An Exploratory Factor Analysis of the Water Conservation Domain of the Climate Change Action Inventory

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INTRODUCTION

- Climate change has exacerbated water scarcity.
- The Climate Change Action Inventory (CCAI; Barchard et al., 2021) measures direct and indirect actions people can take toward water conservation.
- The purpose of our research is to analyze the factors that underlie the Water Conservation domain of the CCAI.

METHOD

Participants

- 500 MTurk Workers from the United States were recruited through CloudResearch.
- After filtering we were left with 481 participants:
  - 278 Male, 200 Female, and 3 non-binary
  - Ages 19-76
  - 88.3% Caucasian/White, 8.1% African American/Black, 5.2% Asian, 1% Native American, 0.2% Native Hawaiian/Pacific Islander, 2% Other

Measures

- The Climate Change Action Inventory (CCAI; Barchard et al., 2021) measures the frequency of pro-environmental actions.
- The Water Conservation of the CCAI includes eight direct and indirect actions that individuals can take to conserve water
- The response options range from 1 (less than once a year) to 9 (at least 14 times a week).

Procedures

- Participants completed a 15-minute online study. They were compensated $3.

Data Analysis

- To determine if all items are related to the same general concept, we extracted the first principal component.
- To determine the number of factors, we considered our personal theory, the Kaiser-Guttman rule, the scree test, parallel analysis, and the minimum average partial (MAP) test.
- We examined several orthogonal and oblique rotations. We selected the direct oblimin rotation because it was the closest to the ideal of simple structure.

Water conservation: Easy actions are not a gateway to hard actions

RESULTS

- All items had salient coefficients on the first principal component (see Table 1).
- The Kaiser-Guttman rule, the scree test, and parallel analysis all indicated two factors. Therefore, we extracted two factors.
- The first factor represented easy actions that are taught in school, such as taking shorter showers.
- The second factor represented effortful actions that are not taught in school, such as turning off the water while soaping in the shower.
- These factors correlated .21.

DISCUSSION

- The CCAI Water Conservation Domain has strong factorial validity.
- It measures simple water conservation actions that are taught in schools, as well as more effortful actions.
- Schools should teach a wider variety of water conservation actions.

Table 1
First Principal Component

Item	Pattern Matrix Coefficient
Item 1	**.60**
Item 2	**.39**
Item 3	**.74**
Item 4	**.73**
Item 5	**.77**
Item 6	**.81**
Item 7	**.82**
Item 8	**.66**

Note. Salient pattern matrix coefficients are in boldface.

Table 2
Factor Analysis of the CCAI Water Conservation Domain

		Factor		
Item		1	2	h^2
Item 8	Give money or time to organizations working on conserving water	**-.39**	**.89**	.72
Item 7	Problem solve how to conserve water	-.03	**.86**	.72
Item 4	Turn off the water while soaping in the shower	-.14	**.83**	.63
Item 6	Encourage others to conserve water	.17	**.74**	.66
Item 5	Turn off the water while washing vegetables (or wash them in a bowl)	.28	**.64**	.60
Item 3	Turn off the water while washing your hands	**.35**	**.57**	.58
Item 2	Turn off the water while brushing your teeth	**.85**	-.05	.71
Item 1	Take shorter showers	**.66**	.26	.61

Factor Intercorrelations	1	2
Factor 1	1	
Factor 2	.31	1

Note. h^2 = communality. Salient factor pattern matrix coefficients are in boldface. No items were reverse-scored for this analysis. Factor 1 = Effortful, Factor 2 = Frugal.