Evaluating Pre-Service Teacher Workforce: Environmental Health Knowledge, Attitude, and Behavior

by

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Abstract

Research has shown that personal health behaviors and actions established early in life are often carried through adulthood. Thus, working with children to increase environmental health literacy may improve the environmental health literacy of future adults, potentially improving the health of the Nation. Given the amount of time children spend in school, this setting could be an ideal place to address environmental health with children. According to social cognitive theory, observation is one way in which learning takes place. Consequently, the environmental behaviors and attitudes modeled by teachers would likely impact the environmental behaviors and attitudes learned by students. A research study including 101 pre-service teachers from a large Midwestern university was conducted to determine participants' knowledge, attitudes, and behaviors regarding environmental health. Results indicated major deficiencies in basic knowledge as well as many unfavorable environmental behaviors. On average, participants answered only 49.7% of knowledge items correctly. Less than half (46.0%) recycle bottles or cans "often" or "almost always." Given these results, pre-service teachers are likely ill-prepared to address environmental health literacy in their classrooms. Teacher education programs need to address this deficiency in pre-service teachers through the implementation of new courses focused on environmental health or the redesign of current courses to include environmental health content.

Key Words: environmental health, pre-service teachers, social cognitive theory

Introduction

"Because the impact of the environment on human health is so great, protecting the environment has long been a mainstay of public health practice" (U.S. Department of Health and Human Service [USDHHS], 2000, p. 8-3). As such, environmental health continues to be a public health priority as exemplified by the presence of 24 national environmental health objectives outlined in Healthy People 2020 (USDHHS, 2010) and forty years of work by the Environmental Protection Agency (U.S. Environmental Protection Agency, 2011). Further, in the first seven months of 2010, state legislatures throughout the U.S. had introduced or carried over from the previous year more than 1500 environmental health bills (Farquhar, 2010). Despite the national attention that environmental health has received**,** progress in improving it has been mixed (depending on the environmental issue) (USDHHS, 2000).

Research has shown that personal health behaviors and actions established early in life often are carried through adulthood (Centers for Disease Control and Prevention [CDC], 2001). Therefore, working with younger age groups to improve personal health behaviors that impact the environment and to increase environmental health literacy may result in positive environmental health behaviors in adulthood, thereby improving the health of the Nation. Further, this approach harnesses the group of people characterized as "the greatest driving force behind the sustainability movement" (Gutter, 2009, p. 40).

Environmental health issues currently are and have been included in elementary school curricula (e.g. science, social studies, and other disciplines) in the past. Their inclusion, however, has neither been comprehensive nor cross curricular (McCrea, 2000). While youth may have positive feelings about the environment and a desire to engage in positive environmental behaviors, their ability to make sound environmental decisions and subsequently engage in pro-environmental behaviors needs improvement (McBeth & Volk, 2010). However, in some states where environmental education is required, many teachers are still not including it in their curriculum (Lane, Wilke, Champeau, & Sivek, 1994; Young & LaFollette, 2009). Some teachers cited they do not teach environmental education due to a lack of knowledge on the topic (Young and LaFollette, 2009) while other research indicated increased training on an environmental curriculum was associated with increased implementation of that curriculum (Paul & Volk, 2002). Further, environmental education materials and programs in schools have been criticized as being "emotional, unscientific, and biased" (McCrea, 2000, p. 4). If environmental health is left out of the national educational standards movement (McCrea, 2000), efforts to promote "environmental health literacy" may be unsuccessful.

One national study of colleges/universities (representing 42 states) found that most teacher education programs did not address environmental health topics within required coursework (Heimlich, Braus, Olivolo, McKeown-Ice, & Barringer-Smith, 2004). Among teacher education candidates, awareness of environmental education resources was reported as being low. Further, faculty and staff within teacher education programs reported environmental education teaching resources as one of the greatest perceived needs with regard to incorporating environmental health education into a teacher education program (Heimlich, et al., 2004). Similarly, another national study including 446 colleges/universities found that about half of the students in teacher education programs received some type of environmental education but, faculty and/or administration in the teacher education programs most often perceived the effectiveness of their program's environmental education as being poor or adequate (McKeown-Ice, 2000). However, research outside of the United States has noted improvements in pre-service teachers' environmental literacy during their course of study (Young & LaFollette, 2009) and found positive links between pre-service teachers' environmental backgrounds and environmental literacy (Tuncer et al., 2009).

According to Bandura's (1997) social cognitive theory (SCT), behavior, environmental factors, and personal factors all interact together affecting human behavior collectively. A change in any one factor will impact the others. One construct of SCT is observational learning and it indicates some behaviors are a result of observing the actions and outcomes of another person's behaviors. Given this theory, the behaviors and attitudes of teachers can have a profound impact on their students, particularly since many environmental health behaviors could be easily observed by students (i.e. recycling, sun protection, refuse disposal, litter removal, etc.). Further, SCT has been used for many years by health educators and behavioral scientist to inform the development behavior change strategies for a variety of populations (Glanz, Rimer, & Lewis, 2002). Given the potential for observational learning to take place in schools and the wide use and recognition of SCT in public health, SCT served as the theoretical basis for this study. The research question posed for this study was: What are the environmental health knowledge, attitudes, and behaviors of selected pre-service teachers.

Methods

Participants

A total of 101 pre-service teachers from a large Midwestern university completed the survey. The convenience sample was predominately female (n=67, 66.3%) and White (n=89, 88.1%). The entire sample reported being a senior in college and most participants were between the ages of 18 and 23 (n=81, 80.2%). The sample study was recruited from a teacher preparation program at a university that does not require an environmental health course as part of the curriculum.

Procedures

Upon approval from an Institutional Review Board, participants were recruited during regularly scheduled education major course class times. Trained researchers read a cover letter explaining the research study at the beginning of class and distributed surveys to volunteer participants. Upon completion of surveys, participants raised their hands and placed surveys into a manila envelope. After all surveys were returned, the envelope was sealed by the researcher.

Instrumentation

Survey items included 9 environmental health knowledge items, 16 belief and attitude items, and 17 behavior items. Demographic items also were included. Knowledge items were multiple response items and were coded as correct or incorrect, 1 and 0 respectively. Belief and attitude items used a Likert-type scale that ranged from “strongly agree” to “strongly disagree” and were coded from four to one. Behavior items used a Likert-type scale that ranged from “almost never” to “almost always” and were coded from one to four. Standard and reverse coding were used on behavior items so that the most favorable responses were coded with a four. Survey question areas were selected based on a literature review of articles from federal and academic sources, including the Centers for Disease Control and Prevention (CDC). Content validity was established with a literature review and was corroborated by experts in the field of environmental health to ensure the questions pertained to the core areas, as well as determining the appropriateness of the survey for use by undergraduate students.

Data Analysis

Frequencies and percentages were computed for each item. A total score was calculated for knowledge and behavior items. Scores were calculated by summing the numeric value of each response in the subscales. Descriptive statistics were computed on total scores, and a

Pearson's product moment correlation coefficient was computed for total scores.

Results

Environmental Health Knowledge

The knowledge item mean score was 4.47 (SD=1.19) or 49.7% correct. Possible scores ranged from 0-9**.** Of the nine knowledge items, five of them were answered incorrect more often than correct. Most notably, the item that questioned about the "number one risk factor for lung cancer among non-smokers" was answered incorrectly by 90.1% of participants who responded with something other than "radon." Conversely, the item answered correctly most frequently questioned about the "easiest and most effective way to avoid becoming ill" with 94.1% of participants who answered hand washing. See Table 1.

Environmental Beliefs and Attitudes

More than half of the participants (n=56, 55.4%) reported they "strongly agree" environmental health issues affected them and/or their family. Further, nearly 100% of participants (n=100, 99.0%) strongly agreed or agreed families should have an emergency plan, while 96% (n=96) strongly agreed or agreed families should have a 72-hour disaster supply kit. Overall, participants also felt "it should be illegal to smoke around children" with 85% (n=84) who strongly agreed or agreed with that statement. Responses were most mixed regarding confidence in the government to provide adequate response in an emergency such as flooding. A total of 53% of participants (n=53) strongly agreed or agreed they were confident the government would provide adequate response while 47% (n=47) were not confident in the government. See Table 2.

Environmental Behaviors

The behavior item mean total score was 42.59 (SD=5.85). Possible scores ranged from 17-68**.** Two of the most frequently reported favorable behaviors related to food consumption. A total of 53 participants (52.5%) reported they "almost always" washed fruits and vegetables prior to eating them. Further, 46 participants (45.5%) reported checking expiration dates prior to consuming foods. Other favorable behaviors included 69 participants (69.0%) not using hands free listening devices when using a cellular phone and 86 participants (85.1%) not smoking at least one cigarette per day. The most frequently reported unfavorable behavior was not checking or rotating emergency supplies with 70 participants (69.3%) who reported they "almost never" do. See Table 3**.**

Correlation Results

Pearson's product moment correlation coefficient (*r*) was computed to determine the relationship between total knowledge scores and total behavior scores. Alpha level was 0.05. A statistically significant correlation was found between these two variable (r =.246; p=.021).

Discussion and Recommendations

While researchers suspected the average score on knowledge items may be low, it was unexpected it would be below 50%. While it is not known how these scores compare to those in the general public, as only pre-service teachers were studied in this research, it seems unlikely the future teachers in this study will be able to adequately educate their students about environmental health as they themselves are not adequately educated. Further, low behavior scores make it unlikely they will model favorable environmental behaviors in front of their students. Given that some learning may take place through observation, according to social cognitive theory, (Glanz, Rimer & Lewis, 2002) these low behavior scores are troubling. Not only may students not learn to practice positive environmental health behaviors but they may observe negative behaviors and adopt them. These negative behaviors may then carry through to adulthood (CDC, 2001).

While environmental health attitudes and beliefs were mixed on many of the issues addressed in this study, an overwhelming majority of participants (85.1%) thought it should be illegal to smoke around children. This belief is not necessarily surprising given the chosen career path of participants. Presumably pre-service teachers would be concerned about the welfare of children and such a belief reflects this concern. Interestingly, while 91% of participants believed environmental health issues affected them and/or their families, behavior scores indicated limited favorable environmental health behaviors. There seemed to be some type of disconnection among participants between their beliefs and actions. However, this disconnection may be explained somewhat by the low knowledge scores as participants may be so limited in their knowledge they are not able to make informed, responsible decisions about environmental health issues. Another possibility may be that participants responded they believed environmental health issues affected them and/or their families because they believed this was the more socially acceptable response and wanted to appease the researchers. However, if participants were considered with social desirability regarding this response, it seems logical they also would have reported favorable behaviors more frequently than they did.

While knowledge does not necessarily predict behavior, in this study, a statistically significant correlation between environmental health scores and environmental behavior scores was noted. Including an environmental health course into teacher preparation programs or integrating environmental health content into existing courses could improve knowledge and may improve environmental health behaviors of future teachers. Additionally, for teachers already in classrooms, faculty in-services that include environmental health curriculum training may increase the likelihood of such material being addressed with students as this has been the case with other health education and environmental health curricula (Connell, Turner, & Mason, 1985; Fors & Doster, 1985; Paul & Volk, 2002).

This study does provide some valuable insight into the knowledge, attitudes and behaviors of pre-service teachers, but it is not without limitations. Some of the behavior items in the instrument may not adequately reflect overall environmental behaviors of participants. For example, there is no distinction between participants who responded “almost never” to items that address food preparation because they rarely prepare food versus those who responded “almost never” and frequently prepared food. Thus, further instrument development is needed and may include adding a “not applicable” response to some behavior items. Other limitations include the use of self-reported data which are subject to information biases and the use of a convenience sample. A more rigorous research design could be implemented in future studies to improve the credibility of results. Additionally, studies comparing pre-service teachers in programs with and without environmental health courses could determine the effectiveness of these courses in altering knowledge, attitudes, and behaviors. Follow-up studies of these pre-service teachers after graduation and in their own classrooms could be designed to determine if environmental health courses impacted what was being taught and even more significantly, the knowledge, attitudes, and behaviors of students in these classrooms.

Conclusion

Overall knowledge scores of pre-service teachers were low and were combined with limited favorable behaviors and mixed attitudes about environmental health issues. Given this circumstance pre-service teachers in this study appear ill-prepared to teach environmental health in their classrooms. However, further research is needed to confirm or deny these findings. If further research confirms the results of this study, a possible solution to improve professional preparation of pre-service teachers is to require an environmental health course in teacher education preparation programs. Research comparing pre-service teachers who have and have not taken an environmental health course would be beneficial.

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Table **1**

Frequencies and Percentages of Correct and Incorrect Responses to Environmental Health Knowledge Items (n=101)

Knowledge Item	**Frequency (n)**	**Percentage (%)**
In the U.S., the most frequent means of disposing solid waste		
is:	90	89.1%
Landfill	10	9.9%
Incorrect Responses		
Improper sewage treatment can cause:		
Cholera	26	25.7%
Incorrect Responses	75	74.3%
To prevent the possibility of food-borne illness, chicken		
should be cooked until it reaches an internal temperature of:		
170 degrees Fahrenheit	34	33.7%
Incorrect Responses	66	65.3%
The number one risk factor for lung cancer among non-		
smokers is:	9	8.9%
Radon	91	90.1%
Incorrect Responses		
Which of the following contributes to the greenhouse gas		
effect:	13	12.9%
Car exhaust	87	86.1%
Incorrect responses		
The easiest and most effective way to avoid becoming ill is:		
Frequent hand washing with soap and water	95	94.1%
Incorrect responses	5	5.0%
Triggers for asthma can include:		
All of the above (included cockroach infestation, mold,	84	83.2%
and secondhand smoke)	17	16.8%
Incorrect responses		

Note: Correct responses are in bold print. Percentages not totaling 100% indicate missing data

Table **1** (continue)

Frequencies and Percentages of Responses to Environmental Health Knowledge Items (n=101) (continued)

Item	Frequency (n)	Percentage (%)
Potential sources of radiation exposure include which of the following:	26	25.7%
All of the above (included TV and computer, ultraviolet light, and smoke detectors)	75	74.3%
Incorrect responses		
Integrated Pest Management utilizes:		
All of the above (included pesticides, insect repellant, and	73	72.3%
bio-control)	28	27.7%
Incorrect responses		

Note: Correct responses are in bold print. Percentages not totaling 100% indicate missing data

Table **2**

Frequencies and Percentages for Environmental Health Beliefs and Attitudes Items

Item	n	SA n(%)	A n(%)	D n(%)	SD n(%)
Environmental health issues affect me and/or my family.	101	56(55.4)	35(34.7)	9(8.9)	1(1.0)
Carbon dioxide (CO_2) causes global climate change.	100	27(27.0)	53(53.0)	15(15.0)	5(5.0)
Lead paint is not a major health concern.	100	2(2.0)	19(19.0)	38(38.0)	41(41.0)
I am concerned about the impact of radiation from frequent cell phone use.	101	7(6.9)	21(20.8)	54(53.5)	19(18.8)
Recycling has health benefits.	100	42(42.0)	52(52.0)	3(3.0)	3(3.0)
Chemical control of mosquitoes is effective.	96	9(9.4)	47(49.0)	35(36.5)	5(5.2)
Noise pollution is a problem.	98	11(11.2)	35(34.7)	41(41.8)	11(11.2)
I am confident that federal, state, and local governments will provide adequate response to an emergency such as widespread flooding.	100	9(9.0)	44(44.0)	32(32.0)	15(15.0)
Every family should have an emergency plan.	101	70(69.3)	30(29.7)	0(0.0)	1(1.0)
Every individual should have a 72-hour disaster supplies kit easily available.	100	49(49.0)	47(47.0)	3(3.0)	1(1.0)
Most global warming is caused by human actions.	101	32(31.7)	41(40.6)	23(22.8)	5(5.0)
I can easily find the number for the Poison Control Center.	101	26(25.7)	45(44.6)	27(26.7)	3(3.0)

Note: SA = Strongly Agree, A = Agree, D = Disagree, SD = Strongly Disagree

Table **2** (continue)

Frequencies and Percentages for Environmental Health Beliefs and Attitudes Items (continued)

Item	**n**	**SA n(%)**	**A n(%)**	**D n(%)**	**SD n(%)**
Living in a rural area is less risky than living in a suburban area.	101	17(16.8)	27(26.7)	47(46.5)	10(9.9)
It should be illegal to smoke around children.	100	52(52.0)	31(31.0)	14(14.0)	3(3.0)
Tap water is safe to drink.	100	33(33.0)	47(47.0)	16(16.0)	4(4.0)
Bottled water is safe to drink.	101	35(34.7)	57(56.4)	7(6.9)	2(2.0)

Note: SA = Strongly Agree, A = Agree, D = Disagree, SD = Strongly Disagree

Table **3**

Frequencies and Percentages for Environmental Health Behavior Items

Item	n	AN n(%)	S n(%)	O n(%)	AA n(%)
How often do you avoid being around secondhand smoke?	101	12(11.9)	19(18.8)	35(34.7)	35(34.7)
How often do you recycle your bottles and cans?	100	23(23.0)	31(31.0)	30(30.0)	16(16.0)
How often do you smoke a least one cigarette per day?*	101	86(85.1)	4(4.0)	2(2.0)	9(8.9)
In the past month, how often did you do so some type of exercise in which your heart was elevated for 20 minutes or more?	93	10(10.8)	33(35.5)	29(31.2)	21(22.6)
How often do you eat fish more than twice a month?*	101	46(45.5)	25(24.8)	20(19.8)	10(9.9)
How often do you check the expiration date before consuming food?	101	4(4.0)	15(14.9)	36(35.6)	46(45.5)
How often do you use a thermometer to check the internal temperature when cooking meat?	101	63(62.4)	22(21.8)	7(6.9)	9(8.9)
How often do you use head-phones or hands-free listening devices?*	101	29(28.7)	26(25.7)	25(24.8)	21(20.8)
How often do you use ear protection when around loud noises, such as while using a lawnmower or when attending a concert?	101	59(58.4)	22(21.8)	15(14.9)	5(5.0)
How often do you use a "re-usable" bag when you buy groceries?	101	53(52.5)	21(20.8)	16(15.8)	11(10.9)
How often do you check or rotate your emergency supplies?	101	70(69.3)	24(23.8)	5(5.0)	2(2.0)

*Reverse coded items
Note: AN = Almost Never, S = Sometimes, O = Often, AA = Almost Always

Table **3** (continue)

Frequencies and Percentages for Environmental Health Behavior Items (continued)

Item	**n**	**AN** n(%)	**S** n(%)	**O** n(%)	**AA** n(%)
How often do you use hands-free listening devices when using a cellular phone?*	100	69(69.0)	13(13.0)	13(13.0)	5(5.0)
How often do you "natural" (compost, manure) fertilizer instead of "chemical" fertilizers?	100	69(69.0)	16(16.0)	11(11.0)	4(4.0)
How often do you wash fruits and/or vegetables before eating?	101	7(6.9)	14(13.9)	27(26.7)	53(52.5)
How often do you check the batteries on your carbon monoxide detector and/or smoke alarm?	101	29(28.7)	37(36.6)	29(28.7)	6(5.9)
How often do you recycle your newspapers and other paper products?	101	40(39.6)	24(23.8)	24(23.8)	13(12.9)
How often do you recycle your batteries?	101	63(62.4)	18(17.8)	14(13.9)	6(5.9)

*Reverse coded items
Note: AN = Almost Never, S = Sometimes, O = Often, AA = Almost Always