental benefits generated by plogging.
- Difficulties associated with plogging practice: Through this third theme, the aim was to understand participants' perceptions of the issues that plogging practice can cause.
- Proposals and prospective vision: This section aimed to analyze participants' future intentions to continue practicing plogging, as well as the suggestions they made for its future use.

Once the themes were defined, the research team formulated a series of questions (9 questions in total) that were reviewed and validated based on expert judgment. For this, the collaboration of three specialists in physical education (PE) and sustainability was requested. These experts, not affiliated with the research project, met the established criteria: (1) hold doctoral degrees and (2) have more than 10 years of teaching experience in compulsory secondary education. The initial version of the interview was validated by these experts. For this purpose, they were sent an email kindly inviting them to review the protocol. The email also included a link to a Google Forms questionnaire. It featured each

of the questions that made up the instrument and instructions for validation. Specifically, they were asked to assess the coherence, relevance, and content (clarity of the questions and degree of comprehension) of each of the questions posed and the instrument as a whole. They were also asked to review the structure, format, arrangement, and order of the issues. Each expert reviewed the instrument independently and sent their comments to the research team through the Google Forms platform. Their suggestions were, in all cases, minor, focusing mainly on grammatical and syntactical aspects of the wording. After receiving the feedback, the research team met and implemented all the suggested changes. Additionally, to ensure the validity and quality of the instrument, it was piloted with 5 students with similar characteristics to the selected sample. The final version of the instrument is presented in Table 2.

Table 2. Questions included in the interview.

Initial Order	Questions
1	Do you believe that plogging contributes to preserving the care of the nearby environment? Why?
2	Had you heard of this activity before? Explain what you now know after the plogging sessions.
3	Besides the environmental benefits, what other advantages would you associate with plogging? Both personally and collectively.
4	Based on your experience, are there any physical or postural difficulties when practicing plogging?
5	From your experience, would you have any recommendations for someone who has never tried it?
6	After completing the plogging sessions, have you experienced any kind of muscle soreness?
7	Are there any rules established or that you consider necessary for practicing this activity?
8	Do you think your environmental awareness has improved after engaging in this activity? Why?
9	Would you participate in another plogging outing? Why?

2.3. Procedure

After the intervention phase, the research objectives were presented and explained to the participants. They were then interviewed and asked to respond candidly and freely to the questions in Table 2. These questions were presented in a random order and served as guiding prompts. Their formulation ensured the achievement of specific objectives, and, in any case, they were subject to reformulation and supplementation. The interviews were conducted in person with the group of students constituting the sample, lasting approximately 30 min each.

The intervention consisted of a total of 4 full sessions, each lasting 50 minutes, and an additional session solely for responding to the interview (Table 3). The sessions commenced once the students completed and submitted the signed consent form to participate in the study. In the first session, the group watched an explanatory video about plogging; its origins, benefits, and how it is practiced. Furthermore, a discussion followed about the potential risks associated with the sport and personal hygiene after its practice. An explanation about recycling was provided, as the students were not familiar with how to recycle various types of waste. In the second session, the class was divided into groups of four. Each group was given a map and instructions. The map displayed various markers, to which they had to arrive by performing one of the exercises (walking on tiptoes, walking on heels, skipping, heel-to-glute, or lateral movement) indicated at the preceding marker. In the third session, accompanied by the researcher and the teacher, the students ventured to the park adjacent to the institute. They were instructed to collectively gather a certain number of kilograms of waste. In the fourth session, a team competition was organized, with teams of three members, to see which team could collect the most waste within the institute. The teams were

assigned names, and subsequently, a ranking was determined to identify the team that collected the largest quantity of waste. In the final session, the 2nd-year ESO students completed the interview in the class, thus concluding the intervention procedure.

Table 3. Procedures carried out by the group during the intervention.

General Phase	Specific Phase			
1	**2**	**3**	**4**	**5**
Explanatory video on plogging and explanation of risks, hygiene, and recycling	Physical fitness, healthy posture, and running technique	Collaborative plogging in the park.	Plogging competition in the institute.	Interview responses.
Session 1 (50′)	Session 2 (50′)	Session 3 (50′)	Session 4 (50′)	Session 5 (50′)

Note: This table displays the intervention steps that the selected group followed during the study, along with the didactic content of the sessions.

2.4. Data Analysis Procedure

Content analysis followed the phases proposed by Bardín [35]: pre-analysis, material exposure, and processing and interpretation of results. After a thorough reading of all the information, codes and sub-codes used in the analysis emerged inductively. These were grouped into two categories capable of encompassing and defining their meaning. The categories were chosen based on their clarity and utility. In this process, it was necessary to eliminate some identical and recurring terms. During this stage, the principles of exhaustiveness, representativeness, homogeneity, and relevance were followed, facilitating the development of indices and indicators for coding. Once the analysis tool was defined, it was verified that all units of meaning were located in one of the emerging categories, codes, and sub-codes. Their validity was confirmed by the same experts who had previously validated the interview.

2.5. Data Analysis Procedure

The analysis of participants' discourses allowed us to organize their voices into two categories: (1) opinion of the conducted experience, and (2) critical assessment of plogging. The results are presented in two tables. These tables capture the results of calculations performed during the analysis process. Specifically, they include:

- Absolute frequency (AF), which corresponds to the number of times students comment on a unit of meaning.
- The percentage of absolute frequency (AF%), calculated as AFx100/Total AF.

The results are presented with a set of narratives that serve to illustrate the meaning attributed to each of the codes and sub-codes used in the analysis process. Additionally, text segments are identified with an alphanumeric code to ensure anonymity.

3. Results

The discourses were restructured into two categories. The first of these pertained to the opinion regarding the developed didactic experience, and within this category, the generated impact and their prospective view of it were encompassed (Table 4).

Concerning the effects stemming from the activity, among the emergent codes, they recurrently emphasized that it had primarily enabled them to discover a novel sports practice that combines physical exercise with environmental care (I had never heard of it before. Now I know it's an activity that combines exercising, being in nature, and picking up trash, Participant_06). In specific instances, participants acknowledged possessing some prior knowledge, albeit not entirely accurate (Yes, but I thought it was an activity that had no relation to sports, Participant_08). Consequently, the developed experience afforded them a more comprehensive understanding of what practicing plogging truly entails (This activity consists of picking up trash while exercising, running, walking, or cycling, Participant_14). Simultaneously, with a highly comparable presence, they also

underscored their increased awareness of the environmental deterioration engendered by human actions (While doing the activity, I've seen all the pollution we create, and that's just from going to the schoolyard and the park. Now I'd like to help the environment more, Participant_07). Through plogging, they were able to become conscious of the waste and residues we generate in our immediate environment, prompting their commitment to environmental care. Nonetheless, the existence of a few narratives is worth noting, albeit with a minimal prevalence that alluded to specific muscular issues (My back hurt because I have scoliosis, but I don't think the activity was to blame, Participant_04). However, in the majority of cases, these stemmed from pre-existing medical conditions in the participants, and as such, cannot be directly attributed to the practice of plogging.

Table 4. Opinion on the Conducted Experience.

Category	Codes and Subcodes	FA	%FA
1. Opinion on the Conducted Experience	1.1 Impact of the Activity		
	1.1.1 Improvement of Knowledge	21	23.86
	1.1.2 Environmental Awareness	20	22.73
	1.1.3 Muscle Pain	3	3.41
	1.2 Prospective View		
	1.2.1 Suggestions for Practice	24	27.27
	1.2.2 Intention for Future Practice	20	22.73
Totals		88	100

Regarding their prospective view, the second of the inferred codes, all participants reiterated their intention to continue practicing plogging. The reasons they put forth for this were diverse and varied. For instance, there were discourses that highlighted the fun generated by the experience (Yes, because I had a lot of fun doing the activities, Participant_01; Yes, because I really liked this sport and had a lot of fun in the activities we did, Participant_03), or those who emphasized the potential of plogging for both health and environmental care (Yes, I think it's a good way to improve my fitness, both running and walking, and to help the environment, Participant_02). Despite this, they suggested some areas for improvement. Among other suggestions, they emphasized the need to adopt certain hygiene and safety measures (I think you should carry a couple of trash bags and gloves with you, Participant_01), wear comfortable clothing (I consider it necessary to wear comfortable clothing, Participant_09), and perform specific movements to maintain good posture and maximize physical exercise (To pick up the waste and to get more exercise, run while picking up trash and do squats to pick up the waste, Participant_10). Others, on the other hand, recommended a warm-up to avoid fatigue and muscular overload (I would recommend starting by walking or jogging as a warm-up, as if you start running full speed from the beginning, you'll get tired very quickly, Participant_04). There were also a few voices, albeit in the minority, that proposed practicing plogging in other spaces more in touch with nature (Yes, but I would like to do it more in the forest, I think it's more important for wildlife, Participant_16) or in areas with higher pollutions, as that way the environmental benefits would be greater (I would do it in a place with more pollution, Participant_13). Finally, some narratives suggested some form of financial compensation to encourage broader societal participation (Yes, but I think if they paid, many more people would sign up, Participant_18).

Regarding the second category, which focused on the critical evaluation of plogging, positive opinions stood out (Table 5). Specifically, participants emphasized the environmental benefits (We take care of the environment where we live, leave it cleaner, and help the environment, Est_14). In addition, frequent references to health improvement were also noted, given the multiple possibilities that plogging offers for physical activity (You exercise, you can run, jog, or walk, and even do squats, in short, it's good for your well-being, Est_04) and mental disconnection (I associate this activity with being outdoors and breathing well. By this, I mean that both on a personal level, I would listen to music,

and on a group level, for talking, laughing, having fun, etc., I think this activity can be a lot of fun, doing things that improve the quality of life, Est_16). Another benefit participants highlighted from plogging, when done in a group, was the possibility of expanding their network of contacts and friendships (And you can meet people on outings to the mountains, Est_18).

Table 5. Critical Evaluation of Plogging.

Categories	Codes and Subcodes	FA	%FA
2. Critical Evaluation of Plogging	2.1 Positive Aspects of Plogging		
	2.1.1 Environmental Benefits	27	32.15
	2.1.2 Health Improvement	19	22.62
	2.1.3 Socialization	7	8.33
	2.2 Negative Aspects of Plogging		
	2.2.1 Disgust	6	7.14
	2.2.2 Physical Discomfort	5	5.95
	2.2.3 None	20	23.81
Totals		84	100

Regarding the negative aspects of plogging, participants repeatedly emphasized the absence of difficulties, considering it an activity that can be practiced by all kinds of people (I think there are no physical or postural difficulties when performing this activity, Est_14). Only a few statements alluded to the apprehension that picking up other people's trash might cause (However, there might be people who disagree or feel disgust about picking up other people's garbage, Est_01) and to the physical discomfort that can arise when not done properly (I don't consider it a tiring activity, but if you spend a lot of time doing it, you might feel very tired afterward, Est_09), have a pre-existing physical condition (Some people might have difficulties bending over, like back pain, due to some problem, as it happened to me, Est_04), or are of advanced age (From my perspective, young people don't have problems, but I think if an older person were to do it, they might have problems, Est_06).

4. Discussion

The primary objective of this research was to evaluate whether plogging is effective as an educational tool. There is a lack of studies that utilize plogging within a didactic unit to analyze students' environmental awareness, primarily due to its recent inception. In this section, the obtained data will be compared with similar studies in search of results. First and foremost, this research introduces a new approach to working and physical activity in the natural environment, which has traditionally been limited to addressing the same objectives for all students [36]. In their article, Peñarrubia Lozano et al. [37] underscore the significance of its implementation, as they highlight that the aspects enhanced by outdoor physical activity align with the integral education of students, a primary goal of the teaching and learning process. Furthermore, outdoor physical activity could be the ideal solution to combat sedentary behaviors in adolescents; some authors such as Poveda-Acelas and Poveda-Acelas [38] and Silva et al. [39] have determined that factors such as socioeconomic status, globalization, family education level, and urban living have led to increased physical inactivity and sedentary habits in this population. Our work, much like that of Pereira [40] and Colio et al. [31], has leveraged the recent rise of plogging to create a didactic unit aimed at raising environmental awareness among secondary school students. Service learning will be used as a methodology to implement the content that is typically taught in a theoretical manner in the classroom. The application of plogging as a form of service learning will transfer the benefits of the acquired learning in the didactic unit to a nearby environment [41]. Our study's findings demonstrate that using plogging as an active teaching method does, indeed, heighten environmental consciousness among secondary students. This bridges the gap identified in the literature, which previously had not studied plogging's potential for academic and environmental impact.

Once again, Colio et al. [31] state that: "participating in the plogging intervention could have led students to change their behavior and act more responsibly regarding various environmental issues" (p. 11). This assertion closely resembles what the students themselves have expressed in this study, as after completing this unit, they became aware of the high levels of pollution they are exposed to, leading them to want to change their lifestyle to contribute to environmental conservation. By juxtaposing our findings with prior work, we have fortified the notion that active methodologies like plogging can revolutionize the way students perceive and interact with their environment. Moreover, by achieving this in a mere four-session span, we have unveiled the potency of such methods in a brief yet impactful educational intervention. In their article, Baena-Morales et al. [18] call for the creation of new initiatives that establish connections between physical education sessions and the Sustainable Development Goals (SDGs), while also working to develop students' awareness and their contribution to a more sustainable world. Our research manages to unite all these demands, bridging the SDGs with the classroom context and addressing the goals of Climate Action (13) and Life on Land (15). Going even deeper into objectives 13.3, 15.1, and 15.4, it primarily addresses the environmental aspect, which is often not explored in such depth, thus expanding the literature in this area. Plogging combines garbage collection with physical exercise, making it a suitable solution for individuals who do not engage in any form of exercise in their daily lives. Studies like that by Concha-Cisternas et al. (2019) explain that active students experience a better quality of life (physical and psychological health) compared with inactive students, underscoring the importance of exercise in quality of life. Plogging is not only relevant in an academic context; the project "Reiníciate S. A. S." aims to contribute to the health and well-being of individuals in the workplace. Through this activity, they seek to increase productivity and reduce stress and absenteeism while strengthening the worker–company relationship [42]. This demonstrates that, similar to our unit, plogging is a tool for enhancing physical fitness, mood, and social interactions among peers.

After conducting the study, it was observed that with only a 4-session intervention, it was sufficient to determine plogging as an effective educational tool for promoting environmental awareness in secondary education. This intervention was carried out using an active methodology and a type of work that aimed to engage 10th-grade students extensively in the activities. The results of this unit show increased interest in the environment among the majority of students; therefore, it is important to conduct research that involves both students and teachers, a vital part of the process. In their article, Vega-Marcote et al. [43] express the dissatisfaction of teachers due to the limited training they have received on this subject, thus hindering them from delivering education that promotes development. Despite this, Evans et al. [44] affirm that the training of most teachers remains outdated. Baena-Morales et al. [24] discuss the main reasons why teachers do not implement the Sustainable Development Goals (SDGs) in the classroom context, including factors such as lack of awareness, time constraints, absence of guidelines, excessive workload, or lack of support from families. In light of the evolving discourse on environmental consciousness, it is crucial to underscore the pivotal role of internal motivation in driving sustained environmental conservation efforts. This research has taken strides to delve deeper into this aspect. While transient attitudes towards conservation can be influenced by external factors or trends, it is the deeply-rooted, internal motivation that propels individuals towards long-term commitment and actionable change. Drawing from this perspective, a clear distinction has been established in this study between short-lived attitudes and lasting motivation. This distinction not only highlights the depth of commitment required for genuine environmental stewardship but also serves as a framework for future research aiming to foster authentic and enduring conservation behaviors.

Limitations and Future Prospects

Finally, it must be acknowledged that this study has some limitations. The available sample, as well as the number of interventions, was not excessively large and the study could not be conducted with more than one group. However, the greatest strength can be found in the quality of the intervention, which delved deeply into plogging and aspects related to environmental awareness. This work opens the door to new and very interesting avenues of study, such as exploring the relationship between engaging in sports in natural settings and environmental consciousness or utilizing plogging as a tool for addressing environmental awareness among adults. A primary limitation is the absence of a control group in this investigation. Although this was a descriptive assessment due to logistical and temporal constraints, it is essential to recognize the importance of a more rigorous experimental design for robust evaluations in future studies.

The short duration of the intervention also brings forth the need for future assessments that consider the long-term impacts of such educational interventions. Future research could incorporate extended follow-ups to gauge the persistence and evolution of the promoted behaviors and attitudes. The successful implementation of educational interventions necessitates consideration of educator acceptance and support. Thus, the development of specific training programs or educational guides to ensure alignment with the pedagogical expectations and needs of the plogging program might be essential. A notable point was raised by student #18, highlighting the necessity of reflecting on the transformation of materialistic values towards intrinsic sustainability-related values. While a singular intervention may not be definitive in eliciting a complete shift, it is recognized as an initial step in fostering a sustainable mindset in the student population. Future interventions are advised to incorporate activities and discussions that directly address materialistic values, steering students toward a comprehensive understanding of sustainability. Lastly, integrating cognitive tasks, such as research on waste management, from fields of student interest (e.g., STEM or humanities) could amplify the intervention's impact on students' value systems. Such an approach may also better cater to contemporary pedagogy and educators' sustainability needs.

5. Conclusions

Plogging is an activity that is gaining rapid attention globally. It uniquely combines waste collection with outdoor exercise. While it started as a grassroots movement in Sweden, it has rapidly garnered attention worldwide as an innovative solution to two pressing concerns of the modern age: environmental pollution and sedentary lifestyles. Further research is being conducted to delve into its health benefits, both physical and mental.

Given these facts, can this activity become a useful tool in an educational context? The context of education, especially in today's world, demands practical and active approaches that not only impart knowledge but also inculcate values and habits. The results obtained from this research seem to indicate that plogging can indeed be a valuable tool in educational settings, thereby confirming the main objective of this study. Moreover, it appears to be quite effective in promoting environmental awareness through a practical approach, moving away from the typical lectures on pollution and recycling. The incorporation of plogging within the educational curriculum has the potential to revolutionize the way we approach environmental education. Instead of passive learning, students are actively engaged, both mentally and physically, in addressing real-world environmental issues. It is highly appreciated that, in addition to being beneficial, plogging is an activity that allows individuals to enhance their physical fitness while socializing. Student responses indicate a high level of acceptance towards plogging and suggest that through this activity, they gained a greater awareness of the amount of litter discarded on the ground, and how these activities can significantly contribute to environmental improvement. Furthermore, by fostering a sense of community responsibility and collective action, plogging prepares students to be proactive agents of change in their communities. For a sustainable future,

adults must develop appropriate environmental consciousness and instill in the youth its immense significance. This research adds to the foundational steps towards understanding how traditional classroom teachings can be enhanced and made more impactful with the integration of innovative practices like plogging. Erik Ahlström, the founder of plogging, is resolute in his goal to assist the environment: "We have a great mission to educate the younger generation about the importance of climate change." Our study echoes this sentiment by highlighting the potential of plogging in reshaping environmental education.

Author Contributions: Conceptualization, C.M.-M. and S.B.-M.; Methodology, C.M.-M. and S.B.-M.; Software, M.U.-S.; Formal analysis, M.U.-S.; Investigation, C.M.-M.; Resources, S.B.-G.; Data curation, M.U.-S.; Writing—original draft, C.M.-M.; Writing—review & editing, S.B.-G. and S.B.-M.; Visualization, S.B.-G.; Supervision, S.B.-M.; Project administration, S.B.-M. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: The study was conducted in accordance with the Declaration of Helsinki, and approved by the Committee of University of Alicante (UA-2022-03-17).

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: Not applicable.

Conflicts of Interest: The authors declare no conflict of interest.

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