Extension Participants and Nonparticipants Differ in Water Conservation Normative Beliefs, Intentions, and Behaviors

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Summary. Uncertain future availability of water is one of the most critical current issues, and outdoor water use contributes substantially to the strain on water resources. Much of the nation's outdoor water use is through urban landscape irrigation, and one solution for conservation of this limited resource is to change home landscape irrigation practices. Thus, households that use landscape irrigation are an important audience for Florida extension programs. Complex, statewide water conservation programs are difficult to evaluate because of program variability and limited resources, yet evaluation is an important task that reveals the success, or failure, of a program. This study compared factors between people who have or have not engaged in Florida extension programs. The targeting outcomes of programs model and theory of planned behavior were used as a basis for measuring different levels of possible outcomes. There were no differences in attitudes toward good irrigation practices and perceived ability to adopt them between extension participants and nonparticipants. There were differences between the two groups in perceived normative attitudes, intent to adopt good irrigation practices, and actual engagement in landscape water conservation practices. Findings demonstrate a relationship exists between these characteristics and engagement with extension. The greatest differences were stronger social norms and more engagement in complex conservation behaviors among people who had attended extension programs. It is not known how much externalities play a role in leading certain people to seek out extension education. Extension professionals should use the findings of this study to target nonparticipants and deliver more impactful programs.

Water availability is one of the key environmental and social issues of the present time. Places such as the southeast, southwest, and southern Great Plains of the United States are currently experiencing both long- and short-term water deficits and these shortfalls are projected to intensify (Georgakakos et al., 2014; Huang and Lamm, 2015). Urbanization and increasing population have led to urban residential landscapes that contribute to water scarcity (Shober et al., 2010). About half of the nation's domestic water use is directed toward the landscape in the form of irrigation (DeOreo et al., 2016). In places such as central Florida, this amount can exceed 60% (Haley et al., 2007) and in Florida, the adoption of water conservation practices in the home landscape could save 46 million gallons (174,128.9 m^3) of water per day (U.S. Environmental Protection Agency, 2013).

Water conservation is considered an effective strategy to reduce the demand on this finite resource (Hurd, 2006; University of Florida Institute of Food and Agricultural Sciences, 2011). However, to address environmental problems such as water scarcity it is necessary for people to change specific behaviors that influence the issue (Andreasen, 2006). Changing irrigation practices and technologies in the residential landscape has been identified as an opportunity for water conservation, and therefore, people who use irrigation at home represent an important audience for the Cooperative Extension Service (Warner et al., 2015).

Nationwide, public agencies, including the Cooperative Extension Service, offer programs on best landscape management practices such as research-based irrigation techniques that lead to water conservation (Huang and Lamm, 2015; Hurd, 2006; Shober et al., 2010). However, to elicit change, citizens must comprehend the issue and be encouraged to play a role in the solution (Andreasen, 2006). Extension is considered one of the most successful change agencies (Rogers, 2003), and the University of Florida Institute of Food and Agricultural Sciences (IFAS) extension focuses on encouraging sound irrigation practices statewide.

Evaluation is a critical step in extension programming because it documents outcomes and impacts, helps to define programmatic goals, and provides information for overall accountability (Cloyd, 2005; Hurd, 2006; Steil and Lyons, 2009). Further, funding agencies may require appropriate program evaluation so they can be certain of a program's value to stakeholders (Steil and Lyons, 2009). The evaluation of complex, statewide extension programs can be difficult due to limited resources, lack of standard tools for water conservation program evaluation, and inadequate evaluation expertise (Glenn et al., 2015; Shepard, 2002; Steil and Lyons, 2009). The diversity of statewide water conservation programs can add to the challenge of conducting sound evaluation because innovative strategies are needed to identify their impacts (Shepard, 2002). These challenges have contributed to a lack of clarity about the long-term effects of water conservation programs (Syme et al., 2000).

Following horticultural program completion, it is common to identify short-term effects, such as temporary reductions in irrigation water usage (Borisova and Useche, 2013). However, there is great value in identifying long-term outcomes, such as changes in people's long-term practices or their intrinsic beliefs. To address this challenge, we used survey research to examine possible differences among people who had or had not engaged in extension programming.

Theoretical framework

This study was guided by targeting outcomes of programs (TOP), an approach to planning for and evaluating outcomes and impacts (Rockwell and Bennett, 2004), along with the theory of planned behavior (TPB),

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which describes factors that lead to behavior change (Ajzen, 1991). TOP is a two-sided hierarchy. The left side of the hierarchy demonstrates how TOP informs the program planning process by first identifying the current social, economic, and environmental (SEE) situation and then the changes that are needed in existing practices to achieve the desired SEE condition. Next, the requisite knowledge, aspirations, skills, and attitudes (KASA) to support the practice changes are identified, followed by reactions, participation, activities, and resources. On the right side of the hierarchy (Fig. 1), TOP informs program evaluation by identifying increasingly higher levels of program performance beginning with resources, activities, and participation, followed by reactions, changes in KASA, practices changes, and ultimately SEE outcomes (Rockwell and Bennett, 2004). Success at each level is dependent on positive outcomes of the proceeding level. For example, participants must experience positive reactions to a program to achieve gains in knowledge or skills.

TPB explains that people who have positive attitudes toward a behavior, perceive social support to engage in the behavior, and believe they have control over adopting the behavior are more likely to intend to adopt the behavior than those who do not (Ajzen, 1991). TPB explains that the greater an individual's intent is to engage in a behavior, the more likely they are to do so (Ajzen, 1991). Personal norms may also be considered as a factor that increases the explanatory power of the three core variables of attitude, perceived behavioral control, and subjective norms on behavior (Harland et al., 1999).

The TOP model can be applied to extension water conservation programs. For this study, we focused on the performance side of the hierarchy, which postulates that to achieve long-term water conservation (SEE condition), home landscape irrigation users need to participate in extension programs (participation) to develop positive reactions toward good irrigation practices (reactions), which are required to achieve gains in the KASA needed to adopt them. For the purposes of this study, we measured attitudes toward water conservation practices, operationalized social norms and personal norms as internalized attitudes, and considered perceived control as a measure of both knowledge and skill. Gains in each of these variables should result in increased intent to adopt good irrigation practices, increased engagement in good irrigation practices, and ultimately improvement in SEE conditions (Fig. 1) (Ajzen, 1991; Rockwell and Bennett, 2004).

The study reported here is a comparison of the KASA and practices—level characteristics between the baseline state (those who had not been a Florida extension program participant) and those who had engaged in Florida extension programs.

Materials and methods

We collected data for this cross-sectional study using an online survey instrument and respondents were recruited by a survey sampling company using a nonprobability opt in sampling technique. This secured sampling frame may have a "potential sample frame error, but it is used due to the lack of any other sample frame. It is the researcher's responsibility to seek out a sample frame with the least amount of error at a reasonable cost" (Burns and Bush, 2003). Because a defined sampling frame of this target audience was not available (Warner et al., 2015) we used purposive sampling (N = 653), which is considered appropriate when there is nonavailability of the target population sampling frame (Baker et al., 2013; Bryman, 2008). Purposive sampling can produce results comparable and sometimes better than probability samples (Abate, 1998; Twyman, 2008; Vavreck and Rivers, 2008). This approach reduced social desirability bias by directly surveying Florida residents not connected to specific extension programs or agents and outside of the extension classroom. The power of the findings was increased by adding a comparison with nonparticipants.

Screening questions were used to identify target audience members by confirming they were at least 18 years of age, had a lawn or landscape, and had an irrigation system over which they had decision-making power. To differentiate extension participants and nonparticipants, we incorporated one question: "Have you participated in any of the following activities since living in Florida?" and the response options were five different key Florida extension programs or none of the above. The five extension programs were major water and natural resources–focused programs (Table 1).

We labeled those who responded none of the above as nonparticipants (n = 454) and those who indicated they had participated in one or more of the five major water and natural-resources focused programs as extension participants (n = 199). There were more males [n = 110 (55.3%)] in the extension participant sample, whereas there were more females [n = 268 (59%)] in the extension nonparticipants sample. The majority of extension participants [n = 169 (84.9%)] and nonparticipants [n = 406 (89.4%)] were white. More than half of the extension participants [n = 116 (58.3%)] had a 4-year college degree or higher level of education, whereas fewer than half of the nonparticipants [n = 204 (44.9%)] had 4-year college degree or higher level of education. The extension participants were younger (mean = 42.2 years, SD = 15.02) compared with nonparticipants (mean = 49.8 years,

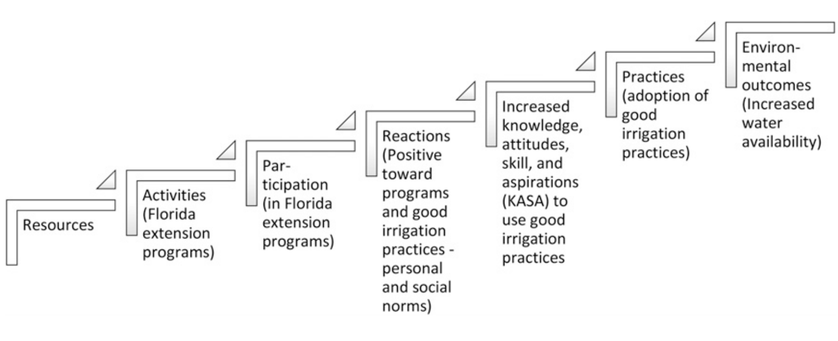

Fig. 1. Hierarchy of landscape water conservation program outcomes among Florida extension participants (Rockwell and Bennett, 2004).

Table 1. Description of programs used to define participation in Florida extension programs in this study.

Program name	Program description[z]
Florida-Friendly Landscaping™ program	Training for homeowners, developers, and landscape professionals on research-based landscaping best management practices which include water conservation and protection
Master Gardener program	Nationwide program provides training in the science of gardening; substantial volunteer commitment is required (Langellotto et al., 2015)
Florida Shellfish Aquaculture online resource	Comprehensive online educational resource integrating research and extension to enhance the aquaculture industry in Florida
Florida Master Naturalist program	Science-based program promotes awareness and knowledge of Florida's natural resources
Sustainable Floridians	Promotes environmental protection through an understanding of actions related to topics such as energy and water conservation, local foods, and climate change

[z]All programs are headquartered at the University of Florida, Gainesville, FL.

SD = 16.78). The most common annual household income range for extension participants was $50,000 to $74,999 [n = 120 (26.4%)], whereas for nonparticipants the most common annual income range was $25,000 to $49,999 [n = 42 (21.1%)]. We measured six personal factors of Florida residents who use irrigation in the home landscape: attitudes toward good irrigation practices, personal norms toward good irrigation practices, social norms toward good irrigation practices, perceived control over adopting good irrigation practices, irrigation water conservation behavioral intentions, and current irrigation water conservation behaviors (Fig. 2).

The questions used for this research are described in detail below. Expert panel review and several iterations of pilot testing assessing the face and content validity of the instrument confirmed that valid inferences can be derived from data collected with this instrument within the context of this study (Campbell and Nehm, 2013; Warner et al., 2015). The reliability for attitude, personal norm, social norm, and perceived control, as measured by Cronbach's alpha, was 0.94, 0.89, 0.91, and 0.89, respectively, and therefore the scales were deemed suitable for use (Santos, 1999). Frequency and percentages were calculated to describe data while independent sample *t* tests and Pearson's chi-square tests were used to compare the two groups. The effect size for *t* tests were calculated using Cohen's *d*. We interpreted Cohen's *d* values as 0.20 = small effect, 0.50 = medium effect, and 0.80 = large effect (Cohen, 1988).

We used Fisher's exact test for some behavioral intentions and current water conservation behaviors statements because some cells did not have the minimum cell count required for analysis. Cramer's V was used to measure the effect size for cross-tabulation done using chi-square tests. We interpreted Cramer's V values as: less than 0.10 = negligible effect, 0.10 to 0.19 = weak effect, 0.20 to 0.39 = moderate effect, 0.40 to 0.59 = relatively strong effect, 0.60 to 0.79 = strong effect, 0.80 to 1.00 = very strong effect (Rea and Parker, 1992). We analyzed all data using SPSS (version 22.0; IBM Corp., Armonk, NY).

Knowledge, aspirations, skill, and attitudes

At the KASA level, we measured general attitudes toward good irrigation practices; deeper, normative attitudes surrounding good irrigation practices; and perceived control over adopting good irrigation practices.

General attitudes. Respondents' general attitudes toward good irrigation practices were measured by presenting one main statement (Implementing good irrigation practices is …), which was completed using six pairs of opposite words separated by 5-point semantic differential scales (good to bad; important to unimportant; wise to foolish; beneficial to harmful; positive to negative; necessary to unnecessary). The point closest to the positive word received a value of 5 while the point closest to the negative word received a 1, with points between corresponding to values of 2, 3, and 4, respectively. An attitude index was calculated by averaging the six attitude values and could range from 1 (negative reaction) to 5 (positive reaction).

Normative attitudes. Normative beliefs can guide the functioning and formation of normative attitudes (Riemer et al., 2014; Terry and Hogg, 1996). We measured personal normative beliefs (personal norms), or the internal obligation to engage in good irrigation practices, as well as social normative beliefs (social norms), or the perceived social pressure felt to engage in good irrigation practices. Both personal norms and social norms were considered to reflect normative internalized attitudes (Riemer et al., 2014).

Personal norms were measured by instructing respondents to indicate their level of agreement or disagreement with five statements by completing them using a 5-point Likert-type scale (1 = strongly disagree, 2 = disagree, 3 = undecided, 4 = agree, 5 = strongly agree). The statements were I feel a personal obligation to explore ways to reduce my landscape's impact on water resources, it is important to manage my landscape using the smallest amount of water possible, it is important to encourage my friends and family to protect our water resources, I feel a personal obligation to minimize my personal impact on local water resources, and I should be responsible for doing whatever I can to protect water resources. A personal norm index was created by calculating the mean of the five statements and could range from 1 (low personal norms) to 5 (high personal norms). Social norms were measured by instructing respondents to indicate their level of agreement or disagreement with five statements along a 5-point Likert-type scale (1 = strongly disagree, 2 = disagree, 3 = undecided, 4 = agree, 5 = strongly agree). The statements were: the people

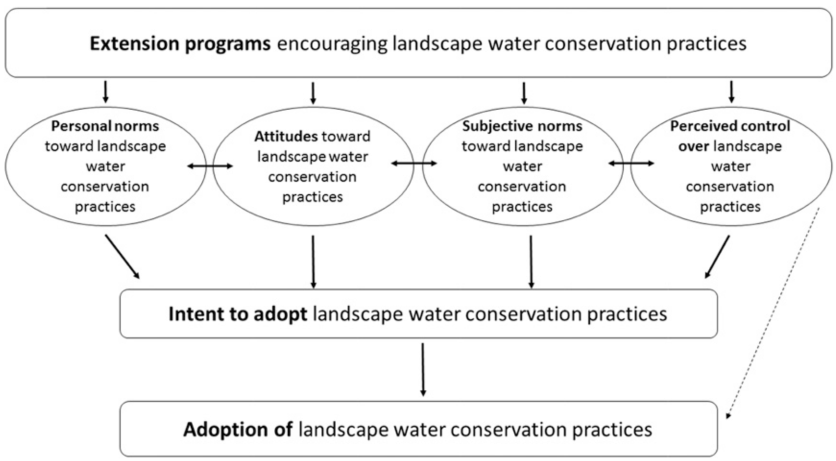

Fig. 2. The theory of planned behavior applied to Florida extension programs to encourage landscape water conservation (Ajzen, 1991).

who are important to me would approve if I reduced my landscape's impact on water resources, the people who are important to me think I should encourage others to protect our water resource, the people who are important to me expect that I will manage my landscape using the smallest amount of water possible, the people who are important to me expect that I will minimize my personal impact on local water resources, and the people who are important to me would approve if I explored ways to reduce my impact on water resources. A social norm index was created by calculating the mean of the five statements and could range from 1 (low social norms) to 5 (high social norms).

KNOWLEDGE AND SKILL. We operationalized knowledge and skill as one variable, perceived control over good irrigation practices. This variable was measured by presenting one main statement (Implementing good irrigation practices is …), which was completed by using six pairs of words with opposite meanings which were separated by 5-point semantic differential scales (possible for me to not possible for me; easy for me to not easy for me; in my control to not in my control; up to me to not up to me; practical for me to not practical for me). The point closest to the positive perceived control word received a value of 5 and the point closest to the negative control word received a 1, with the points between corresponding to values of 2, 3, and 4, respectively. The perceived control index was calculated by averaging the five values and could range from 1 (low perceived control) to 5 (high perceived control).

ASPIRATIONS. To identify aspirations to engage in good irrigation practices, or behavioral intentions, we asked respondents how likely or unlikely they were to engage in 20 possible water conservation behaviors. We selected the 20 water conservation behaviors from irrigation best management practices and technologies that are informed by research and encouraged by Florida extension programs. Responses were measured on a 5-point Likert scale (1 = very unlikely to 5 = very likely) with a sixth option not applicable (6). For analysis purposes, we coded the not applicable option as missing data.

Practices

We measured current water conservation behaviors using 17 statements with three possible responses (yes, no, unsure). The 17 practices corresponded to landscape irrigation water conservation practices and technologies that are encouraged throughout the state by University of Florida IFAS extension programs.

Results

To examine possible differences among people who had or had not engaged in extension programming, we compared participants and nonparticipants on the KASA and behavior-level variables.

KNOWLEDGE, ASPIRATIONS, SKILL, AND ATTITUDES. A comparison of general attitudes toward good irrigation practices of extension participants (mean = 4.58, SD = 0.69) to nonparticipants (mean = 4.61, SD = 0.60) did not detect any significant differences [t (323) = –0.48, P = 0.63]. Similarly, no significant differences were found in perceived control over good irrigation practices between extension participants (mean = 4.36, SD = 0.71) and nonparticipants (mean = 4.20, SD = 0.76) [t (323) = 1.79, P = 0.07]. The number of responses for both attitude and perceived behavioral control were less (N = 325) than the complete sample (N = 653) because we removed individuals who were exposed to an experimental element that was not a part of this study. All of the other variables in this study were collected before exposing a selection of participants to the experimental element.

Personal norms and social norms were examined as indicators of normative, internalized attitudes. An independent sample t test revealed that extension participants had significantly higher personal norms (mean = 4.33, SD = 0.66) around good irrigation practices than nonparticipants (mean = 4.17, SD = 0.67) [t (651) = 2.90, $P < 0.01$]. Cohen's d value for personal norms was 0.24, demonstrating a small effect size. Extension participants also had significantly higher social norms (mean = 4.12, SD = 0.72) around good irrigation practices than nonparticipants (mean = 3.80, SD = 0.79) [t (651) = 4.80, $P < 0.001$]. Cohen's d value for social norms was 0.42, demonstrating a medium effect size.

ASPIRATIONS. The results of a Pearson's chi-square test indicated that extension participants were significantly more likely to aspire to engage in irrigation water conservation behaviors in the future for all but three water conservation behaviors when compared with nonparticipants (Table 2). Cramer's V values for all future irrigation water conservation behaviors ranged from 0.07 to 0.47, showing a range of negligible to relatively strong effect sizes. Out of the 20 behaviors, three behaviors had relatively strong effect, nine behaviors had moderate effect, six behaviors had weak effect, and two behaviors had negligible effect. The strongest practical differences were for advocacy actions and monetary commitments. More than half of the extension

Table 2. Comparison of intentions to engage in irrigation water conservation between Florida extension participants and nonparticipants (N = 653).

Behavioral intentions[y]	Participation in extension programs	Very unlikely[z]	Unlikely[z]	Undecided[z]	Likely[z]	Very likely[z]	*P* value[x]	Chi-square	Cramer's V[w]
Join a water conservation organization	Participants (196)	5.6% (11)	12.8% (25)	24.0% (47)	23.5% (46)	34.2% (67)	<0.001	141.10	0.47
	Nonparticipants (452)	18.8% (85)	30.5% (138)	35.8% (162)	9.7% (44)	5.1% (23)			
Volunteer for a stream cleanup or wetland restoration event	Participants (196)	7.1% (14)	6.6% (13)	24.5% (48)	20.9% (41)	40.8% (80)	<0.001	129.68	0.45
	Nonparticipants (448)	22.1% (99)	24.6% (110)	29.2% (131)	16.7% (75)	7.4% (33)			
Buy a specialty license plate that supports water protection efforts	Participants (197)	11.2% (22)	17.8% (35)	22.3% (44)	18.8% (37)	29.9% (59)	<0.001	108.14	0.41
	Nonparticipants (451)	27.7% (125)	33.3% (150)	25.1% (113)	9.1% (41)	4.9% (22)			
Donate to an organization that protects water	Participants (198)	6.1% (12)	10.1% (20)	21.7% (43)	24.7% (49)	37.4% (74)	<0.001	88.15	0.37
	Nonparticipants (451)	17.3% (78)	20.2% (91)	31.7% (143)	21.7% (98)	9.1% (41)			
Convert turfgrass areas to landscaped beds	Participants (191)	4.7% (9)	3.7% (7)	19.9% (38)	28.8% (55)	42.9% (82)	<0.001	79.84	0.36
	Nonparticipants (425)	8.9% (38)	23.8% (101)	29.4% (125)	21.9% (93)	16.0% (68)			
Use a rain barrel or cistern	Participants (192)	6.8% (13)	8.3% (16)	17.2% (33)	28.1% (54)	39.6% (76)	<0.001	57.53	0.30
	Nonparticipants (433)	15.0% (65)	22.4% (97)	27.0% (117)	15.5% (67)	20.1% (87)			
Eliminate irrigated areas in my landscape	Participants (196)	5.6% (11)	8.2% (16)	22.4% (44)	26.5% (52)	37.2% (73)	<0.001	56.90	0.30
	Nonparticipants (449)	8.7% (39)	23.2% (104)	29.8% (134)	24.5% (110)	13.8% (62)			
Install smart irrigation controls	Participants (191)	5.2% (10)	6.3% (12)	19.9% (38)	25.7% (49)	42.9% (82)	<0.001	56.66	0.30
	Nonparticipants (423)	9.5% (40)	18.0% (76)	33.8% (143)	20.6% (87)	18.2% (77)			
Install an efficient irrigation technology	Participants (191)	4.2% (8)	5.8% (11)	16.2% (31)	28.3% (54)	45.5% (87)	<0.001	44.41	0.27
	Nonparticipants (432)	8.6% (37)	15.5% (67)	30.6% (132)	19.2% (83)	26.2% (113)			
Modify my landscape so that a portion is not irrigated	Participants (194)	3.1% (6)	4.6% (9)	15.5% (30)	33.5% (65)	43.3% (84)	<0.001	43.74	0.26
	Nonparticipants (440)	8.0% (35)	15.7% (69)	24.8% (109)	28.6% (126)	23.0% (101)			
Turn off zone(s) or cap irrigation heads for established woody plants	Participants (195)	3.1% (6)	501% (10)	11.8% (23)	33.8% (66)	46.2% (90)	<0.001	37.15	0.25
	Nonparticipants (424)	5.4% (23)	14.9% (63)	20.8% (88)	34.0% (144)	25.0% (106)			
Replace high volume irrigated areas with low volume irrigation	Participants (192)	4.7% (9)	5.7% (11)	13.5% (26)	32.3% (62)	43.8% (84)	<0.001	35.20	0.24
	Nonparticipants (426)	4.5% (19)	13.6% (58)	23.2% (99)	36.4% (155)	22.3% (95)			
Use a rain gauge	Participants (194)	3.6% (7)	3.1% (6)	16.5% (32)	28.4% (55)	48.5% (94)	<0.001	22.61	0.19
	Nonparticipants (436)	5.7% (25)	12.2% (53)	21.8% (95)	26.6% (116)	33.7% (147)			
Replace high water plants with drought tolerant plants	Participants (192)	4.2% (8)	5.2% (10)	14.6% (28)	32.3% (62)	43.8% (84)	<0.001	22.58	0.19
	Nonparticipants (428)	4.7% (20)	11.4% (49)	22.0% (94)	35.7% (153)	26.2% (112)			
Calibrate my sprinklers	Participants (191)	3.1% (6)	3.7% (7)	9.4% (18)	28.3% (54)	55.5% (106)	0.003	15.93	0.16
	Nonparticipants (437)	2.5% (11)	8.7% (38)	14.9% (65)	33.6% (147)	40.3% (176)			
Use different irrigation zones/zone run times based on plants' irrigation nee	Participants (194)	3.1% (6)	2.6% (5)	9.8% (19)	32.0% (62)	52.6% (102)	0.019	11.77	0.14
	Nonparticipants (441)	5.0% (22)	5.7% (25)	17.2% (76)	28.8% (127)	43.3% (191)			

(*Continued on next page*)

Table 2. (*Continued*) Comparison of intentions to engage in irrigation water conservation between Florida extension participants and nonparticipants (N = 653).

Behavioral intentions[y]	Participation in extension programs	Very unlikely[z]	Unlikely[z]	Undecided[z]	Likely[z]	Very likely[z]	*P* value[x]	Chi-square	Cramer's V[w]
Follow watering restrictions	Participants (190)	1.1% (2)	1.6% (3)	10.5% (20)	14.7% (28)	72.1% (137)	0.032	9.90	0.13
	Nonparticipants (431)	0.9% (4)	0.7% (3)	4.9% (21)	11.8% (51)	81.7% (352)			
Only water your lawn in the morning or evening	Participants (196)	1.0% (2)	4.1% (8)	8.2% (16)	24.5% (48)	62.2% (122)	0.087	7.85	0.12
	Nonparticipants (443)	1.1% (5)	0.9% (4)	6.3% (28)	25.1% (111)	66.6% (295)			
Reduce the number of times a week you water your lawn	Participants (193)	3.1% (6)	1.0% (2)	11.4% (22)	30.1% (58)	54.4% (105)	0.389	4.15	0.08
	Nonparticipants (438)	3.0% (13)	3.7% (16)	9.8% (43)	32.6% (143)	50.9% (223)			
Seasonally adjust irrigation times	Participants (191)	2.6% (5)	1.6% (3)	10.5% (20)	26.2% (50)	59.2% (113)	0.554	3.03	0.07
	Nonparticipants (434)	2.5% (11)	3.9% (17)	8.8% (38)	24.0% (104)	60.8% (264)			

[z]Numbers in parenthesis represent actual number of responses for corresponding percentages.
[y]The current water conservation behaviors were measured on a 5-point Likert-type scale (1 = very unlikely, 2 = unlikely, 3 = undecided, 4 = likely, 5 = very likely). Scale also had not applicable response category that we made system missing for analysis.
[x]Probability values were reported based on Pearson's chi-square test and Fishers' exact text.
[w]Cramer's V values were interpreted as: less than 0.10 = negligible effect, 0.10 to 0.19 = weak effect, 0.20 to 0.39 = moderate effect, 0.40 to 0.59 = relatively strong effect, 0.60 to 0.79 = strong effect, 0.80 to 1.00 = very strong effect.

participants [n = 113 (57.7%)] indicated they were likely or very likely to join a water conservation organization in the future compared with 14.8% (n = 67) of nonparticipants. Similarly, 61.7% of extension participants (n = 121) indicated they were likely or very likely to volunteer for a cleanup or wetland restoration event compared with only 24.1% (n = 108) of nonparticipants. Nearly half of the extension participants [n = 96 (48.7%)] indicated they were likely or very likely to purchase a license plate that benefits a water protection organization compared with 14.0% (n = 63) of nonparticipants. About twice as many extension participants [n = 123 (62.1%)] than nonparticipants [n = 139 (30.8%)] indicated they were likely or very likely to donate money to an organization that works to protect water resources. About twice as many extension participants [n = 137 (71.7%)] than nonparticipants [n = 161 (37.9%)] indicated they were likely or very likely to convert turfgrass into landscaping beds in the future. There were no differences between the groups for those behaviors related to irrigating at specific times of day, reducing frequency of irrigation, and seasonally adjusting irrigation times.

Practices. Extension participants were significantly more likely to currently engage in landscape water conservation behaviors than nonparticipants as indicated by the Pearson's chi-square test comparing all water conservation behaviors under study (n = 17) excluding seasonally adjusting irrigation times (Table 3). Current engagement in landscape water conservation behaviors effect sizes ranged from negligible to moderate effects, with Cramer's V values ranging from 0.07 to 0.38. Among all the 17 current conservation behaviors, 10 behaviors had medium effect sizes, six behaviors had weak effect sizes, and one behavior had a negligible effect size. The strongest practical differences were associated with using specific technologies in the home landscape. More than half [n = 107 (53.8%)] of the extension participants reported using drip irrigation compared with only 16.7% (n = 76) of nonparticipants. Similarly, more than half of participants [n = 114 (57.3%)] reported using smart irrigation controls compared with about one-fifth

Table 3. Comparison of current water conservation behavior between extension participants (n1 = 199) and nonparticipants (n2 = 454) among residential irrigation users (N = 653)

Current behavior[y]	Extension participants (n1)[z]	Nonparticipants (n2)[z]	*P* value[x]	Chi-square	Cramer's V[w]
I use drip (micro) irrigation	53.8% (107)	16.7% (76)	<0.001	95.34	0.38
I have installed smart irrigation controls [such as soil moisture sensors (SMS) or an evapotranspiration device (ET)] so irrigation won't turn on when it isn't needed	57.3% (114)	20.9% (95)	<0.001	84.13	0.36
I use rain barrels to collect water for use in my garden/ lawn	54.8% (109)	22.0% (100)	<0.001	76.02	0.35
I use a rain gauge to monitor rainfall for reducing/ skipping irrigation	66.3% (132)	36.3% (165)	<0.001	50.64	0.28
I have retrofitted a portion of my landscape so that it is not irrigated	55.3% (110)	28.2% (128)	<0.001	44.93	0.26
I have converted turfgrass areas to landscaped beds	57.3% (114)	30.2% (137)	<0.001	43.17	0.26
I have replaced high water plants with drought tolerant plants	74.4% (148)	47.4% (215)	<0.001	41.46	0.25
I have replaced high volume irrigated areas with low volume irrigation	64.8% (129)	40.7% (185)	<0.001	32.19	0.22
I use recycled wastewater to irrigate my lawn/landscape	53.3% (106)	30.6% (139)	<0.001	30.53	0.22
I have turned off zone(s) or capped irrigation heads for established woody plants	64.3% (128)	43.2% (196)	<0.001	24.77	0.20
I use a rain sensor to turn off irrigation when it is not needed	65.8% (131)	47.4% (215)	<0.001	22.89	0.19
I have low-water consuming plant materials in my yard	73.4% (146)	56.8% (258)	<0.001	20.23	0.18
I use high-efficiency sprinklers	73.9% (147)	57.7% (262)	<0.001	19.81	0.17
I calibrate my sprinklers	75.4% (150)	61.7% (280)	0.003	11.59	0.13
I use different irrigation zones/zone run times based on plants' irrigation needs	72.4% (144)	59.0% (268)	0.005	10.79	0.13
I follow watering restrictions imposed by local government and/or water management districts	85.9% (171)	92.7% (421)	0.019	7.81	0.11
I seasonally adjust irrigation times	80.9% (161)	80.0% (363)	0.225	2.94	0.07

[z]Numbers in table represent percentage who responded yes to current water conservation behavior with values in parenthesis represent corresponding actual responses.
[y]Possible responses were yes, no, and unsure.
[x]Probability values were reported based on either Pearson's chi-square test or Fisher exact test.
[w]Cramer's V values were interpreted as: less than 0.10 = negligible effect, 0.10 to 0.19 = weak effect, 0.20 to 0.39 = moderate effect, 0.40 to 0.59 = relatively strong effect, 0.60 to 0.79 = strong effect, 0.80 to 1.00 = very strong effect.

of nonparticipants [n = 95 (20.9%)]. The smallest practical but significant differences included using high-efficiency sprinklers, using different irrigation zones based on the needs of the landscape, calibrating sprinklers, and following water restrictions.

Discussion

This analysis revealed important similarities and differences between those home irrigation users who had attended extension programs and those who had not. General attitudes toward good irrigation practices or perceived ability to adopt them were positive overall, with no differences between extension participants and nonparticipants. We concluded that the presence of positive attitudes and perceived ability to adopt good irrigation practices did not translate to uniform conservation practices between groups. Although their general attitudes and perceived control were the same as nonparticipants, extension participants were more likely to intend to adopt water conservation actions in the future and were more actively engaged in landscape water conservation behaviors at the time of the study. We interpreted the differences we identified between participants and nonparticipants to mean that lack of positive attitude, skill, and knowledge is not preventing people from engaging in landscape water conservation. There is frequently a discrepancy between what people know and identify as positive or beneficial and what they actually do, which is often referred to as the knowledge-attitude-practice (KAP) gap (Rogers, 2003). This finding is consistent with others who have identified a lack of relationship between knowledge, attitudes, and adoption of water conservation practices (Dolnicar and Hurlimann, 2010; Estrada, 2013).

Nonetheless, those home irrigators who had attended extension programs had stronger perceived social norms and personal norms surrounding engagement in good irrigation practices. This finding indicates that these individuals have social support to engage in landscape water conservation and have also deeply internalized their obligation to do so. The practical effect size that corresponded to the difference in social norms was stronger than for personal norms, suggesting greater practical significance in the differing social norms. Extension participants also had greater intent to adopt good irrigation practices in the future as well as greater likelihood of current engagement for nearly all of the water conservation behaviors under study.

The greatest practical effect sizes for future behaviors were for those that require substantial personal time or resources. The greatest practical effect sizes for current behaviors were those that require installing some type of technology. We concluded that the most impactful behavioral differences between extension participants and nonparticipants were those that required the greatest commitment of a person's time or commitment to a new technology. This revealed an important relationship between engagement in extension and the adoption of more complex water conservation strategies.

There is an association between participating in extension programs and some important personal factors. Those who participated were more likely to have higher social and personal norms, greater behavioral intent, and more actual engagement in the water conservation practices in this study. This finding demonstrates that extension may be playing some role in reducing the KAP gap, possibly by providing a greater amount of a treatment, which prompted several questions. What is extension's role? What are nonparticipants lacking that they do not engage in conservation? We know that both groups are different, but we do not fully understand why. Extension seems to provide something that makes more people engage in conservation, but the key difference between participants and nonparticipants is not knowledge, skill, or general attitudes.

Extension may also be attracting people with the knowledge, skills, and attitudes required to engage in conservation behavior and enabling or facilitating their change into conservation behaviors. This may include providing information and validation or supplementing them with additional knowledge and skills. For example, some individuals engage in landscape irrigation water conservation and then come to extension for validation, or for additional information required to maintain or expand their practice, which would explain the important differences we identified. However, extension plays an important role in helping people develop stronger internal normative attitudes and supporting the development of social norms surrounding landscape water conservation.

Recommendations for research. Our approach aimed to uncover relationships between key outcomes and being, or not, an extension program participant. More similar to a black box than a transparent box evaluation (Love, 2004), this work determined important differences and revealed future opportunities to learn more about how to better reach nonparticipants. Further research is needed to identify barriers for participation in extension programming and strategies to overcome those barriers. Future study should examine differences between extension participants and nonparticipants on a national scale. Further examination needs to be conducted to explore the relationship between landscape water conservation practices and intensity of an extension program or frequency of interacting with extension.

Our study reveals a key question: why do some people engage in extension programming while some do not? Now that differences have been identified between extension participants and nonparticipants, future research should examine causation. The next study should explore specifically what it is about these extension programs that is contributing to positive water conservation behaviors. Qualitative research may be used to explore how people feel about participation in extension programs, why they have or have not engaged with extension, and how they perceive various water conservation practices and technologies. Future study needs to determine factors that prohibit this population from engaging with extension. Future research should also examine why nonparticipants have not engaged in extension programs to better target a larger percentage of this very important audience. Research also needs to examine the relationship between landscape water conservation behaviors, and participation in specific extension programs. The demographic data revealed possible differences between extension participants and nonparticipants. It was outside the scope of this study to examine demographic differences, but future research may examine how personal characteristics may influence engagement in extension programs or landscape water conservation.

Recommendations for practice. This study reveals a need to be more intentional about targeting nonparticipants. There are positive changes associated with participating with extension and an important conclusion is that nonparticipants seem to already be equipped with the basic knowledge, skills, and positive general attitudes to adopt landscape water conservation behaviors. Extension professionals should consider that it is not positive attitudes, knowledge, and skill alone that lead people to adopt home irrigation practices and technologies. The role of helping people to see themselves as individuals who conserve water in home landscape cannot be overemphasized. Even more importantly, a person's behavior is strongly influenced by the groups and communities to which they belong (Saurí, 2013). Therefore, it is critical to help people to see themselves as part of groups who conserve water by developing social support and social norms surrounding the desired behaviors. Many conservation behaviors are not visible within a peer group, and therefore, social norms can be artificially low. There is an important opportunity for extension to play a role in making others' engagement in landscape water conservation behaviors more visible within a social network.

Social norms can be increased by approaching water conservation programs at the community level. Extension professionals should conduct community-wide campaigns and highlight the positive behaviors among members of a social system. This strategy will be most effective when extension professionals can identify positive behaviors that many members of a community engage in so that individuals can perceive that changing their behavior means they are joining the majority (McKenzie-Mohr and Schultz, 2014). Programs should demonstrate use of landscape water conservation practices so that actual adoption of landscape water conservation practices and technologies is perceived by other members of the community. Landscape water conservation campaigns can also emphasize social norms by using signage to denote water-conserving landscapes in a community. Extension professionals can also use newspaper and community newsletter articles, and messages in utility bills to communicate community members' engagement in water conservation activities.

Conclusions

This research was a first step in understanding the relationship between people's home landscape irrigation conservation practices and their engagement with extension. Findings reveal an important link between participation in extension programming and engagement in water conservation. The results of this study point to a positive influence from extension, a promising finding from an evaluation standpoint. Regardless of causation, it is recommended that extension educators develop strategies to target nonextension users while continuing to support those who seek out extension services. Further research is needed to more deeply explore the differences between extension participants and nonparticipants, and extension professionals are encouraged to intentionally engage in promoting positive social and personal norms surrounding desired behaviors. This study highlights extension's influence on long-term practice changes which may lead to improved SEE conditions such as increased water availability. Further studies should be conducted to examine factors that influence engagement in extension programs and adoption of potential water conservation practices.

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