1   Long title: **Education influences knowledge about environmental issues in Washington, DC, USA**

2   Short title: **Education and environmental knowledge**

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9   **ABSTRACT**

10   We predicted that demographic differences in Washington, DC's population would influence people's

11   knowledge and perceptions about the interconnectedness of natural resources, climate change,

12   economics, and socio-cultural well-being, so we conducted surveys over three years to test that

13   prediction. We collected demographic data from 455 participants and asked them 26

14   questions/statements related to natural resources, climate change, economics, and health. We selected

15   education as the focal demographic category and participants were categorized based on their level of

16   educational attainment: 1) completion of high school or less (hereafter "high school"); 2) some trade

17   school or university education beyond high school up to and including completion of a trade school,

18   two-, or four-year degree (hereafter "post-high school"); and 3) completion of a Master's, professional,

19   or doctoral degree (hereafter "advanced education"). Answers to 14 of the 26 survey questions were

20   dissimilar across educational groups. People with advanced education reported the highest connection

21   with the natural community and were more likely to report that their personal welfare depended on the

22   natural community. Participants in the high school group were more likely to believe that humans do

23   not have much influence on natural resources and placed more trust in technology and human

24   achievements to control nature and ensure that earth will not become unlivable. Compared to those

25   with education beyond high school, those with a high school education were more likely to express an

26   interest in local environmental concerns over global, jobs over natural resources, and effects of

27   degraded local natural resources on income, health, and the environment instead of on cultural/social

28   practices, neighborhood aesthetics, and recreation. The results suggest ways in which educational

29   information and engagement in environmental issues should be targeted for stakeholders of different

30   educational background in order to increase knowledge and build effective partnerships that find

31   solutions for environmental problems.

32   **INTRODUCTION**

33   Only 14% of the world's population lived in cities in 1900, but now over 50% live in cities and this

34   percentage is expected to reach 66% by 2050 [1]. The United States of America (USA) has an even higher

35   urban population than the world average: over 80% live in urban areas [2]. The urbanization of the

36   human population is happening simultaneously with worsening local and global environmental

37   problems, such as overexploitation and degradation of natural resources [3-4], population declines and

38   extinctions of other species [5-6], and climate change [7]. These environmental problems are

39   interrelated in often complex ways and have the potential to influence neighborhood aesthetics and a

40   person's economic well-being, health, cultural and social practices, and recreation [8-9]. Whereas

41   environmental knowledge does not necessarily lead people to take pro-environmental actions, tackling

42   environmental, and related economic, social, and cultural, problems may be more challenging if the

43   general public is under- or uneducated about the problems [10-12].

44   Cities can have a profound influence on natural resources and pollution within a region as well

45   as globally, which in turn can negatively affect human well-being [13-15]. Therefore, effective solutions

46   for sustainably using natural resources, curtailing climate change, and improving the lives of people

47   must consider the role that cities can play [8, 16-17]. Some city governments have been more proactive

48   than others in addressing environmental problems and the well-being of the city's inhabitants. For

49   example, London (UK) and Beijing (China) have made efforts to electrify transportation, including public

50   buses and taxis, in order to improve air quality [18] and Portland, Oregon is considered one of the most

51   advanced cities in the USA for climate planning because they have been conducting work on mitigation

52   since the 1990s [19]. Characteristics of proactive cities include a political culture that embraces

53   mitigation, a general public that has an awareness of environmental problems and advocates that their

54   political leaders act, and local experts that engage with government agencies [19].

55   Washington, DC is the capital of the USA and its District government has plans for sustainability,

56   improving air quality, adapting to climate change, reducing the government's carbon footprint, and

57   protecting wildlife and watersheds [20-21]. The District government also commissioned a study on the

58   linkage between urban heat islands and poor health [22]. These plans and studies may indicate that

59   Washington, DC has the characteristics of a proactive city because they seek to identify and mitigate

60   environmental problems and the associated impacts on people. However, little is known about

61   environmental knowledge and perceptions of residents in the Washington, DC area. Globally,

62   environmental knowledge and action are often correlated with demographic characteristics, such as

63   education, age, gender, and place of residence[23-26], and participation in group organizations [12].

64   Washington, DC has an extremely diverse population, there are large disparities among the

65   population in education, employment, income, health, and overall well-being [27], and distribution of

66   natural, manmade, and financial resources is unequal [21, 28]. Washington, DC is divided into eight

67   Wards, and people who live in eastern and eastern-central Wards typically have fewer resources, less

68   education, higher unemployment, lower income, and a higher rate of poor health indicators, such as

69   obesity, diabetes, heart disease, and a shorter lifespan, than those in western and western-central

70   Wards [27]. The population is also largely African American in the east and becomes predominantly

71   Caucasian in the west. We predicted that demographic differences in Wards throughout Washington, DC

72   would influence people's knowledge and perceptions about the interconnectedness of natural

73   resources, climate change, economics, and socio-cultural well-being, so we conducted surveys over

74   three years to test that prediction. Understanding what people know and perceive, and which

75   demographic characteristics may influence knowledge and perceptions, is key to designing effective

76   educational programs, engaging in collective conversations, and building effective partnerships that find

77   solutions for environmental problems and benefit the community.

78

79   **METHODS**

80   The survey included five demographic questions (i.e., age, education, ethnicity, gender, and place of

81   primary residence), and 26 open-ended, close-ended, and Likert scale questions/statements (hereafter

82   "questions") to assess knowledge and perceptions of the participants (Table 1, 2, 3). Some questions

83   were duplicated or adapted from the connectedness-to-nature-scale [29]. We also included a question

84   about whether the District government was spending the appropriate amount on health, workforce

85   development, education, protecting natural resources, developing natural resources, law enforcement,

86   and drug rehabilitation to see what people thought about spending for natural resources compared to

87   other priority areas (Table 3). We loaded the survey into the iSurvey app (Harvest Your Data, Wellington,

88   New Zealand) and trained undergraduate students in our classes at the University of the District of

89   Columbia to conduct face-to-face interviews during each fall semester from 2016-2018. We canvassed

90   11 neighborhoods in Washington, DC's eight Wards and solicited participants at transit stations,

91   businesses, libraries, homes, and along sidewalks. Participants were adults (≥ 18 years old) and were

92   selected because of their presence in the area only and without regard to any demographic category. In

93   total, 455 completed surveys were collected. A survey was considered complete once a participant was

94   read the final question, but it was not mandatory for the participants to answer every question.

95   Some demographic variables were potentially correlated (e.g., people in some Wards are also

96   likely from a certain ethnic group), so they were not all independent variables. Therefore, we ran

97   preliminary analyses using separate χ^2 contingency tests to determine whether the responses to two

98   questions differed according to age, education, ethnicity, gender, and place of primary residence. We

99   selected education as the focal demographic category because preliminary analyses found strong

100   differences in response to the statement that "human activities have little influence on natural

101   resources" ($P < 0.05$), whereas no strong differences in responses were found across other demographic

102   variables ($P > 0.05$).

103   Participants were categorized into one of three groups based on their level of educational

104   attainment: 1) completion of high school or less (hereafter "high school") (n = 177); 2) some trade

105   school or university education beyond high school up to and including completion of a trade school,

106   two-, or four-year degree (hereafter "post-high school") (219); and 3) completion of a Master's,

107   professional, or doctoral degree (hereafter "advanced education") (n = 59).

108   There were four open-ended questions that probed participants' perceptions of natural

109   resources (Table 1). We coded answers to each open-ended question in order to reduce all responses to

110   a limited number of categories. These response categories were analyzed using χ^2 contingency tests to

111   determine whether the responses differed among educational groups. Answers to the question "Can

112   you describe what natural resources are?" were coded to fit into four categories: natural resources,

113   creation, recycling, and none (Table 1). When the participant gave an example of a natural resource,

114   such as air, water, trees, land, this indicated that they understood what natural resources are and their

115   response was coded as "natural resources." Participants' answers that included terms such as God or

116   biblical phrases were coded as "creation." Answers that indicated a reuse or recycling of materials for

117   financial gain were coded as "recycling." Finally, responses that indicated that the participants were

118   unable to answer the question were coded as "no." Answers to the questions "What do you consider to

119   be the most important natural resource?" and "Which natural resources has been threatened the most

120   in your neighborhood?" were coded to fit into eight categories: air, water, soil, trees, land, energy/fossil

121   fuels, multiple resources, and other (Table 1). Participants' answers that included oil, fossil fuel, coal,

122   and gas were coded as "energy/fossil fuels." Participants' answers that included more than one natural

123   resource were coded as "multiple resources." The "other" category includes natural resources that were

124   infrequently mentioned, such as food, and resources that were not natural, such as education and

125   transportation. Answers to the question "Can you describe what climate change is to you?" were coded

126   to fit into four categories: weather patterns, human cause/reaction, climate change, and no.

127   Participants' answers that included weather change, temperature change, hotter or colder weather, or

128   similar statements were coded as "weather patterns." Participants' answers that voiced a human cause

129   or invoked a human emotion, such as scary or fear, were coded as "human cause/reaction."

130   Participants' answers that included climate change causes or effects (not including weather), such as

131   global warming, carbon emissions, greenhouse gases, and sea level rise, were coded as "climate

132   change." Finally, responses that indicated that the participants were unable to answer the question

133   were coded as "no."

134   We also used separate χ^2 contingency tests to determine whether the responses to the other 22

135   questions differed among educational groups. Sample size was sometimes fewer than the total number

136   of participants previously reported when a participant did not answer a question.

137

138   **RESULTS**

139   Participants across the three educational groups answered 14 questions dissimilarly (see Tables 1 and 2

140   for data supporting the results in this paragraph). Over 84% of participants in the post-high school and

141   advanced education groups were able to describe natural resources, whereas fewer than 67% of

142   participants in the high school group were able to do so. Participants in the high school group were

143   more likely to discuss recycling of materials for financial gain when asked to describe natural resources.

144   Over 60% of all participants discussed weather patterns when asked to describe climate change, but

145   those with advanced degrees or post-high school education also discussed other causes and effects of

146   climate change, whereas a greater percentage of those in the high school group were unable to describe

147   climate change. Over 80% of participants with advanced education somewhat or strongly agreed that

148   they think of the natural world as a community to which they belong, but only slightly over half of the

149   other participants agreed with this question. Similarly, those with advanced education were less likely to

150   feel disconnected from nature than other participants. Whereas over 70% of those with advanced

151   education somewhat or strongly disagreed that their personal welfare is not connected to the welfare of

152   the natural world, fewer than 60% and 42% of participants in the post-high school and high school

153   groups, respectively, felt similarly. A relatively low percentage of participants with an advanced (15.2%)

154   or post-high school education (20.1%) somewhat or strongly agreed that human activities have little

155   influence on natural resources, whereas 42.6% of participants in the high school group somewhat or

156   strongly agreed with this question. Those with the lowest educational attainment were also most likely

157   to somewhat or strongly agree that technological advances will ensure that we do not make the earth

158   unlivable (48.6% of the high school group versus 28.8-31.5% of other participants). Those with a post-

159   high school or high school education were more likely to strongly agree that humans are severely

160   abusing the environment than those with an advanced education, but 84.8% of those with an advanced

161   education selected that they somewhat or strongly agreed with this question compared to 72.9-80.4%

162   of other participants. Participants in the high school group were more likely to somewhat or strongly

163   agree that local environmental concerns are more important than global concerns (43% versus 23.7-

164   28.8% of participants with post-high school and advanced education). Participants with a post-high

165   school or high school education were more likely than those with an advanced education to strongly

166   agree that earth has plenty of natural resources if we just learn how to develop them. Those in the high

167   school group were also more likely than other participants to strongly agree that humans will eventually

168   learn enough about how nature works to be able to control it and to somewhat or strongly agree that

169   there is there is too much worry about natural resources and not enough about jobs. Those with an

170   advanced education were over twice as likely to be a member of a community organization or faith-

171   based group than all other participants.

172   Participants were asked whether degraded natural resources in their neighborhood had a

173   negative impact on income, health, environment, cultural/social practices, neighborhood aesthetics, and

174   recreation (see Table 2 for data supporting the results in this paragraph). More than two-thirds of

175   participants with an advanced education selected that local degraded natural resources negatively

176   impacted all of these except income. Income was selected by fewer than a third of participants with an

177   advanced education. Those in the post-high school group felt less strongly than those in the advanced

178   education group that degraded natural resources had an impact on these categories; however, more

179   than half still thought that local degraded natural resources negatively impacted health, environment,

180   neighborhood aesthetics, and recreation. Participants in the high school group felt less strongly than all

181   other participants that local degraded natural resources impact these categories, except for income.

182   More than half of these participants said that degraded natural resources negatively impacted income.

183   Health and the environment were the other two categories where more than half of those in the high

184   school group said that local degraded natural resources had a negative impact.

185   Participants across all educational groups answered 12 questions similarly (see Tables 1 and 2

186   for data supporting the results in this paragraph). All participants most frequently mentioned water as

187   the most important natural resource and the one most threatened in their neighborhood, followed by

188   air. Participants were more likely to agree that they had a strong knowledge of natural resources than

189   disagree, but the most common answer was "neutral." Participants frequently selected "neutral" to the

190   statement that natural resources in their neighborhood cannot support more people, with participants

191   with advanced education somewhat disagreeing with this statement and all others somewhat agreeing.

192   Participants also selected "neutral" most frequently to the statement that natural resources in their

193   neighborhood are plentiful. Over 66% of participants somewhat or strongly agreed that if things

194   continue on their present course, we will soon experience an environmental catastrophe, over 55%

195   somewhat or strongly agreed that climate change negatively impacts natural resources in their

196   neighborhood, and over 70% somewhat or strongly agreed that they understand that the natural

197   environment impacts their health. Over one-third of participants thought individuals had the most

198   responsibility to improve natural resources, followed by government entities (federal or district

199   government). Businesses, environmental groups, and community organizations were less frequently

200   selected. Approximately half the participants reported spending time outdoors frequently (5 days per

201   week) or almost daily, although those that belong to a faith-based or community organization said their

202   organization was outdoors infrequently (once per week).

203   Participants were also in agreement about spending by Washington, DC's government and most

204   frequently thought the government was spending "too little" on each of the seven priority areas (Table

205   3). All participants were especially likely to say that District government spends too little on education

206   (>60% of participants). Those in the high school group were also especially likely to say that too little

207   was spent on health (62.1% of participants). Over 54% of all participants thought District government

208   spent too little on protecting natural resources and over 46% thought too little was spent on developing

209   natural resources. Law enforcement was the priority area for which participants were least likely to say

210   that spending was too little.

211

212   **DISCUSSION**

213   People in Washington, DC had some similar knowledge and perceptions about the interconnectedness

214   of natural resources, climate change, economics, and socio-cultural well-being. Whereas survey

215   participants did not report having a strong knowledge about natural resources, most were able to define

216   natural resources, listed water and air as the natural resources that they were most concerned about,

217   indicated that the natural environment affects health, and reported that climate change negatively

218   impacts natural resources. What created similar knowledge and perceptions among participants is

219   unknown, but could be due to shared experiences, such as lived experiences and exposure to these

220   issues through education and the media, and/or shared values. In fact, nationally in the USA there has

221   been an increased awareness and concern about at least one major environmental issue: climate change

222   [30]. A national survey about climate change found that people are increasingly discussing it with family

223   and friends, regularly exposed to it in the media, and reporting that they feel the effects of climate

224   change and are harmed by them [30]. The participants in the national survey also expressed worry

225   about extreme weather events, especially those pertaining to water, such as flooding, drought, and

226   shortages [30]. Some of the similarities among participants in our survey in Washington, DC may be part

227   of the shifting attitudes and knowledge happening on a national scale. Additionally, the "biospheric

228   (concern for environment)" and "altruistic (concern for others and intrinsic value)" value orientations

229   influence responses to environmental issues and climate change [31], so the people in Washington, DC

230   may have similar values.

231   Despite some similarities among survey participants, educational attainment, as we predicted,

232   influenced people's knowledge and perceptions about the interconnectedness of natural resources,

233   climate change, economics, and socio-cultural well-being. Whereas most participants could describe

234   natural resources, a large percentage of those in the high school group could not. People with an

235   advanced education showed a greater understanding of climate change and its impacts, which is

236   consistent with a global survey that found that educational attainment was the strongest predictor of

237   awareness about climate change [32]. Those with an advanced degree were also most likely to report

238   that their personal welfare depends on the natural community and reported the highest connection

239   with the natural community. Connection to nature is often correlated with time spent outdoors [33], but

240   we found that time spent outdoors was similar across educational groups. We speculate that the type of

241   activities engaged in outdoors are more likely to result in a greater feeling of connectedness-to-nature

242   than the amount of time. We base this speculation on the fact that those with an advanced degree were

243   most likely to report that degraded natural resources impacted their recreation, which may indicate that

244   outdoor activities are more commonly recreational with this educational group compared to other

245   groups.

246   People in the high school group were most likely to believe that humans do not have much

247   influence on natural resources and placed more trust in technology and human achievements to control

248   nature and ensure that earth will not become unlivable; beliefs that are not uncommon [34], but likely

249   incorrect without concurrent changes to population growth and resource exploitation [35]. Compared to

250   those with education beyond high school, those with a high school education were also most likely to

251   express an interest in local environmental concerns over global, jobs over natural resources, and effects

252   of degraded local natural resources on income, health, and the environment instead of on

253   cultural/social practices, neighborhood aesthetics, and recreation. Education is correlated with

254   employment and income, with unemployment declining and income increasing with educational

255   attainment [36], which may explain why those with no education beyond high school are more

256   concerned about the local environment and its impact on jobs, income, and health. Vulnerable and

257   marginalized people, such as those who are undereducated, poor, in a minority racial or ethnic group,

258   and/or an immigrant are also disproportionately afflicted by climate change, a degraded environment,

259   and environmental hazards [37-40], so they may be more acutely aware of the local environment and its

260   effects on prosperity and well-being.

261   People afflicted by poor ecosystem health and degradation of natural resources need

262   educational opportunities, tools of empowerment to change their circumstances, and employment that

263   affords them to the choice to relocate or adapt, such as jobs in the clean energy sector. Results from the

264   survey suggest topics that could be emphasized through formal educational classes, cooperative

265   extension programs, traditional media, social media, and other platforms in order to increase knowledge

266   about environmental issues and their interrelationship with economics and socio-cultural well-being. For

267   example, understanding of natural resources is lower than climate change among all survey participants

268   and fewer than half the participants reported having a strong knowledge of natural resources, so natural

269   resources could be emphasized. Understanding of environmental issues, the influence of people on

270   natural resources, and the connection between the natural world and their personal welfare is lower in

271   people who have not had schooling beyond high school. Since as many as one-quarter of students

272   graduating from high school in the USA are completing a science curriculum that is below standard [41],

273   the deficiencies in knowledge may stem, in part, from lack of exposure in primary and secondary school.

274   The deficiencies could be addressed by providing opportunities for education. However, we found that

275   some environmental knowledge was relatively high even among the less educated group, which is

276   consistent with previous studies that show high awareness of environmental risks and support for

277   environmental protections regardless of education and across racial groups that may, on average, be

278   less educated than Caucasians [42-45].

279   Beyond education that creates awareness of environmental issues, people from diverse groups

280   must be given tools of empowerment that enable them to change their circumstances and demonstrate

281   pro-environmental actions, such as advocating for environmental policies. One way in which to

282   empower people is to recruit them into active roles in group organizations. Globally, environmental

283   knowledge and action are often correlated with participation in group organizations [12] and

284   participants in our study with an advanced degree generally had high environmental knowledge and

285   reported higher involvement in community or faith-based organizations. Ensuring that people with

286   lower educational attainment have equal opportunities to participate in group organizations may help

287   close the gap in environmental knowledge, provide a tool of empowerment to change their

288   circumstances and take pro-environmental actions. Mainstream environmental organizations have a low

289   percentage of non-white minorities on their staff [46] and the term "environmentalist" is associated

290   with well-educated and white people by minorities and Caucasians alike [45], so structural and

291   psychological barriers currently prevent diverse participation and representation.

292   Our results suggest that those wishing to lead collective conversations and build effective

293   partnerships that find solutions for environmental problems need to take the demographics of their

294   stakeholders into account. Stakeholders with advanced degrees may be likely to think and act more

295   globally and show more of an interest in curtailing environmental problems that have a negative impact

296   on their recreation, neighborhood aesthetics, and cultural/social practices. However, engaging

297   stakeholders with a high school education means shifting focus to local concerns and issues that have a

298   more immediate impact on their jobs and income. People with lower incomes will more likely want to

299   discuss mitigation and adaptation measures in their neighborhoods, such as improved emergency alerts,

300   access to government subsidies for air conditioners and energy-efficient appliances, stronger buildings

301   that withstand extreme weather, and more local agriculture and community gardens [47]. The negative

302   impacts of a degraded environment on health and the environment, especially air and water, are

303   common concerns that would likely be of interest to most of the population in Washington, DC,

304   regardless of their educational attainment. So, for example, increasing awareness among the population

305   in Washington, DC that degradation of the environment promotes poor air quality, which exacerbates

306   chronic illnesses, may prompt people to want to more thoroughly understand natural resources and

307   climate change. The survey participants indicated that individuals, followed by government entities,

308   have the greatest responsibility to improve local natural resources, so people should be empowered to

309   engage in the process of improving a degraded environment and taught how to advocate for changes

310   within the government.

311

312   **ACKNOWLEDGMENTS**

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Table 1. Open-ended questions that assessed knowledge and perceptions of people of different educational attainment in Washington, DC, USA about the interconnectedness of natural resources, climate change, economics, and socio-cultural well-being.

Survey question	Education (sample size)	Responses (%)								Statistics
Can you describe what natural resources are?		Natural resources	Creation	Recycling	No					χ^2= 15.4 df = 6 P = 0.018
	Advanced degree (59)	84.7	1.7	11.9	1.7					
	College/trade (219)	85.4	0.9	12.8	0.9					
	High school (177)	66.7	1.1	30.5	1.7					
What do you consider to be the most important natural resource?		Air	Water	Soil	Trees	Land	Energy / fossil fuels	Multiple resources	Other	χ^2= 18.8 df = 14 P = 0.17
	Advanced degree (59)	11.9	47.5	0	3.4	0	11.9	10.2	15.2	
	College/trade (219)	22.4	44.1	1.4	1.4	1.8	10.5	6.4	15.1	
	High school (177)	18.6	37.9	2.3	8.5	0	7.9	6.2	18.6	
Which natural resource has been threatened the most in your neighborhood?		Air	Water	Soil	Trees	Land	Energy / fossil fuels	Multiple resources	Other	χ^2= 15.6 df = 14 P = 0.34
	Advanced degree (59)	23.7	25.4	0	6.8	1.7	3.4	3.4	35.6	
	College/trade (219)	21.5	27.9	0	8.7	1.8	10.0	3.2	26.9	
	High school (177)	14.1	23.2	2.8	11.3	0.6	6.8	3.4	37.9	
Can you describe what climate change is to you?		Weather patterns	Human cause / reaction	Climate change	No					χ^2= 12.8 df = 6 P = 0.046
	Advanced degree (59)	66.1	15.3	11.9	6.8					
	College/trade (219)	61.6	12.3	18.3	7.8					
	High school (177)	64.4	9.0	8.5	18.1					

Table 2. Close-ended and Likert scale questions/statements that assessed knowledge and perceptions of people of different educational attainment in Washington, DC, USA about the interconnectedness of natural resources, climate change, economics, and socio-cultural well-being.

Survey question/statement	Education (sample size)	Responses (%)					Statistics
I have a strong knowledge of natural resources.		Strongly agree	Somewhat agree	Neutral	Somewhat disagree	Strongly disagree	$\chi^2 = 11.2$ df = 8 $P = 0.19$
	Advanced degree (59)	1.7	16.9	30.5	28.8	22.0	
	College/trade (219)	2.3	14.2	37.9	26.0	19.6	
	High school (177)	9.6	16.9	34.5	22.0	16.9	
I think of the natural world as a community to which I belong.		Strongly agree	Somewhat agree	Neutral	Somewhat disagree	Strongly disagree	$\chi^2 = 20.4$ df = 8 $P = 0.009$
	Advanced degree (59)	1.7	3.4	11.9	35.6	47.5	
	College/trade (219)	2.7	9.1	25.6	22.4	36.5	
	High school (177)	6.2	11.3	26.0	26.0	30.5	
I often feel disconnected from nature.		Strongly agree	Somewhat agree	Neutral	Somewhat disagree	Strongly disagree	$\chi^2 = 25.7$ df = 8 $P = 0.001$
	Advanced degree (59)	35.6	32.2	10.2	22.0	0	
	College/trade (219)	25.1	26.9	23.3	14.6	10.0	
	High school (177)	26.6	24.9	15.8	16.4	16.4	
My personal welfare is not connected to the welfare of the natural world.		Strongly agree	Somewhat agree	Neutral	Somewhat disagree	Strongly disagree	$\chi^2 = 30.0$ df = 8 $P < 0.001$
	Advanced degree (59)	52.5	18.6	16.9	6.8	5.1	
	College/trade (219)	32.4	27.4	21.5	12.3	6.4	
	High school (177)	23.2	18.6	22.0	21.5	14.7	
Human activities have little influence on natural resources.		Strongly agree	Somewhat agree	Neutral	Somewhat disagree	Strongly disagree	$\chi^2 = 54.0$ df = 8 $P < 0.001$

		Strongly agree	Somewhat agree	Neutral	Somewhat disagree	Strongly disagree	
	Advanced degree (59)	64.4	13.6	6.8	8.4	6.8	
	College/trade (219)	47.9	22.4	9.6	5.9	14.2	
	High school (176)	19.9	15.3	22.2	17.0	25.6	
Technological advances will ensure that we do not make the earth unlivable.		Strongly agree	Somewhat agree	Neutral	Somewhat disagree	Strongly disagree	$\chi^2 = 19.8$ df = 8 $P = 0.01$
	Advanced degree (59)	15.3	27.1	28.8	25.4	3.4	
	College/trade (219)	17.4	20.5	30.6	17.8	13.7	
	High school (177)	15.8	11.9	23.7	31.1	17.5	
Humans are severely abusing the environment.		Strongly agree	Somewhat agree	Neutral	Somewhat disagree	Strongly disagree	$\chi^2 = 17.0$ df = 8 $P = 0.03$
	Advanced degree (59)	6.8	1.7	6.8	40.7	44.1	
	College/trade (219)	2.3	6.8	10.5	25.1	55.3	
	High school (177)	6.8	7.3	13.0	20.9	52.0	
Local environmental concerns are more important than global environmental concerns.		Strongly agree	Somewhat agree	Neutral	Somewhat disagree	Strongly disagree	$\chi^2 = 18.3$ df = 8 $P = 0.02$
	Advanced degree (59)	10.2	23.7	37.3	23.7	5.1	
	College/trade (219)	20.5	22.8	32.9	14.6	9.1	
	High school (177)	13.6	15.3	28.2	24.9	18.1	
The natural resources in your neighborhood cannot support more people.		Strongly agree	Somewhat agree	Neutral	Somewhat disagree	Strongly disagree	$\chi^2 = 14.6$ df = 8 $P = 0.07$
	Advanced degree (59)	8.5	35.6	32.2	16.9	6.8	
	College/trade (219)	12.8	19.2	33.8	24.2	10.0	
	High school (177)	9.0	20.3	30.5	22.6	17.5	
The earth has plenty of natural resources if we just learn how to develop them.		Strongly agree	Somewhat agree	Neutral	Somewhat disagree	Strongly disagree	$\chi^2 = 18.4$ df = 8 $P = 0.02$
	Advanced degree (58)	1.7	10.3	17.2	46.6	24.1	
	College/trade (218)	8.3	8.7	13.8	31.2	38.1	
	High school (176)	3.4	7.4	19.9	26.7	42.6	

		Strongly agree	Somewhat agree	Neutral	Somewhat disagree	Strongly disagree	
Humans will eventually learn enough about how nature works to be able to control it.							$\chi^2 = 19.4$ df = 8 P = 0.01
	Advanced degree (59)	15.3	30.5	22.0	25.4	6.8	
	College/trade (219)	19.2	19.2	21.9	27.4	12.3	
	High school (177)	12.4	15.8	20.9	25.4	25.4	
If things continue on their present course, we will soon experience an environmental catastrophe.		Strongly agree	Somewhat agree	Neutral	Somewhat disagree	Strongly disagree	$\chi^2 = 9.9$ df = 8 P = 0.27
	Advanced degree (59)	5.1	6.8	15.3	40.7	32.2	
	College/trade (219)	3.2	4.6	20.0	26.9	45.2	
	High school (177)	4.5	10.2	18.6	26.0	40.7	
There is too much worry about natural resources and not enough about jobs.		Strongly agree	Somewhat agree	Neutral	Somewhat disagree	Strongly disagree	$\chi^2 = 49.4$ df = 8 P <0.001
	Advanced degree (59)	18.6	47.5	23.7	6.8	3.4	
	College/trade (219)	17.8	20.5	35.2	11.9	14.6	
	High school (177)	14.7	16.9	21.5	20.9	26.0	
Natural resources in my neighborhood are plentiful.		Strongly agree	Somewhat agree	Neutral	Somewhat disagree	Strongly disagree	$\chi^2 = 14.3$ df = 8 P = 0.07
	Advanced degree (59)	10.2	28.8	35.6	22.0	3.4	
	College/trade (219)	16.0	30.6	33.3	14.6	5.5	
	High school (177)	15.3	22.0	27.1	21.5	14.1	
Climate change has a negative impact on natural resources in my neighborhood.		Strongly agree	Somewhat agree	Neutral	Somewhat disagree	Strongly disagree	$\chi^2 = 4.7$ df = 8 P = 0.79
	Advanced degree (59)	3.4	13.6	23.7	35.6	23.7	
	College/trade (219)	4.6	9.1	31.5	27.9	26.9	
	High school (177)	4.5	15.3	24.9	28.2	27.1	
I understand that the natural environment		Strongly agree	Somewhat agree	Neutral	Somewhat disagree	Strongly disagree	$\chi^2 = 8.5$ df = 8

impacts my individual health.								$P = 0.38$
	Advanced degree (59)	3.4	6.8	13.6	25.4	50.8		
	College/trade (219)	1.8	1.8	10.5	28.8	57.1		
	High school (177)	4	8.5	17.5	23.2	46.9		
Degraded natural resources in my neighborhood has a negative impact on (select all that apply):		you or your family's income	you or your family's health	other parts of the local environment	your cultural or social practices	the aesthetics of the neighborhood	your recreation	$\chi^2 = 22.5$ df = 10 $P = 0.01$
	Advanced degree (59)	32.2	81.4	69.5	67.8	66.1	76.3	
	College/trade (219)	35.6	76.3	66.2	42.0	53.9	52.1	
	High school (177)	53.7	65.5	56.5	37.3	40.1	44.6	
Which people or groups do you think have the most responsibility for improving natural resources in your neighborhood?		Individuals	Community organizations	Businesses	Environmental groups	District government	Federal government	$\chi^2 = 17.3$ df = 10 $P = 0.07$
	Advanced degree (59)	35.6	5.1	16.9	15.3	13.6	13.6	
	College/trade (219)	36.1	5.0	9.1	7.3	15.5	26.9	
	High school (177)	35.6	6.2	5.1	9.0	13.6	30.5	
How often do you spend time doing outdoor activities?		Never	Very infrequently (once a week)	Occasionally (3 days a week)	Frequently (5 days a week)	Almost daily (>5 days a week)		$\chi^2 = 6.7$ df = 8 $P = 0.57$
	Advanced degree (59)	1.7	13.6	30.5	27.1	27.1		
	College/trade (219)	7.3	11.0	31.1	22.4	28.3		
	High school (177)	5.6	15.3	29.4	17.5	32.2		
Are you a member of a community or faith-based organizations in your neighborhood?		Yes	No					$\chi^2 = 35.6$ df = 2 $P < 0.001$
	Advanced degree (59)	33.9	66.1					
	College/trade (219)	67.1	32.9					
	High school (177)	72.3	27.7					

How often does your community or faith-based organization spend time doing outdoor activities?		Never	Very infrequently (once a week)	Occasionally (3 days a week)	Frequently (5 days a week)	Almost daily (>5 days a week)	$\chi^2 = 11.5$ df = 8 $P = 0.17$
	Advanced degree (38)	15.8	34.2	26.3	10.5	13.2	
	College/trade (72)	9.7	47.2	20.8	16.7	5.6	
	High school (49)	8.2	36.7	24.5	18.4	12.2	

Table 3. Responses of people of different educational attainment in Washington, DC, USA when asked "For each of the following categories,

answer whether you think the District government is spending too little, about the right amount, too much, undecided."

Category	Education (sample size)	Responses (%)				
		Too little	**About the right amount**	**Too much**	**Undecided**	**Statistics**
Health	Advanced degree (59)	54.2	30.5	5.1	10.2	χ^2 = 2.6
	College/trade (219)	58.9	26.5	2.7	11.9	df = 6
	High school (177)	62.1	26.5	2.7	11.9	P = 0.85
Workforce development	Advanced degree (59)	49.2	33.9	5.1	11.9	χ^2 = 1.7
	College/trade (219)	52.5	34.2	3.7	9.6	df = 6
	High school (177)	54.2	28.8	6.2	10.7	P = 0.95
Education	Advanced degree (59)	69.5	22.0	1.7	6.8	χ^2 = 3.3
	College/trade (219)	64.4	26.0	1.8	7.8	df = 6
	High school (177)	61.6	27.7	4.5	6.2	P = 0.78
Protecting natural resources	Advanced degree (59)	57.6	25.4	0	16.9	χ^2 = 6.5
	College/trade (219)	58.4	23.3	4.1	14.2	df = 6
	High school (177)	54.2	26.0	6.2	13.6	P = 0.37
Developing natural resources	Advanced degree (59)	57.6	27.1	1.7	13.6	χ^2 = 9.3
	College/trade (219)	55.7	22.4	5.0	16.9	df = 6
	High school (177)	46.9	26.6	10.7	15.8	P = 0.16
Law enforcement	Advanced degree (59)	28.8	30.5	23.7	16.9	χ^2 = 6.7
	College/trade (219)	30.6	26.5	32.9	10.0	df = 6
	High school (177)	32.8	25.4	33.9	7.9	P = 0.35
Drug rehabilitation	Advanced degree (59)	52.5	25.4	5.1	16.9	χ^2 = 3.1
	College/trade (219)	55.7	20.1	6.8	17.4	df = 6
	High school (177)	55.4	22.6	9.6	12.4	P = 0.79