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ADOLESCENTS' CLIMATE CHANGE PERCEPTIONS: DO CLIMATE CHANGE LEARNING AND ENGAGING IN ENVIRONMENT-RELATED GROUPS MATTER?

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Abstract

Previous research suggested that improved climate change (CC) knowledge contributes to youths' awareness of its impact and predicts concern. Formal education institutions have played a fundamental role in CC education and have made efforts to promote awareness and literacy on the topic. Studies have also shown the potential complementary effect of non-formal and informal settings. The purpose of this study is to analyze the influence of learning CC in school and engagement in environmental groups on adolescents' CC subjective knowledge and concern, as well as on the perceived impact of CC in their lives. A questionnaire was applied to 209 Portuguese early and middle adolescents, aged between 11 and 18 years old. Participants were split into three groups: Group 1 comprised adolescents who self-reported no prior CC learning; Group 2 included participants who reported only previous CC learning in school; and Group 3 comprised participants who reported previous CC learning in school and had been engaged in environmental groups. The results showed Group 1 reported the lowest CC knowledge, followed by Groups 2 and 3. Moreover, Group 1 reported lower CC concern than Groups 2 and 3. The differences between Groups 2 and 3 were statistically different. Lastly, Group 1 reported experiencing CC less frequently and with lower intensity compared to Groups 2 and 3. Differences between Groups 2 and 3 were not statistically different in these two variables. Despite the limited sample, the current study highlights the differentiated contribution of formal and informal environmental education in Portugal. Learning about CC in school is essential to building adolescents' knowledge about this issue, and engaging in environmental groups seems to expand this positive impact.

Keywords: *Adolescence, Climate Change, environmental engagement, formal education, perceptions.*

1. Introduction

Previous research has suggested that developing climate change (CC) knowledge is crucial to increase awareness and concern. Since these are some of the key initial drivers for self-efficacy in climate action (Kolenatý, Kroufek, & Cincera, 2022), it is relevant to understand how to promote them. Literature on adolescents has shown an increased interest in understanding the role of different contexts of CC education in promoting awareness, literacy, and action on the topic (Dawson & Carson, 2020; Littrell et al., 2020).

Although the role of formal education has been considered crucial (United Nations, 2015), complementary educational approaches have been a focus of environmental literature. Place-based non-formal and informal education has been shown to improve youths' CC knowledge, perceptions, awareness, and concern (Littrell et al., 2020). For instance, a study in Northern Portugal found that students who engage in environmental extracurricular activities exhibit fewer misconceptions about CC (García-Vinuesa, Carvalho, Meira Cartea, & Azeiteiro, 2021). Nevertheless, to the best of our knowledge, no study has yet sought to understand to what extent CC subjective knowledge, perceptions, and concern vary for adolescents with different CC learning opportunities and involvement in environmental groups.

2. Objectives

The purpose of this study is to analyze the influence of engagement in CC learning in school and environmental groups (e.g., associations, clubs) on adolescents' perceived CC: a) subjective knowledge, b) concern, and c) impact on their lives (i.e., frequency and intensity).

3. Methods

A total of 209 Portuguese early and middle adolescents, aged between 11 and 18 years old, participated in the study (see Table 1). Participants were split into three groups: Group 1 (n = 47) comprised adolescents who self-reported no prior CC learning in school (despite belonging to classes where 55.5 to 93.7% of the classmates reported having learned about CC in school, in a larger study) and were not engaged in environmental groups; Group 2 (n = 81) included participants who reported only previous CC learning in school; and Group 3 (n = 81) comprised participants who reported previous CC learning in school and had been engaged in environmental groups.

Table 1. Means and frequency distribution of the sociodemographic characteristics of the sample.

	Group 1	Group 2	Group 3	Total
N	47 (22.5%)	81 (38.8%)	81 (38.8%)	209
Sex				
Female	16 (34.0%)	45 (55.6%)	52 (64.2%)	113 (54.1%)
Male	31 (66.0%)	36 (44.4%)	29 (35.8%)	96 (45.9%)
Age: *M* (*SD*)	13.3 (1.6)	13.7 (1.7)	13.7 (1.6)	13.6 (1.6)

The questionnaire comprised a four-item Likert scale on CC subjective knowledge and three single-item questions about CC concern and impact (i.e., frequency and intensity). Regarding subjective knowledge of the CC, reflecting different dimensions as proposed by Hoppe, Taddicken, and Reif (2018), participants were asked to evaluate their knowledge of the CC in general, its causes, consequences, and mitigation actions. The response options ranged from low (1) to high (5). This scale revealed good internal consistency (α = 0.894). A five-point Likert scale was also used for the remaining three questions. For CC concern and impact, they were asked to what extent they felt concerned about CC (1 - Nothing; 5 - Extremely), how often they feel affected by CC (1 - Never; 5 - Almost always), and to what extent they feel negatively affected by CC (1 - Nothing; 5 - Extremely).

Preliminary analyses of the demographic data included the computation of descriptive statistics. Due to the dependent variables being ordinal-scale responses, or mean scores derived from these, non-parametric tests were chosen for statistical comparisons of the observed outcome variables between groups. Kruskal-Wallis tests were used to compare the study's three independent samples, and for paired samples, Mann-Whitey U tests were used. Additionally, effect sizes are reported as epsilon-squared (ε^2), and the benchmarks by Rea and Parker (2014) were used to interpret its values.

4. Results

The data shows statistically significant differences between the three groups in all outcome variables of the study (see Table 2). Regarding CC subjective knowledge, Group 1 reported a statistically significant lower score than Groups 2 (Z = -5.17, p < .001) and 3 (Z = -6.98, p < .001). Differences between Groups 2 and 3 were also statistically significant (Z = -3.39, p = .001). Likewise, Group 1 reported lower CC concern than Groups 2 (Z = -3.54, p < .001) and 3 (Z = -5.15, p < .001). Differences between Groups 2 and 3 scores were statistically different (Z = -2.24, p = .025). Lastly, regarding the perception of being affected by CC, Group 1 reported lower frequency scores, marginally less than Group 2 (Z = -1.92, p = .055) and significantly less than Group 3 (Z = -3.08, p = .002). Group 1 also reported significantly lower intensity scores than Groups 2 (Z = -3.19, p = .001) and 3 (Z = -3.23, p = .001).

Table 2. Comparison between the groups' means, Kruskal-Wallis tests, and effect sizes for the study's measures.

Variables	Group 1 *M* (*SD*)	Group 2 *M* (*SD*)	Group 3 *M* (*SD*)	χ^2 (*df*)	ε^2
Subjective knowledge	2.54 (0.92)	3.37 (0.71)	3.77 (0.65)	54.96 (2)***	0.25
CC concern	3.06 (0.97)	3.65 (0.79)	3.90 (0.72)	27.79 (2)***	0.12
Frequency the participant feels affected by CC	2.43 (1.80)	2.79 (0.95)	3.02 (0.97)	10.16 (2)**	0.03
Extent the participant feels negatively affected by CC	2.26 (0.94)	2.80 (0.90)	2.88 (1.04)	12.74 (2)**	0.04

Notes. ** p < .01; *** p < .001.

5. Discussion

The Portuguese formal education curricula embed CC, however, adolescents from Group 1 reported no prior learning about the topic in school, unlike the majority of their classmates. Future

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Keywords: *Adolescence, Climate Change, environmental engagement, formal education, perceptions.*

Introduction

Although it did not belong to the scope of this study, the data appears to align with research on gender differences in environmentalism (Gifford & Nilsson, 2014), indicating that adolescents who report no prior engagement or learning about CC tend to be male, while those involved with environmental groups tend to be female. Future research might consider gender while creating CC literacy strategies. Despite the small sample size, this study's findings on the key initial drivers for self-efficacy in climate action are relevant to educators (e.g., teachers, guardians). Adolescents seem to benefit from engaging in environmental-related activities in formal school and informal out-of-school settings.

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