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Using Cognitive Dissonance to Communicate with Hypocrites About Water Conservation and Climate Change

Melissa R. Taylor
University of Florida

Alexa J. Lamm
University of Florida

Lisa K. Lundy
University of Florida

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Abstract

The effects of climate change can be mitigated by altering human behavior related to water conservation; however, many who are aware of climate change are not aligning their behavior to curb the impact. This research sought to explore the relationship between citizens' beliefs, attitudes and behaviors regarding water conservation and their knowledge and beliefs regarding climate change to guide the development of effective communication campaigns focused on water conservation. Using cognitive dissonance theory and an adapted environmental attitudes and behavior quartet, this research focused on individuals who demonstrated high levels of climate change knowledge but did not engage in positive water conservation behaviors; referred to as Hypocrites. The findings revealed Hypocrites held different perspectives on climate change than the general public. They believed climate change was real and caused by humans but are doing little to curb their personal water use and are not taking personal action to mitigate the effects of climate change. The best communication sources to use in reaching these individuals was examined and discussed with recommendations offered for how to best engage the hypocritical group who should be most likely to change their water conservation behaviors.

Keywords

climate change, cognitive dissonance, environmental communication, public opinion, water conservation

Cover Page Footnote/Acknowledgements

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Introduction

Despite near unanimity about the existence of climate change from the science community, the United State's public opinion varies between those who believe to those who deny its existence (Donner & McDaniels, 2013). Scientists have confirmed that climate change is real, it is happening now, and humans are primarily to blame (Liu, Vedlitz, Stoutenborough, & Robinson, 2015). Research has shown individual attitudes about climate change are influenced by many factors including personal values, political ideology, current events, media coverage and risk perception (Donner & McDaniels, 2013). The discrepancy between public opinion and scientific evidence has generated concern given the public makes everyday choices about their use of natural resources including water, which is affected a great deal by climate change (Guy, Kashima, Walker, & O'Neill, 2014). While the planet warms, the hydrological cycle will intensify causing wet regions to get even wetter and dry regions drier (Famiglietti, 2016). The Intergovernmental Panel on Climate Change (2013) is highly confident that the contrast between wet and dry regions and wet and dry seasons will increase over most of the world.

Areas affected by drought have become the most concerning. In the last decade, there has been an increased interest and attention towards water security, reflected in the numerous publications, research, and funding initiatives focused on the topic (Bakker, 2012; Cook & Bakker, 2012; Pahl-Wstol, Gupta, & Bhaduri, 2016; UNESCO-IHE, 2009; World Economic Forum, 2011). It has been predicted that by 2050 one-third of all U.S. counties will face water scarcity (Spencer & Altman, 2010). The length and location of droughts have increased due to climate change and this trend is projected to continue into the future (Burke, Brown, & Christidis, 2006). In addition, global demands on water continue to rise due to population increases, agricultural needs, and industrial demands (Kingsolver, 2010). Water supports human life, sustains the ecological balance, and supports economic activities around the world (Hurlimann, Dolnicar, & Meyer, 2009), therefore it must be protected. People can witness the direct effect climate change has on water, therefore water issues associated with climate change are garnering a great deal of public attention.

Unfortunately, the scientific community has not fully and effectively communicated the science behind climate change and its link to water resources to the general public (Liu, Smith, & Safi, 2014). When scientists discuss climate change they are often referring to a set of complex variables and topical areas which may include ocean levels, temperature, annual rainfall, and atmospheric pressure (Werndl, 2015) that seem ambiguous to the general public and not something they directly impact with their behaviors. However, Martinsson and Lundqvist (2010) found that knowledge levels of climate change did impact their respondents' attitudes towards water conservation and guided individual water conservation behavior engagement.

Agricultural communicators have encouraged communities to implement water conservation solutions for the sake of saving water for the future (Gorham, Lamm, & Rumble, 2014; Lenton & Muller, 2009; Warner, Rumble, Martin, Lamm, & Cantrell, 2015). However, most water conservation practices occur at the individual level and understanding factors that lead to positive water conservation attitudes have proven to be difficult to measure (Lamm, Lamm, & Carter, 2015; Leal, Rumble, & Lamm, 2015). Communication campaigns focused on future water supply levels with an emphasis on climate change may assist in the promotion of water

conservation behaviors necessary to ensure communities have enough water to meet future needs (Evans et al., 2015). Agricultural communicators may be able to increase engagement in water conservation behavior engagement by focusing on communicating about climate change, a topic often overlooked or avoided and not included in water discussions. Therefore, this study sought to explore the connection (or disconnect) between public beliefs and attitudes about water conservation and knowledge and beliefs regarding climate change to guide the development of effective communication campaigns focused on water conservation.

Conceptual Framework and Literature Review

The theory of cognitive dissonance suggests individuals tend to feel uncomfortable when their behavior and beliefs contradict one and another (Festinger, 1957). Cognitive dissonance (Festinger, 1957) guided the development of a conceptual framework for this study, which sought to understand the disconnect between individuals holding a high level of climate change knowledge and yet not engaging in positive water conservation practices. Martinsson and Lundqvist (2010) stated 'the importance of consistency in the environmental field and the amount of dissonance produced by behaving inconsistently has been found to depend on the person's moral standards for environmentally responsible behavior' (p. 522). Furthermore, Thogersen (2004) found individuals often self-report dissonant environmental behaviors because they fail to perceive the relevant similarity between the behaviors (example: buying organic and recycling). He advocated for communicating to citizens the environmental significance of daily individual behaviors.

When it comes to climate change people typically begin in a state of disinterest about the climate and exhibit little or no interest in changing their behavior (Markowitz & Doppelt, 2009). This tends to be caused by a lack of information and the idea that individual behaviors will do little to mitigate the global situation (Markowitz & Doppelt, 2009). Providing individuals with knowledge about climate change, and emphasizing their personal role, may enable them to make the decision most suitable to their beliefs and behaviors. Based on previous research 'environmental choices are not reflective of a general conservation stance, but are instead made on an activity-to-activity basis' (Picket, Kangun, & Gorve, 1993, p. 240). Additionally, studies have shown cognitive dissonance can produce behavior that is environmentally friendly (Aitken, McMahon, Wearing, & Finlayson, 1994).

A conceptual framework was introduced by Martinsson and Lundqvist (2010) that identified individuals who practiced green habits and whether or not those practices correlated with their attitudes toward the environment. Green habits are defined as behaviors that seek to limit an individuals' ecological footprint (Dobson, 2007). Martinsson and Lundqvist (2010) created an environmental attitudes and behavior quartet. Using this quartet there are four possible combinations of attitudes and behaviors that can be identified. Two of these groups show consistent attitudes and behaviors while the remaining exhibit inconsistent patterns leading to cognitive dissonance. The conceptual framework was adapted to address climate change for this study and can be seen in Figure 1.

Combinations of climate change knowledge and conservation behavior engagement within the conceptual framework lead to four theoretical categories of individuals in terms of environmental attitudes and conservation behaviors: Believers, Diehards, Hypocrites and Coverts (Martinsson & Lundqvist, 2010). Believers are identified as those who possess high levels of climate change knowledge and exhibit positive water conservation behaviors. Believers reflect

consistency when it comes to their attitudes and behaviors (Martinsson & Lundqvist, 2010). In this case, Believers trust climate change is happening and is influenced by humans. They also practice positive water conservation behaviors and actions. Diehards also exhibit consistency between knowledge and behaviors, however, these individuals hold low levels of knowledge of climate change and do not exhibit positive water conservation behaviors (Martinsson & Lundqvist, 2010). Diehards typically act with a disregard towards climate change and water conservation behaviors.

Conservation Behaviors	Climate Change Knowledge
Coverts *Individuals holding low levels of climate change knowledge but exhibit positive conservation practices*	Believers *Individuals holding high levels of climate change knowledge and exhibit positive conservation practices*
Diehards *Individuals holding low levels of climate change knowledge and do not exhibit positive conservation practices*	Hypocrites *Individuals holding high levels of climate change knowledge but do not exhibit positive conservation practices*

Figure 1. *Climate Change Quartet Conceptual Framework (adapted from Martinsson and Lundqvist, 2010)*

On the other side of the model, there are two categories with inconsistencies between beliefs and behaviors. One is the Hypocrites. Hypocrites express high levels of climate change knowledge but do not engage in positive water conservation behaviors. Based on Festinger's (1957) theory this group exhibits the highest level of cognitive dissonance. Hypocrisy is not uncommon in the realm of conservation behavior. This discrepancy can produce behavioral changes, especially when the relationship between knowledge and behavioral actions is deemed hypercritical (Dickerson, Thibodeau, Aronson, & Miller, 1992; Rubens, Gosling, Bonaiuto, Brisbois, & Moch, 2015). Researchers have even purposefully induced hypocrisy in order to examine its ability to change intentions and behaviors (Aronson, Fried, & Stone, 1991; Priolo et al., 2016).

The last group is the Coverts that engage in water conservation behaviors but have low levels of climate change knowledge (Martinsson & Lundqvist, 2010). This last group also exhibits a high level of cognitive dissonance in relation to their knowledge and behaviors and are most likely engaging in water conservation behaviors for reasons other than climate change.

Purpose and Research Objectives

The purpose of this study was to explain cognitive dissonance in persons from the general public who display characteristics and traits of Hypocrites. This knowledge will then be used to develop agricultural communication initiatives targeted at Hypocrites in order to alter their water conservation behavior. The research objectives were as follows

Research Objective 1:
Describe Hypocrites knowledge of climate change.

Research Objective 2:
Describe Hypocrites perception of climate change.

Research Objective 3:
Describe Hypocrites level of engagement in water conservation behaviors.

Research Objective 4:
Identify the sources Hypocrites use to get information about water issues.

Methods

The research presented here was part of a larger research project with four sections germane to the objectives of the study. The researchers used a web-based survey to collect data that included several elements from already existing, reliable instruments including the Canadian water attitudes survey (Patterson, 2012) and the American Knowledge of Climate Change survey (Leiserowitz, Smith, & Marlon, 2010). The latter survey was used in Yale's 2010 Climate Change Communication report: *Americans' Knowledge of Climate Change* (Leiserowitz et al., 2010).

To measure levels of climate change knowledge test consisting of eleven statements where respondents were asked to indicate whether each statement was true or false was utilized. This scale originated from the American Knowledge of Climate Change survey (Leiserowitz et al., 2010) found to be reliable in the literature with coefficients ranging from .72 to .86. For every correct answer, the respondents were given a score of one and an incorrect answer was given a zero. The responses were summed to create an overall climate change knowledge score ranging from zero to 11 (M = 7.30 SD = 2.43). Reliability was calculated *ex post facto* using a Guttman split-half test resulting in a reliability coefficient of .70.

To identify perspectives on climate change, respondents were asked to select which of the three statements they personally believed: (a) climate change is happening now, caused mainly by human activities, (b) climate change is happening now, caused mainly by natural forces, and (c) climate change is NOT happening. This question was adapted from the American Knowledge of Climate Change survey by Leiserowitz et al. (2010) and reported descriptively.

To measure water conservation behavior engagement, respondents were asked to respond to two sets of statements. These statements originated from the Canadian water attitudes survey (Patterson, 2012). The first set contained 10 statements pertaining to water conservation activities where respondents were asked to indicate how often they engaged in each behavior on a five-point Likert scale ranging from 1 = *Never*, 2 = *Almost never*, 3 = *Sometimes*, 4 = *Almost every time*, and 5 = *Every time*. Example statements included: 'I shower for no more than five minutes each time I bathe,' 'I let my sprinklers run when it has rained or is raining,' and 'I allow used motor oil to run down a storm drain.' The second set contained six statements asking respondents to indicate if they engaged in water conservation behaviors by answering 'yes'or 'no' to each statement. Example statements included 'I have low-flow shower heads installed in my home,' 'I have water-efficient toilets installed in my home,' and 'I have low-water consuming plant materials in my yard.'

A total engagement score for water conservation behaviors was assigned to each respondent by adding up the number of positive behavior experiences they reported. For the first set of statements those who answered 'almost every time' or 'every time' received one point. Three of these statements were reverse coded to reflect a positive answer: 'I turn off the water every time I brush my teeth,' 'I avoid watering my lawn in the summer,' and 'I shower for no more than five minutes each time I bathe.' From the second set, each 'yes' response was given one point as well. The responses were summed to create an overall score ranging from zero to 16 (M = 7.48, SD = 3.31). Reliability was calculated *ex post facto* using a Guttman split-half test resulting in a reliability coefficient of .68.

Finally, respondents were asked to identify where they received information about water issues in the U.S. Respondents were given a list of 13 possible information sources and allowed to check all that applied. Those sources included newspaper, social media, Internet, magazine, farming organizations, family/friends, attending events/activities, governmental websites, self-observation, television, radio, other, or none of the above. Prior to distribution, a panel of experts reviewed the survey instrument for internal validity. The panel included an Assistant Professor and Extension Specialist in Water Economics and Policy, the Director of the UF/IFAS Center for Public Issues Education in Agriculture and Natural Resources, and an Assistant Professor specializing in survey methodology.

The population of interest was U.S. residents aged 18 or older. Non-probability opt-in sampling techniques were used. A third party public opinion research company, Qualtrics, distributed the survey by sending a link to 2,703 U.S. residents. Respondents had to meet certain criteria based on the sampling procedure to enter the survey and pass a series of quality checks to complete the survey to ensure cognitively responsive results. After criteria-based selection and quality assurance, a 39% participation rate was obtained (N = 1,050). Demographic questions were included in the survey instrument to ensure the collected sample reflected the U.S. adult population and were geographically representative of the nation. In addition, the data were weighted using the 2010 U.S. Census for age, gender, and race/ethnicity to ensure the respondents were representative of the population of interest (Kalton & Flores-Cervantes, 2003). This is a common procedure when using non-probability sampling to ensure accuracy and alleviate the impacts of selection, exclusion, and bias (Baker et al., 2013). The results were analyzed descriptively using the Statistical Package for the Social Sciences (SPSS) version 23 and Excel.

Results

Hypocrites Knowledge of Climate Change

Scores for the climate change knowledge questions were averaged to create an overall climate change knowledge index that could range from zero to 11. Based on the climate change index mean score of 7.30 a response of seven or higher indicated a high level of climate change knowledge (Table 1). Next, an overall water conservation index was created ranging from zero to 16. Based on the water conservation behavior index mean score of 7.48 a response of six or lower indicated the respondent exhibited negative conservation behaviors. Respondents with high levels of climate change knowledge and poor water conservation behaviors were labeled Hypocrites (Figure 2). The 233 respondents that fell into this category were used for further analysis.

Table 1
Climate Change Knowledge Level and Level of Water Conservation Behavior Engagement

	Knowledge Quiz[a] *M* (*SD*)	Water Conservation Behaviors[b] *M* (*SD*)
Believers (*n* = 429)	8.78 (1.27)	9.84 (2.03)
Hypocrites (*n* = 233)	9.01 (1.28)	3.98 (1.72)
Coverts (*n* = 213)	4.59 (1.43)	9.26 (1.87)
Diehards (*n* = 175)	4.67 (1.25)	4.15 (1.65)

Note. [a]Scale ranged from 0 = *no knowledge* to 16 = *complete knowledge;* [b]Scale ranged from 0 = *no engagement* to 11 = *complete engagement*.

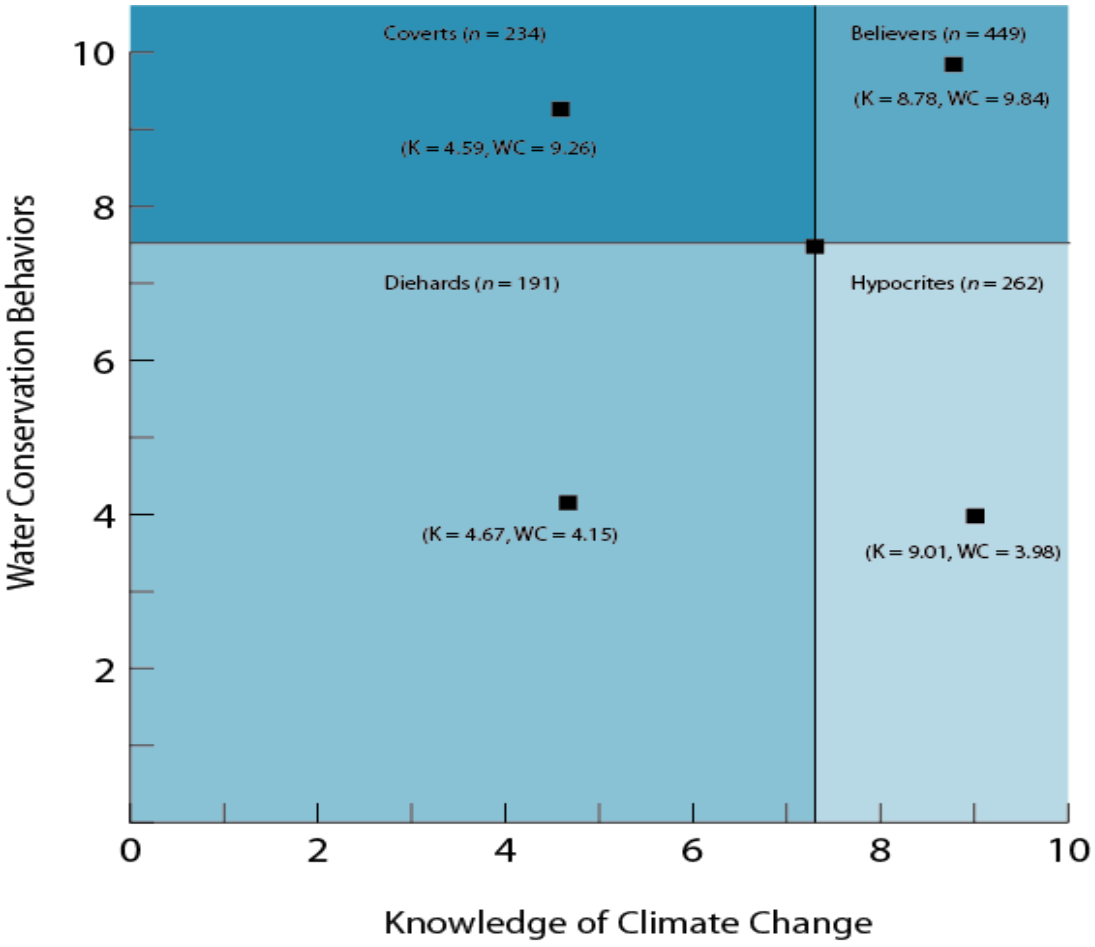

Figure 2. Climate Change Quartet

Demographically, the Hypocrites were slightly more female (52.9%) than male. In addition, Hypocrites were well educated with 46.9% having at least a 4-year college degree or a Graduate/Professional degree. Hypocrites tended to report being liberal or very liberal (34.8%) and were young (Table 2).

Table 2
Demographics of Overall Respondents and Hypocrites

	Overall (N = 1,050) %	Hypocrites (n = 233) %
Sex		
Female	51.2	52.9
Male	48.8	47.1
Education		
Less than 12th grade	1.7	.7
High School/GED	21.6	19.7
Some college, no degree	24.9	20.8
2-year college degree	13.3	11.9
4-year college	26.2	31.1
Graduate/Professional degree	12.4	15.9
Race		
White	66.9	64.5
Black	11.6	11.1
Asian or Pacific Islander	5.0	6.3
Multiracial	1.4	3.3
Native American	0.7	0.7
Other	0.2	.3
Hispanic Ethnicity	14.2	13.8
Political Beliefs		
Very Liberal	10.1	9.0
Liberal	18.5	25.8
Moderate	45.4	52.1
Conservative	17.8	10.9
Very Conservative	8.3	2.2
Political Affiliation		
Republican	26.1	20.2
Democrat	38.1	41.9
Independent	25.3	25.4
Non-Affiliated	9.9	12.2
Other	.5	.2
Age		
20-29	18.2	28.9
30-39	17.1	21.3
40-49	18.6	16.5
50-59	17.9	11.5
60-69	12.5	8.6
70-79	7.1	5.5
80+	8.7	7.8

Hypocrites Perception of Climate Change

In addition to knowledge level being measured quantitatively using a test, perceptions of climate change were also examined descriptively using a categorical question. Hypocrites were likely to believe climate change was happening now and caused mainly by humans. There were a relatively low number of Hypocrites that believed climate change was caused by natural forces (18.6%) or not happening at all (Table 3).

Table 3
Perceptions of Climate Change

	Overall (*N* = 1,050) %	Hypocrites (*n* = 233) %
Climate change is happening now and caused mainly by humans	63.7	79.4
Climate change is happening now, caused mainly by natural forces	29.6	18.6
Climate change is not happening now	6.7	2.0

Hypocrite Engagement in Water Conservation Behaviors

Respondents were asked to identify their level of engagement in water conservation behavior efforts with a series of 16 statements. The first ten statements represented water conservation actions. The highest reported negative water conservation actions Hypocrite respondents reported being engaged in were leaving the water running in the kitchen when washing dishes (45.0%), showering for longer than five minutes (42.8%), never turning off the water while brushing teeth (33.6%), and watering the lawn in the summer (32.2%) (Table 4).

Table 4
Hypocrites Engagement in Water Conservation Actions (n = 233)

	Never/ Almost Never %	Sometimes %	Almost Every Time/ Every Time %
I leave the water running in the kitchen when washing or rinsing dishes	23.6	31.4	45.0
I shower for no more than five minutes each time I bathe	42.8	26.8	30.4
I turn off the water while brushing my teeth	33.6	23.1	43.3
I avoid watering my lawn in the summer	32.2	39.3	28.5
I allow soapy water to run down a storm drain	44.0	26.4	29.6
I allow oil from cooking to run down the drain	56.2	26.9	16.9
I let my sprinklers run when rain is predicted in the forecast	69.1	18.6	12.2
I allow used motor oil to run down a storm drain	85.9	3.8	10.3
I hose down my driveway	65.5	27.0	7.5
I let my sprinklers run when it has rained or is raining	79.6	13.4	7.0

The second series of questions focused on water conservation behaviors. The highest reported negative water conservation behaviors included Hypocrite respondents not doing the following: using recycled wastewater/reclaimed water to irrigate lawns (97.2%), using rain barrels to collect water for use in garden or lawn (96.8%), donating money to a nonprofit to provide drinking water to another country (90.7%) and having low-water consuming plant materials in their yard (88.4%). These results are shown in Table 5.

Table 5
Hypocrites Engagement in Water Conservation Behaviors (n = 233)

	Yes *%*	No *%*
I use recycled wastewater/reclaimed water to irrigate my lawn/landscape	2.8	97.2
I use rain barrels to collect water for use in my garden/lawn	3.2	96.8
I have donated money at least once in the past five years to a nonprofit that works to provide access to drinking water in another country.	9.3	90.7
I have low-water consuming plant materials in my yard	11.6	88.4
I have low-flow shower heads installed in my home	21.0	78.3
I have water-efficient toilets installed in my home.	26.4	73.6

Sources Hypocrites use to get Information about Water Issues

Respondents were asked where they retrieved their information about water. The results from the Hypocrites are displayed in Table 6. Hypocrites were most likely to obtain their information about water issues from the Internet, television, or social media.

Table 6
Sources Hypocrites use to get Information about Water Issues (n = 233)

	%
Internet	62.6
Television	56.1
Newspaper	45.0
Social Media	43.4
Family and Friends	21.2
Self-Observation	21.8
Radio	16.7
Governmental Website	10.8
Magazine	8.5
Farming Organization	3.8
Attending Events/Activities	1.5

Conclusions and Recommendations

This study sought to identify the Hypocrites who had a high level of knowledge about climate change but were not practicing water conservation behaviors so their cognitive dissonance could be addressed with targeted agricultural communication campaigns. Demographically, the findings revealed Hypocrites were younger, liberal (possibly Democratic)

females who are highly educated. These results are comparable to similar studies focused on environmental conservation; the results also suggested that focusing studies specifically on climate change does not alter the target Hypocrite audience and that future educational initiatives can be targeted towards this audience (Liu et al., 2014; McCright & Dunlap, 2011; Milfont, Milojeve, Greaves, & Sibley, 2015).

The results revealed Hypocrites believed climate change was real and caused by humans but are doing little to curb their personal water use and are not taking personal action to mitigate the effects of climate change. For example, Hypocrites are likely to allow cooking oil to run down the drain, a serious water quality issue, and allow the faucet to run while brushing their teeth. Both of these behaviors are simple to alter.

In addition, a large percentage are also watering their lawn after it rains/if rain is predicted, which uses three gallons of water per minute (University of Florida IFAS Extension, 2016), are not reducing their showering time, which equates to 30-75 gallons per 15 minute shower (United States Geological Survey, 2016) and continue to leave the faucet running while doing dishes, a possible usage of 8-27 gallons (United States Geological Survey, 2016). Since these behaviors are those where the largest impact can be made, agricultural communication materials should focus on trying to alter these targeted behaviors. Based on cognitive dissonance theory (Festinger, 1957), Hypocrites should want to adjust their behavior to more closely align with their beliefs so targeted communication efforts to the younger, liberal, more highly educated population should have the largest effect.

The results also revealed Hypocrites are getting their information about water issues from the Internet followed by television. Agricultural communicators should consider utilizing targeted social media campaigns during times of water restriction. Attention is already paid to water issues and the media buzz can be leveraged to encourage specific behavior engagement. Social media outlets, such as Facebook, can target campaigns to specific users. Agricultural communicators should consider utilizing these avenues to send specific messages about minimizing shower time, shutting off the faucet when brushing teeth and minimizing water use when washing dishes. They may want to consider partnering with organizations whose websites or social media outlets are visited by a younger liberal clientele in an effort to reach Hypocrites specifically. Hypocrites can become Believers if steps are taken to encourage them to rectify inconsistencies between their beliefs and actions (Martinsson & Lundqvist, 2010).

In order to reduce dissonance, continued exposure targeted at the Hypocrite demographic audience may encourage understanding of why particular habits are damaging and should be addressed. Specifically, targeting some of the behaviors that are simple to alter is suggested. For example, the social media efforts previously described could address the fact that Hypocrites may not know the damage their behaviors cause. It is important to inform them of the hazards of pouring cooking oil down the sink such as the possibility of it clogging household pipes and potentially leading to sewage overflows, resulting in damaged local waterways (Harris County Water Protection Group, 2016). The oil can also cause disruption at water treatment facilities, form toxic products that linger in the environment and cause devastating physical effects to animal and wildlife areas (Environmental Protection Agency, 2016). Preventing Hypocrites (and others) from pouring oil down the drain will help minimize negative water quality issues. The other simple behavior to alter is turning off the water while brushing their teeth. This can save up to four gallons of water per day, potentially 120 gallons per month (Texas A&M Agrilife Extension, 2013).

Agricultural communicators could create infographics to be shared online and in print that stresses the importance of protecting water resources in terms of quality or quantity. Communicators can help motivate Hypocrites to promote the adoption of better water habits. Working directly with this target group may also increase researchers' understanding of why this specific group's actions are incongruent with their beliefs.

Water issues related to climate change are happening across the nation and are becoming a priority for many states. Future research could be conducted to further understand why the public does not believe in or understand climate change and how to leverage climate change knowledge to alter behavior. An in-depth analysis of Hypocrites, specifically, may provide additional data on how to access and initiate change within this audience. A qualitative approach using focus groups or in-person interviews with Hypocrites in different regions of the U.S. could be used to further understand if there are regional differences and how Hypocrites want to be communicated with about climate change and water conservation behavior engagement. If focus groups were conducted, a pre/post test could be used to determine if the simple act of meeting in a group with likeminded individuals altered their perceptions regarding their personal water behaviors. Communication materials, including the social media messages recommended earlier, could also be tested using experimental designs with Hypocrites to identify which would be best to utilize broadly to encourage behavior change.

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ABOUT THE AUTHORS

Melissa Taylor was a Research Assistant in the UF/IFAS Center for Public Issues Education when this research was conducted. She is currently a research consultant based in Southern California.

Alexa Lamm is an associate professor in the Department of Agricultural Education and Communication at University of Florida.

Lisa Lundy is an associate professor in the Department of Agricultural Education and Communication at University of Florida.