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Using Cognitive Dissonance to Theoretically Explain Water Conservation Intentions

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Abstract

Water is a scarce resource in Florida. There is an immediate need to reduce the stress on water resources and make the availability of water more sustainable by encouraging engagement in water conservation among the residents of Florida. This study examined how the future intentions of high water users in Florida] to conserve water outdoors were influenced by cognitively dissonant attitudes and behaviors. The independent variables used in the study were: government trust, current water conservation practices, political beliefs, and homeowners' associations (HOA) membership. The results to study indicated that higher trust in government and current engagement in water conservation behaviors promotes water conservation, while conservative political belief and HOA membership restrict water conservation. The independent variables (government trust, current water conservation practices, political beliefs, and HOA membership) also significantly predicted 30% of the variation in water conservation behavioral intentions. Level of engagement in current water conservation behaviors had the highest effect on future intent to conserve water. Extension educators, managers at water utility companies, and other agricultural educators are encouraged to consider cognitive dissonance among their target audiences as it can be used to promote water conservation.

Keywords: cognitive dissonance, HOA membership, high water users, government, political beliefs, water conservation

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Introduction

Water is a very important natural resource that supports human life, sustains ecological balance, and supports economic activities around the world (Hurlimann, Dolnicar, & Meyer, 2009). Human beings use water for a variety of purposes including daily consumption, kitchen and daily ablutions, maintenance of lawns and landscapes, recreation, industrial and transportation needs, hydroelectric services, and maintenance of plants and natural resources (Marandu, Moeti, & Joseph, 2010). An increased disparity between water availability and sustainable water supply needs has been recognized in recent decades due to a surge in population growth, urbanization, industrialization, increased agricultural irrigation, and climate change (Adams et al., 2013; Jorgensen, Gaymore, & O'Toole, 2009; Qaiser, Ahmad, Johnson, & Batista, 2011; Wolters, 2014).

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All these factors have contributed to making water a scarce resource around the world (Adams et al., 2013; Wolters, 2014). Considering the stress on water resources in the U.S., it has been predicted by Spencer and Altman (2010) that by 2050 one-third of all U.S. counties will face the issue of water scarcity.

Due to pleasing landscapes and serene beaches, Florida has recently experienced intense population growth (Marella, 2014). From 1950 to 2010, the population of Florida increased by 16.03 million (580%) (Marella, 2014). Due to cultural norms in Florida for pleasing landscapes, residents pump thousands of gallons of water to their lawns and landscapes; a number way beyond that required by plants (Baum, Dukes, & Miller, 2005; Haley, Dukes, & Miller, 2007; Monaghan, Ott, Wilber, Gouldthorpe, & Racevskis, 2013). Residents in Florida consume 71% of the total public-supplied water just for irrigation of their lawns and landscapes (Baum et al., 2005; Haley et al., 2007). The cultural norms for pleasing landscapes combined with increased population, water pollution, urbanization, and industrialization caused Florida water withdrawals (fresh and saline) to increase it by 465% (12,334 Mgal/day) over a period of 60 years (1950-2010) and made water a scarce resource, with increased stress on water bodies (Marella, 2014).

To reduce the stress on water resources in Florida, and make the availability of water more sustainable, engagement in water conservation among the residents of Florida is an immediate need for all water management authorities (Fielding et al., 2013; Gregory & Di Leo, 2003; McCready, Dukes, & Miller, 2009; Qaiser et al., 2011). To manage the limited water resources and encourage water conservation, Extension and agricultural educators need to understand not only how people use water, but also the cognitive and behavioral aspects of water conservation (Gorham, Lamm, & Rumble, 2014; Gregory & Di Leo, 2003; Lamm, Lamm & Carter, 2015; Leal, Rumble, & Lamm, 2015; Warner, Lamm, Rumble, Martin, & Cantrell, 2016). The most important group to target for the promotion of water conservation would be high water users, as they utilize most amount of water (Huang, Lamm, & Dukes, 2016; 2017). Huang et al. (2016) compared high water users with the general public and found that compared to general public, high water users were wealthier, had obtained a higher level of education, and lived in a homeowner's association (HOA). High water users were also found to less likely to practice water conservation and other related social behaviors compared to the general public (Huang et al., 2016). Due to limited availability of funding and resources (Peters & Franz, 2012) among Extension and agricultural educators, it is more feasible to target high water users rather than the general population, as most water will be saved by changing water use behavior within this group.

Many studies have considered financial factors to explain water use and conservation. Financial factors include water price (Terrebonne, 2005), incentives including rebates on use of water saving technologies (Campbell, Johnson, & Larson, 2004; Renwick & Green, 2000), and characteristics of property owned (e.g., size of the house, age of the house, lot size, availability of lawn and pools) (Baum et al., 2005; Campbell et al., 2004; Haley et al., 2007; Olmstead, Hanemann, & Stavins, 2003; Syme, Shao, Po, & Campbell, 2004). A vast body of literature on the other side asserts water conservation can be better explained through nonfinancial factors such as attitude (Clark & Finley, 2007), values (Buttel, 1987), behavioral intentions (Clark & Finley, 2007; Lam, 1999), cognitive schemas (Dickerson, Thibodeau, Aronson, & Miller, 1992), and norms (Clark & Finley, 2007; Kumar Chaudhary & Warner, 2015; Lam, 1999). Even though economic factors (dollars saved) have a direct influence on consumption of water resources, they alone may not be enough to bring change to a complex environmental behavior change such as water conservation (Gardner & Stern, 1996). This research focuses on the nonfinancial factors that may explain behavioral intentions. A thorough understanding of nonfinancial factors that influence the water conservation behaviors of an individual may assist Extension and agricultural educators and water authorities in promoting water conservation and assist in the design of effective water conservation

educational programs (Gregory & Di Leo, 2003; Huang et al., 2017). This research fits within priority seven of the national research agenda (Roberts, Harders, & Brashears, 2016) as it focuses on increasing understanding of how to educate and communicate about one of the world's most pressing issues: water.

Conceptual Framework

This study utilized cognitive dissonance theory proposed by Festinger (1957) to conceptually explain and interpret the findings of the study. Cognitive dissonance theory is widely applied in social psychology to explain the relationship between attitude and behavior and the adoption of specific behaviors over other alternative behaviors (Metin & Camgoz, 2011). According to cognitive dissonance theory, an individual can have a pair of cognitions that may be relevant and irrelevant to each other. Two relevant cognitions either agree with each other, also referred to as consonant, or disagree with each other, referred to as dissonance (Harmon-Jones, & Mills, 1999). In the situation of cognitive dissonance a person feels psychologically uncomfortable and is motivated to reduce the dissonance by either removing the opposing knowledge/attitude/behavior, accepting new consonant cognitions, reducing the importance of opposing knowledge/attitude/behavior, or increasing the importance of newly adopted consonant cognitions (see Figure 1; Cummings & Venkatesan, 1976; Dickerson et al., 1992; Festinger, 1957; Greenwald & Ronis, 1978; Harmon-Jones & Harmon-Jones, 2008; Harmon-Jones & Mills, 1999).

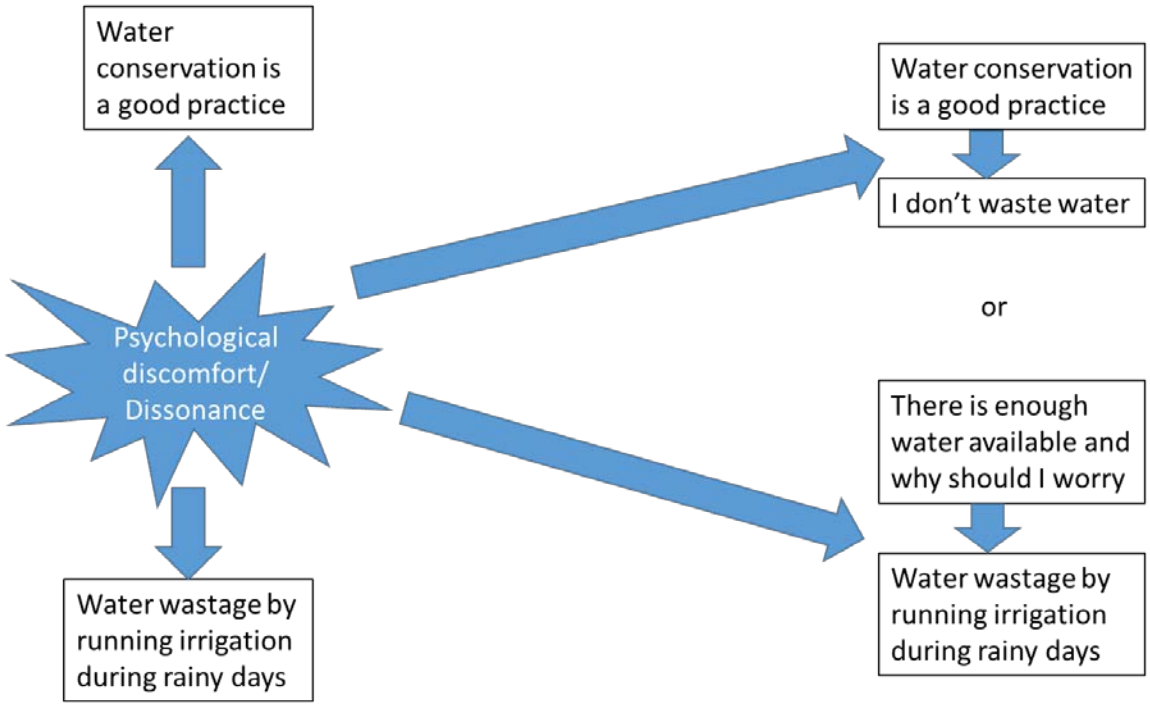

Figure 1. Cognitive dissonance associated with water conservation decision-making

An example of cognitive dissonance as exhibited in Figure 1 could be if an individual holds pro-environmental behavior such as water conservation in high regard but currently wastes water by irrigating their lawn during rainy days. Cognitive dissonance is created because of negative emotions related to wasting water. To resolve the negative emotions and bring their beliefs and action into alignment to reach consonant, the individual would have to change their behavior by cutting off irrigation during rainy days (Vining & Ebreo, 2002).

The cognitive dissonance theory was used to promote a variety of behaviors including reduction in electricity consumption (Kantola, Syme, & Campbell, 1984), water conservation during shower (Dickerson et al., 1992), environmentally responsible behaviors (Thøgersen, 2004), and environmental attitudes and behaviors (Martinsson & Lundqvist, 2010). In a meta-analysis of 87 published reports containing 253 experiments testing the pro-environmental behavior, Osbaldiston and Schott (2011) found experiments using cognitive dissonance theory provided the largest overall effect size ($g = 0.93$) on pro-environmental behaviors compared to the use of other physiological factors such as goals, social modeling, rewards, prompts, justification, commitment, feedback, and instructions.

Next few paragraphs describe the specific variables used in the study that can allow researchers to use cognitive dissonance theory to explain the intentions of high water users to engage in water conservation behaviors.

Current Water Conservation Behavior/Habits

In a meta-analysis, Ouellette and Wood (1998) showed that regular past behaviors/habits affect the future behavior of an individual directly with no dependencies on other variables such as attitudes, subjective norms, intentions, and perceived behavioral control. Regular behavior/habits can be defined as "the result of automatic cognitive processes, developed by extensive repetition, so well-learned that they do not require conscious effort" (Ronis, Yates, & Kirscht, 1989, p. 219). Habits can be classified as purely habitual, where the behavior is repetitive and involuntary with no involvement of cognitions such as washing clothes and watering of lawn (Aitken, 1992) or purely cognitive, where an individual has control over the behavior and uses his/her cognitive decision to perform a behavior such as the installation of a rain barrel to conserve water (Svenson, 1992). Aarts, Verplanken, & van Knippenberg (1998) found that habits can supplement the evaluating decision of an individual to form a specific attitude towards the behavior in question. An individual who is habitual in their current engagement in water conservation behaviors is more likely to engage in water conservation behavior in the future (Barr & Gilg, 2007).

Political Beliefs/Ideology

Political beliefs/ideology is an important characteristic that influences individuals' environmental views and actions (Larson, Wutich, White, Muñoz-Erickson, & Harlan, 2011; Schaaf, Ross-Davis, & Broussard, 2006). Political views can explain the attitudes of the public, especially when efforts are made by the government to ensure availability of water (Larson & Santelmann, 2007). In the U.S., political beliefs are typically spread on a continuum between liberal and conservative, where people with liberal views associate importance with equality, humanitarianism, public action (Larson, 2010), and emphasize the welfare of a whole community (McConochie, 2011). Conservatives emphasize law and order, tend to deny human-induced climate changes, and are less concerned about environmental protection than their liberal counterparts (Larson, 2010; Larson et al., 2011; McConochie, 2011). Liberals have more pro-environmental views than conservatives (Johnson, Bowker, & Cordell, 2004; Larson et al., 2011). Pro-environmental behaviors are often influenced by the values and beliefs an individual hold towards individualistic versus collective actions (Larson et al., 2011). Conservatives are more individualistic than liberals and oppose the intervention of government as it relates to water consumption and pricing (Larson et al., 2011).

Government Trust

Institutional trust is required to encourage water conservation behavior among the general public. Research has shown intentions to conserve water increase if government support for water conservation efforts increases (Heiman, 2002; Huang & Lamm, 2015; Jorgensen et al., 2009). It can be said that, if an individual trusts water authority and perceive the government is also making efforts to ensure a sustainable water supply then willingness of an individual to save water increased (Jorgensen et al., 2009).

Membership in a Homeowners' Association

Homeowners' associations (HOAs) are the governing body created to oversee homeowners in a community. HOAs make decisions for the betterment of the community, including decisions about management of community lawns/landscapes (Dyckman, 2008; Turner, & Ibes, 2011). HOAs also act as liaisons between the community members and local planning departments (Austin, 2004). Each HOA has its own rules and regulations, which the members of the community have to abide (Austin, 2004; Dyckman, 2008). Based on their quasi-governmental structure, HOAs can either promote or inhibit water conservation (Dyckman, 2008). HOAs can mandate water conservation behaviors of community members by enforcing post-construction controls, and amendments to conditions and restrictions to landscape management (Dyckman, 2008). However, HOAs were traditionally regarded as a hindrance to water conservation but could be utilized as an entry point to reduce water demand among residents (Dyckman, 2008; Turner, & Ibes, 2011). According to Cook, Hall, and Larson (2011) for residential landscape, there is a gap in "the link between social drivers and ecological outcomes of management decisions" (p. 19) and future research is needed to fill the gap by studying HOAs.

Purpose and Research Questions

The purpose of this study was to understand how the intentions of high water users in Florida to conserve or not conserve water outdoors were influenced by cognitively dissonant attitudes and behaviors. The specific research questions used to address the purpose of this study were:

1. How do current water use behaviors influence future intentions to conserve water?
2. How do political beliefs of high water users dictate water conservation behavioral intentions?
3. How does perceived support from the government influence water conservation behavioral intentions?
4. How does membership in an HOA affect water conservation behavioral intentions?

Methodology

This cross-sectional study was part of a larger research project undertaken to understand the public opinion of high water users in Florida towards water conservation and other water-related issues. The data for the study were collected using a researcher-developed online survey. The survey instrument was adapted from the 2012 RBC Canadian Water Attitudes Study (Patterson, 2012). The target population of the study was high water users in Florida because this population has the high potential to conserve water (Huang et al., 2016; 2017). The target population had specific characteristics: have an irrigated lawn/landscape on their property, they control the irrigation, they hire an outside landscape company to maintain their property, and they belong to one of the four metropolitan counties of Florida which are reputed for high water consumption.

Due to unavailability of above-mentioned target population's sampling frame (Kumar Chaudhary et al., 2017; Huang et al., 2016, Warner, Kumar Chaudhary, Lamm, Rumble, & Momol, 2017; Warner, Rumble, Martin, Lamm, & Cantrell, 2015), a purposive sample (N = 932) was acquired by a web-based survey sampling company using a non-probability opt-in sampling method. In the absence of existing sampling frame, it is the researchers' responsibility to select the best available sample, which has limited sampling frame error (Burns & Bush, 2003). Even though non-probability opt-in samples struggle with non-representation of the target population (Bryman, 2008), they are often used in the absence of target populations' sampling frame (Baker et al., 2013). For non-probability opt-in samples, compared to response rates in probability-based samples, participation rates are reported, where participants are invited to complete the survey until the specific target population quota is full (Baker et al., 2013). The participation rate for the current study was 26.7%, where out of 3,494 participants who were invited to complete the survey, 932 usable responses were received. Table 1 details the demographics of the high-water user respondents in the state of Florida.

Table 1

Demographics of High Water User Respondents (N = 932)

	n	%
Sex		
Male	448	48.1
Female	484	51.9
Race		
African American	41	4.4
Asian	14	1.5
Caucasian/White	871	93.5
Native American	5	.5
Hispanic Ethnicity	63	6.8
Age		
18 - 29	21	2.3
30 - 39	92	9.9
40 - 49	108	11.6
50 - 59	188	20.2
60 - 69	313	33.6
70 - 79	188	20.2
80 years and older	22	2.4

Table 1 (continued)

Demographics of High Water User Respondents (*N* = 932)

	n	%
Education		
Did not obtain a high school diploma	1	.1
High school diploma	55	5.9
Some college education	153	16.4
2-year college degree	94	10.1
4-year college degree	355	38.1
Graduate degree	274	29.4
Annual Household Income		
$50,000 to $74,999	244	26.2
$75,000 to $149,999	461	49.5
$150,000 to $249,999	167	17.9
$250,000 or more	60	6.4
Political Affiliation		
Republican	346	37.1
Democrat	281	30.2
Independent	211	22.6
Non-Affiliated	84	9.0
Other	10	1.1

The dependent variable of the study was behavioral intentions to conserve water, which was conceptualized as the perceived future actions/activities of an individual that promotes the sustainable availability of water, especially changes in lawn/landscaping irrigation behaviors. The behavioral intentions were captured using eight statements measured on a five-point Likert-type scale (1 = *very unlikely*, 2 = *unlikely*, 3 = *undecided*, 4 = *likely*, 5 = *very likely*) with an additional *not applicabl*e response option. Some examples of statements were: *Only water your lawn in the morning or evening*; *reduce the number of times a week you water your lawn*; *modify my landscape so that a portion is not irrigated*. The index score for behavioral intentions was calculated by taking the average of the eight statements, while respondents who selected not applicable were excluded from the analysis.

Among independent variables, the current water conservation behavior was measured using 10 statements measured on a three-point Likert-type scale (1 = *yes*, 2 = *unsure*, and 3 = *no*). Some current water conservation behaviors were: *I avoid watering my lawn in the summer*; *I let my sprinklers run when it has rained or is raining*; *I have low-water consuming plant materials in my yard*; *I use a smart irrigation controller*. For further analysis of the current water conservation behavior variable, the results were dummy coded with baseline coded as 0 (not following the water

conservation behavior), and the remaining coded as 1 (following the water conservation behavior). The residents who selected *unsure* were excluded from further analysis. The index for current water conservation behavior was calculated by summing the responses to the ten statements. Therefore, the responses could range from zero to 10.

The political beliefs/ideology variable was measured using a single statement with a five-point Likert-type scale (1 = *very liberal*, 2 = *liberal*, 3 = *moderate*, 4 = *conservative*, and 5 = *very conservative*). For further analysis, very liberal and liberal were recoded as liberal and very conservative and conservative were coded as conservative and moderate was made missing. To utilize this variable in multivariate analysis, it was dummy coded with liberal as the baseline with a code of zero and conservatives coded as one.

Government trust was measured using three statements measured on a five-point Likert scale (1 = *strongly disagree*, 2 = *disagree*, 3 = *neither disagree nor agree*, 4 = *agree*, and 5 = *strongly disagree*). The government trust statements were: *I feel I have choice to use the strategies provided by the government in order to help the environment*; *the government gives me the freedom to make my own decisions in regards to the environment*; *I feel I have the choice to participate in the environmental programs established by the government*. The index for government trust was calculated by taking the average of the three statements. The last independent variable, membership in an HOA was measured using a single statement asking whether or not residents were a member of an HOA and measured on a yes (1)/no (0) scale. Not being a member of an HOA was coded as zero and being a member of an HOA was coded as one.

The face and content validity of the instrument was established by a panel of experts with specialization in horticulture, agricultural engineering, and social sciences. After an expert panel review, the instrument was pilot tested. Post-hoc reliability was calculated using Cronbach's alpha and found satisfactory for both institutional (government) trust (0.80) and behavioral intentions (0.77). Post completion of experts' panel review and pilot test, minor changes were made to the instrument. The data were analyzed using Statistical Package for Social Sciences (SPSS, version 22.0; IBM Corp., Armonk, NY). Means and standard deviations were used to define the variables. Bivariate correlations were used to examine associations among all the variables used in the study. The associations were interpreted using Davis' (1971) convention with .01 to .09 indicating a negligible relationship, .10 to .29 indicating a low-level relationship, .30 to .49 indicating a moderate relationship, .50 to .69 indicating a substantial relationship, and greater than .70 indicating a very strong relationship. Linear multiple regression (Field, 2013; Tabachnick & Fidell, 1996) was used to see the combined effect of the independent variables on behavioral intentions and for assessing the effect sizes. All the assumptions of linear multiple regression (Field, 2013; Tabachnick & Fidell, 1996): multicollinearity, whether the residuals were independent, and assumptions of linearity were checked, and data satisfied all the assumptions.

Results

After removing the missing values for all variables, 282 responses were utilized in the final analysis. The descriptive statistics indicated respondents were either unsure or likely to save water in the future, respondents either unsure or agreed about their trust and freedom from government to participate in pro-environmental behaviors (see Table 2). For current water conservation practices, almost half of residents followed water conservation practices, while the other half did not; the sample consists of more conservatives (61%), and most respondents were members of their HOAs (72%).

Table 2

Descriptive Statistics for Dependent and Independent Variables

Variable	*M*	*SD*
Behavioral intentions[a]	3.79	0.70
Government trust[b]	3.29	0.86
Current water conservation practices[c]	4.07	2.04

Note. [a]Scale: 1 = *very unlikely*, 2 = *unlikely*, 3 = *undecided*, 4 = *likely*, 5 = *very likely*; [b]Scale: 1 = *strongly disagree*, 2 = *disagree*, 3 = *neither disagree nor agree*, 4 = *agree*, and 5 = *strongly disagree*; [c]Scale: Summed score of engagement in ten water conservation practices ranging from zero = does not engage to 10 = engages in all ten practices.

The results of the bivariate correlations indicated behavioral intentions to conserve water have positive significant moderate correlations with government trust and current water conservation behaviors, and negative significant low correlations with political beliefs and association to HOAs (see Table 3). These findings exhibited that if respondents have trust in government then they are more likely to save water in the future. Respondents who have a habit of water conservation or are currently following water conservation behaviors are more likely to conserve water in the future. For political beliefs, if respondents had conservative political beliefs they were less likely to save water in the future, while on the other side if respondents had liberal political beliefs they were more likely to save water in future. Last, if a respondent belonged to an HOA then the respondent was less likely to save water in the future.

Table 3

Bivariate Correlation Among Variables of Interest

	Behavioral Intentions	Government trust	Current water conservation behavior	Political beliefs	HOA Membership
Behavioral Intentions	1.00	0.33**	0.43**	-0.20**	-0.12*
Government trust		1.00	<0.01	-0.30**	-0.07
Current water conservation behavior			1.00	-0.06	-0.06
Political beliefs				1.00	0.17*
HOA Membership					1.00

Note. **$p \leq 0.001$; *$p \leq 0.05$; Strength of relationships (Davis, 1971): .01 - .09 = *Negligible*, .10 - .29 = *Low*, .30 - .49 = *Moderate*, .50 - .69 = *Substantial*, > .70 = *Very strong*.

The regression model examining behavioral intentions to conserve water was significant ($R^2 = 0.30$, F (1, 277) = 29.59, $p \leq .01$) and explained 30% of the variation. Among the independent variables, only government trust ($b = 0.24$, $t = 5.63$, $p \leq .01$) and current water conservation practices ($b = 1.45$, $t = 8.34$, $p \leq .01$) were significant in explaining water conservation intentions (see Table 4).

Table 4

Predicting Behavioral Intention

Variable	*b*	*p*
Current water conservation behavior	0.42	≤0.01
Government trust	0.30	≤0.01
HOA Membership	-0.06	0.26
Political beliefs	-0.07	0.16

Conclusions, Implications, and Recommendations

To explain the behavioral intentions to conserve water, most researchers have used either the theory of planned behavior (Armitage & Conner, 2001; Clark & Finley, 2007; Trumbo & O'Keefe, 2001), theory of reasoned actions (Marandu et al., 2010) or moral/norm related theories such as the norm activation model (Monroe, 2003). The cognitive dissonance theory has not been adequately applied to understanding water conservation intentions except for the well-known experiment by Dickerson et al. (1992) conducted with female swimmers. The current study fills this gap in the literature by applying cognitive dissonance theory to explain behavioral intentions to conserve water in the future using a non-experimental situation. However, it is advised that the findings of the study be interpreted cautiously due to the utilization of a convenience sample. For this study, we collected data only from high water consuming areas and used a non-probability sampling opt-in panel. The results may be different if data were collected from a random sample of the general population.

The most significant conclusion of our study was that high-water users who hold liberal political beliefs, have trust in government, currently engaged in water conservation behaviors, and who were not the part of HOAs were more likely to conserve water in the future. When it comes to complex behaviors like water conservation, people prefer convenient and familiar behaviors compared to more complex behaviors (Syme, Nancarrow, & Seligman, 2000). The results of this study revealed that it is more likely for residents to conserve water if they are habitual or currently engaged in water conservation behaviors, such as avoiding watering of lawns in summer months. The above findings can be justified using cognitive dissonance theory. For example, when residents report the intentions to conserve water but habituated to wastewater, cognitive dissonance may have enforced the need to be consistent with their behaviors by changing their water wastage habits to water conservation habits (Thøgersen, 2004).

When it comes to governmental trust, if an individual realized the government was providing freedom to its citizens while making efforts to sustain available water resources, residents who were not saving the water may felt cognitive dissonance and tried to modify their behaviors to align with the governmental or social norms (Heiman, 2002; Jorgensen et al., 2009). People with liberal political beliefs were more supportive of pro-environmental behaviors such as water conservation and this belief is further confirmed by the current study (Larson et al., 2011; Larson, 2010). It is evident that conservatives with a willingness to save water in the future feel cognitive dissonance and try to increase their conservation of water rather than doing nothing (Larson, 2010).

When people live in an HOA they are obliged to follow set rules and regulations and may have limited control of lawn/landscaping decisions and this may have limited high water users in the study to engage in water conservation behaviors. As a result of pro-water conservation behaviors and a desire to reduce cognitive dissonance created by HOA policies and procedures, community members can try to accommodate the pro-water conservation behaviors in their landscaping agendas, as managers of HOAs are composed of community members (Dyckman, 2008; Turner, & Ibes, 2011).

Based on the results of this study, it is evident that cognitive dissonance can be successfully utilized to explain water conservation behaviors. It is recommended that Extension educators should use the cognitive dissonance theory to encourage water conservation among their target audiences. For example, Extension educators can do public commitment ceremonies where residents commit to saving water in the future. After the commitment sessions, in the upcoming months based on actual use of water, Extension educators can provide feedback using utility bills indicating that you committed to saving water but currently have not reduced consumption. The continuous feedback would encourage the dissonance among residents and would encourage residents to conserve water in order to reduce the cognitive dissonance (Kantola et al., 1984). Managers at water utility companies and other agricultural educators who want to promote water conservation among urban residents specifically high-water users in their respective jurisdictions can use these study findings to design and deliver water conservation educational programs. For example, managers at water utility companies who are targeting high water users in HOAs who also intended to conserve water can promote moral norms among HOA administrators to activate the thought that water conservation is a good practice and later work with them to promote policies and procedures that support water conservation. Agricultural educators promoting water conservation should first understand water use behaviors of their target audiences along with how much trust their target audience have in government that it supports water conservation efforts because these factors predicted the future intent to engage in water use behaviors.

The results reported in this cross-sectional study are one snapshot and it is recommended that similar studies need to be replicated over a different time of year to ascertain that results of the study withhold, and they are not sensitive to specific time of the year and one specific convenience sample used in the study. We used the convenience sample of high water users for this study, and we recommend that future researchers apply the cognitive dissonance theory to study water conservation behavior of the general population through a random sample. Future researchers are encouraged to use additional variables than those used in this study such as morals of individuals (Aronson, 1997; Thøgersen, 1999; Thøgersen, 2004), as the strength of moral norms can guide certain behaviors such as water conservation. We also recommend studying the relationship between independent variables used in the current study and actual behavior adopted, as it is well indicated by the literature that there is always a discrepancy between behavioral intentions and actual behavior adopted (Hurlimann et al., 2009; Truffer, Markard, & Wustenhagen, 2001). As discussed in the introduction of this study that financial factors (e.g., water price, incentives, and property characteristics) explain water conservation behaviors, future research should examine effect of financial factors in addition to social and behavioral factors discussed in this study on water conservation behaviors. Environmental attitudes, such as attitude towards water conservation have an influence on water conservation behaviors (Clark & Finley, 2007), future researchers can consider attitude towards water conservation in addition to cognitive dissonance theory variables to explain water conservation behaviors. Since the study used cognitive dissonance theory to explain the findings of the study after the fact, future research can use cognitive dissonance more thoroughly ingrained in the study where cognitive dissonance guide the development of the intervention if used, and development of data collection instruments. Even though study targeted high water users and explained their water use behaviors, the researchers have not looked at ways

to segment high water users into meaningful subgroups. Future research can look at ways to segment the high-water users using meaningful segmentation criterion because after segmentation Extension and agricultural educators, and managers at water utility companies can effectively use cognitive dissonance with a targeted subgroup to promote water conservation.

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