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MOTIVATING REASONS FOR PERFORMED & EXPECTED WATER REDUCTION BEHAVIOR

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ABSTRACT: *Building on various behavior-based theories as well as reasoned action as they relate relates to water consumption, thus research targeted those who self-report domestic water use reduction and try to understand why they do so for the purpose of uncovering their reasoning orientation, claiming that an orienting reasoning style of the target group would exist for context-specific "light green" water reduction behaviors and whether these behaviors are performed or expected. A descriptive correlation design was followed using a self-reported electronic survey to 319 college students in Saudi Arabia to determine the reported motivating reasons of "light green" water reductionist behavior in the form of justifying reasoning of performed behavior and explanatory reasoning of hypothetical behavior. Both justifying and explanatory reasoning would elicit a combination of seven reasoning orientations of water demand management behavior that would shed light on two reasoning styles: sustainable and utilitarian. Even though there is an overarching reason across the performed and expected "light green" water reduction behavior, mainly "religious teaching", there are two statistically significant reasoning styles (sustainable and utilitarian) as emerged from those who self-report their motivating reason to justify performed and explain expected water reduction behavior. The disclosure of the reasoning style (sustainable or utilitarian) underpinning water reduction behavior for Saudi college students would be helpful to tailor pro environmental programs and thus increase water reduction practices individually or collectively. This research also provides a novel instrument that can be used as a self-inventory educational tool.*

KEYWORDS: Behavior-Based Theories, Water Consumption, Religious Teaching, Self-Inventory Saudi Arabia.

INTRODUCTION

Throughout the world communities are struggling with the reality of the shortage of water. People from all walks of life are affected and in my study I intend to focus on the household as the initial water reduction point and merge it with global water sustainability efforts.

The accomplishment of household water demand management tactics relies on our sound understanding of how people think about water and water use (Jorgensen, Graymore, & O'Toole, 2009)

With growing populations, warmer climates, dated water infrastructures, and quick fixes for water waste, it is no longer difficult to imagine more shrinking bodies of water across the globe. Saudi Arabia, the third largest consumer of water worldwide, is said to reach a population of around 30 million in less than a year. In addition to its swelling demographics, increased tourism, and modernization, the agricultural and industrial-based country has increasingly stressed its 25 year old water infrastructures. Domestic water conservation in dry climates can result in efficient utilization of existing water supplies. This paper addresses the impacts of

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conservation measures such as: the installation of water-saving devices, water metering and pricing schemes, water usage reduction and public awareness programs, strict plumbing codes, penalties for wasting water, programs designed to reduce leakage from public water lines and within the home, water-efficient landscaping and economic and ethical incentives. Cost savings in arid climates, with particular reference to Saudi Arabia, in relation to some conservation techniques, are presented. Water conservation technology and tentative demonstration and implementation of water conservation programs are discussed. Water tariffs set in place are due to increase from $.027 to as much as $1.40 (5 SR) per cubic meter of water to encourage water conservation (U.S.-Saudi Arabian Business Council, 2009). Moreover, according to the Ministry of Water and Electricity (MOWE), the per capita water consumption in Jeddah, one of the biggest cities in Saudi Arabia, is nearly twice the European average, and demand continues to increase (Thamali, 2013).

Research/ Background

While much research in STEM fields focuses on the impact of water consumption and conservation, emerging research focuses on existing determinants and variables that might explain and predict water conservation behavior. Research in the area of water conservation behaviors specifically related to Saudi Arabia emphasize the importance of studying psychological motivational factors for water conservation behavior *(Al-Zahrani, 2005 and Al-Shafee, 2004).* There is emerging literature on behavioral interventions intended to encourage sustainable environmental behavior broadly (Abrahamse et al., 2005), and water conservation more particularly (Aitken, McMahon, Wearing, & Finlayson, 1994); (Trumbo & O'Keefe, 2001) is also emerging. Although there is mounting literature within the realm of environmental psychology on conservation behaviors, in comparison to energy conservation, there is comparatively less focus on water conservation (Bamberg & Möser, 2007).

Unlike contemporary research that focuses on the macro level of water conservation determinants (i.e. values, beliefs, attitude, intention, and perceived control), this research follows a micro approach and looks at causal reasoning or post rationalization of micro factors reasoning (i.e. a specific-context behavior).

From a researcher's point of view, as a family educationalist, uncovering dominant reasons help in directing, tailoring, and developing environmental programs. Knowing the correlation between a set of different reasons (justifying and explanatory reasons) might be investigated as well, in order to personalize and customize the learning context of a domestic (home-based) environmental education agenda or curriculum.

Moreover, according to Gardner & Stern (1996), analyzing the behaviors to identify the accountable actions and then considering the full range of causal variables and realizing their possible correlation to the target behavior from the actor's point of view, whose behavior is to be changed or enhanced, may offer promising intervention strategies without the need to perform experimental studies to test significance.

Studies that examine only contextual variables, such as material incentives, social norms or the introduction of new technology, may find effects but may fail to reveal their dependence on individuals' attitudes or beliefs. Single variable studies may demonstrate that a particular theoretical framework has explanatory power but may not contribute much to the comprehensive understanding of particular environmentally significant behaviors that need to change (P. C. Stern, 2000).

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Meta-analyses of research using the theory of reasoned action (TRA) and the theory of planned behavior (TPB) show that these models explain on average between 40% and 50% of the variance in intention, and between 19% and 38% of the variance in behavior (Sutton, 1998). Researchers who use attitude-behavior models such as the TRA are usually more positive about their utility in predicting and explaining intentions and behavior. Nevertheless, even the proponents of such models believe that there is room for improvement, and there are frequent theoretical and empirical attempts to extend existing models by incorporating additional explanatory variables with the aim of accounting for more of the variance (Sutton, 1998).

Moreover, most of the models, i.e. Value-behavior-norm (VBN), and motivation-attitude-opportunity (MAO) (Phipps et al., 2013) , and TBP suggest that different levels of antecedents ultimately cause certain behavioral outcomes in a primarily linear, serialized process. For instance, the VBN model conceptualizes behavior as resulting from personal norms that, in turn, are developed from the antecedents of values and beliefs. Behavior (or past behavior) should not be viewed as just an outcome, but also as a determining variable (Phipps et al., 2013) or at least as an explanatory variable.

In the context of the TRA/TPB, a number of other factors have been proposed as additional determinants of behavior; that is, as factors whose effects on behavior are not entirely mediated by intention. These include past behavior, habit, attitude toward the behavior, and self-identity (see (Conner & Armitage, 1998), for a review). Although such factors may have an independent influence on behavior, the possibility remains that the findings simply reflect inadequacies in the measurement of intention. If intentions were measured proximally using highly reliable measures, the effects of factors such as past behavior may be shown to be mediated entirely through intentions (Sutton, 1998).

An important limitation of past research is the measurement of water conservation behavior. Past research can be generally classified into three dominant modes of behavioral measurement, including, (1) measuring water conservation intention, (2) using self-reported behavioral measures of water conservation, and (3) measuring actual water use, with the majority of studies only measuring water conservation intentions (Clark & Finley, 2007); (Lam, 2006) or using self-reported measures of water conservation (Corral-Verdugo et al., 2008). As (Hamilton, 1985) and (De Oliver, 1999) highlight, self-reports of water conservation behavior are often not strongly linked to actual water consumption. While each method has its relative strengths and weaknesses, future research needs to move toward measuring motivating reasons for self-reported water reduction/conservation behavior).

Aim of this Study or Research participants:

King AbdulAziz University (KAU) students were the targeted sample of the study, because older people (Clark & Finley, 2007) and highly educated people (Gilg & Barr, 2006) and (Lam, 2006) are more committed to water conservation. This study takes place at King Abdulaziz University in Jeddah, Saudi Arabia and describes the profile or the dominant motivating reasoning style of water conservation behavior: sustainable and utilitarian and their pervasiveness in selected water conservation behaviors. This research focuses on justifying reasons of performed curtailment water reduction behavior and explanatory reasons of expected water reduction behavior in the household setting.

Even though focusing on domestic curtailment behavior as a private-sphere behavior has direct environmental consequences, they tend to have less environmental impact in comparison to

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efficiency behavior (e.g., home heating and cooling systems). Nonetheless, the environmental impact of any individual's curtailment behavior, however small, has an environmentally significant impact only in a collective mode , when many people separately do the same things (P. C. Stern, 2000).

From a respondent's point of view and in line with theories of explanation-based decision making (Pennington & Hastie, 1988), reasons are important motivationally, as they can be used to justify and defend one's actions (Tetlock, Skita, & Boettger, 1989) which, in turn, may promote and protect feelings of self-worth (Kunda, 1990) as well as satisfy people's needs for meaning (Thomas, Clark, & Gioia, 1993) and psychological coherence (Thagard, 1989). Thus, in relation to understanding the underlying motivations of people's behavior, anticipated behaviors that have justifiable and defensible reasons are more likely to be performed, and performed with confidence, as they may satisfy a number of psychological needs (Westaby, 2005).

Many approaches toward changing individuals' environmentally significant behavior have been tried. Gardner and Stern (1996) reviewed the evidence on four major types of intervention: religious and moral approaches that appeal to values and aim to change broad worldviews and beliefs; education to change attitudes and provide information; efforts to change the material incentive structure of behavior by providing monetary and other types of rewards or penalties; and community management, involving the establishment of shared rules and expectations. They found that each of these intervention types, if carefully executed, can change behavior. However, moral and educational approaches have generally disappointing track records, and even incentive- and community-based approaches rarely produce much change on their own. By far, the most effective behavior change programs involve combinations of intervention types. These findings underline the limits of single-variable explanations for informing efforts of behavior change. Thus, the behavior is determined by multiple variables, sometimes in interaction.

Beside the above four approaches for changing individuals' environmental behavior, within the literature, De Young (2000) distinguish between "antecedent" and "consequence" approaches to changing behavior. Antecedent strategies propose to bring about change by influencing the determinants of behavior, e.g., by seeking a commitment to water saving, setting goals, or providing information. An antecedent approach also promotes conservation by attempting to change attitudes to water conservation. Research by (Kurz, Donaghue, & Walker, 2005), for example, showed that prompts about conserving water placed at the point where water is used, resulted in households reducing their water use by 23 percent. On the other hand, consequence strategies are said to change behavior by influencing determinants after the enactment of behavior. In this way, consequences (positive or negative) are linked to the outcome of the behavior. For example, providing rewards for saving water may reinforce water conserving practices. Similarly, giving households feedback about the level of water consumption in their community can provide information about what is "normative" and thus influence individuals' attitudes and behavior (Russell & Fielding, 2010).

METHOD

This research followed a descriptive correlation design. It is descriptive in the sense that information is collected without manipulating the behavior, attitudes or other characteristics of

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a particular group. It is a correlational study in the sense that the relations as they exist naturally among variables are measured. Analytical cross-sectional surveys were used to investigate the association between a supposed motivating reasoning style and water reduction behavior (outcome) by asking participants to select a numerical value on a predetermined scale.

Survey Instrument Reliability and Validity

Several attempts were made to ensure that the instrument was valid and that items were clear and relevant to participants' life experiences. In addition to evaluating the content validity, Cronbach's alpha was also used to evaluate the instrument's self-consistency and homogeneity. Prior studies on environmental behavior change and its psychological determinants were also analyzed to identify the variables of the current research. The self-reported survey was then administered to 319 KAU students to determine the underpinning motivating reasoning orientation of water reduction/conservation behavior.

Descriptive statistical analyses were performed on the sample to obtain a clear understanding of the water reduction phenomenon. Measures of central tendency (means and percentage) were computed. Bivariate correlational analysis were conducted in order to assess the strength of direction of the relationship between reasons and their relation to some variables as a struggle for obtaining water and behavior frequency and duration . One-way ANOVA was used to show whether we have a statistically significant difference between behavior reasoning means.

Questionnaire Rationale

Due to the low explanatory power of the behavioral models, there is much to learn about the underlying factors impacting water reduction that are yet to be discovered.

Reasons are psychologically instrumental motivating determinant, because they help human beings satisfy their needs to justify and defend their actions, which can theoretically protect their self-concepts (Gawronski & Bodenhausen, 2006).

In contrast to motives that represent general drivers of people's behavior, context-specific reasons –as in this research- are used to justify, defend, and explain in acted/past as well as anticipated/future behavior.

Following Davidson (1963) thoughts, motivating reasons are complexes of beliefs and desires that motivate actions and on which we rely to explain the action, where the explanation in question is taken to be causal.

Based on this understanding, reasons have been found to have unique effects on intention, independent of beliefs, in both correlation and experimental studies (Westaby, 2005).

Thus, a research tool was developed to help us better understand the casual relation of water reduction behavior, without which, a phenomenon would not be explained.

Even though the undertaken "light green" water reduction behaviors are low on the environmental benefit scale, they were used in the survey questionnaire because they required little effort and inconvenience to undertake. According to (Zsoka, Szerenyi, Szechy, & Kocsis, 2013), willingness to engage in certain behaviors often exceeded the perceived climate benefits of those behaviors.

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The current survey is influenced by the work of (Schultz, Shriver, Tabanico, & Khazian, 2004) which is a new ecological paradigm survey considering environmental belief as a psychological determinant, affecting the relationship of people with the natural world.

The development of the survey tool is also inclined by the work of (Corral-Verdugo et al., 2003), such that it is more specific beliefs about water rather than general environmental beliefs, that are the most immediate drivers of water conservation behaviors .

The current survey taps into contextual factors by assessing to what extent the participants base their reason on: 1) utilitarian factors such as saving money, easiness of performing the behavior, and avoiding hardship of water shortage and 2) sustainable factors such as religious teaching, environmental concern, others concerns, and valuing water reduction.

Indeed, most studies tap into contextual factors by assessing perceived behavioral control, which is, how easy or difficult people perceive it is to engage in an action (Lam, 2006). Contextual factors are important considerations in examining water conservation behaviors because of their potential to facilitate or constrain behavior (Steg & Vlek, 2009); (P. C. Stern, 2000).

The development of the three utilitarian reasons stem from the work of expectancy values models which propose that people behave in order to maximize expected benefits from their actions. Utilitarian reasons, unlike sustainable reasons, reflect close and tangible benefits, thus we might describe them as "beneficiary –based reasons". Even though beneficiary –based reasons were available to the sample in which 14% strongly struggle to access water at home, these reasons hold the lowest ranking among the seven reasons.

The four sustainable reasons for those who claim that they practice pro-environmental behavior emerged, based on the work of Value–Beliefs–Norms theory developed by Paul Stern and his colleagues as a theory of environmentally significant behavior. The central premise is that pro-social beliefs and personal moral norms are significant predictors of pro-environmental behavior (Paul C. Stern, 1999). This theory consistently explains more variance in a range of environmental behaviors (including environmental citizenship, policy support and private sphere behaviors) than many competing theories (P. C. Stern, Dietz, Abel, Guagnano, & Kalof, 1999).

The light green behaviors about which the participants reveal their motivating reasons followed the two changing behavior approaches proposed by De Young (2000): "antecedent" and "consequence". An antecedent approach promotes conservation by attempting to change attitudes to water conservation. Research by (Kurz et al., 2005), for example, showed that prompts about conserving water placed at the point where water is used, resulted in households reducing their water use by 23 percent.

On the other hand, consequence strategies are said to change behavior by influencing determinants after the enactment of behavior. In this way, consequences (positive or negative) are linked to the outcome of the behavior. For example, providing rewards for saving water may reinforce water conserving practices. Similarly, giving households feedback about the level of water consumption in their community can provide information about what is "normative" and thus influence individuals' attitudes and behavior (Russell & Fielding, 2010).

In the context of this research, the extracted justifying reasoning for the first set of behavior (4 curtailment-enacted behavior) is linked to the outcome of the performed behavior. For

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example, giving conservative people feedback about individual or group reasoning profile of saving water may stress out the "normative" and as a result reinforce water reduction practices.

The drawn out explanatory reasoning of the second set of behavior (4 expected behaviors) is linked to the antecedent determinants of behavior, e.g., by being aware of the reasoning profile of possible future behavior might play a motivational role. Anticipated behaviors that have reasonable and defensible reasons are more likely to be performed, and performed with self-assurance, as they may fulfill a number of psychological needs (Westaby, 2005).

Questionnaire Description

Along with marketing a survey through various students' activities, an online survey-based questionnaire was sent to KAU students email list. The questionnaire used SurveyMonkey® software as a tool to collect data, the questionnaire consists of 4 parts:

1. Demographics: gender, academic level, household expenditure, and family size.
2. Struggle in obtaining water at home (3 questions)
3. Motivating reasoning orientation of water reductionist behavior:

   Seven reasons reflecting two styles: sustainable and utilitarian were presented simultaneously to the participants to rate each reason on a five-scale Likert scale for two sets of behavior:

   a. Four performed (executed/past) behaviors for the participants to report their justifying reasons along with the behavior reported frequency and duration and,
   b. Four hypothetical (or expected/future) behavior for the participants to report their explanatory reasons.

Part 1, 2, and 3.b were open to all participants, but the reasoning for each performed behavior of part 3.a was open only to those who reported that they executed that particular behavior using "skip logic" function of SurveyMonkey® tool.

RESULT ANALYSIS AND DISCUSSION

Demographics

The internal consistency of the survey items as measured by Cronbach's Alpha Coefficient was accepted and significant (0.95)

Sample consists of King Abdulaziz University students (n=319) who are all Muslim students with the majority being undergraduate enrolled students 65 % and 22 % graduate enrolled students

Of the total sample, there were (150) male 54.69% and (169) Female 53% students

22% of the sample (n=71) live in a family with 1-3 members, 39% (n=123) live with a family of 4-6 members, and 35% (n=113) live with a family of 7-10 members.

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According to Saudi expenditure rate, (67%) of the sample fall into the lower rate (less than 3400 Dollar per month) and 25 % reported that the monthly household expenditure falls between 3400-4500 dollars, which is at the average expenditure level.

Struggle in Obtaining Water at Home

Participants struggle in obtaining water at home was measured by four questions related to water supply methods at home (pipe and truck), water cutoffs at home, and experienced/felt difficulty with water accessibility at home.

66% reported that desalination water services pipes is the primary water supply method used and 28% said that the main water supply method used in their house is through water trucks.

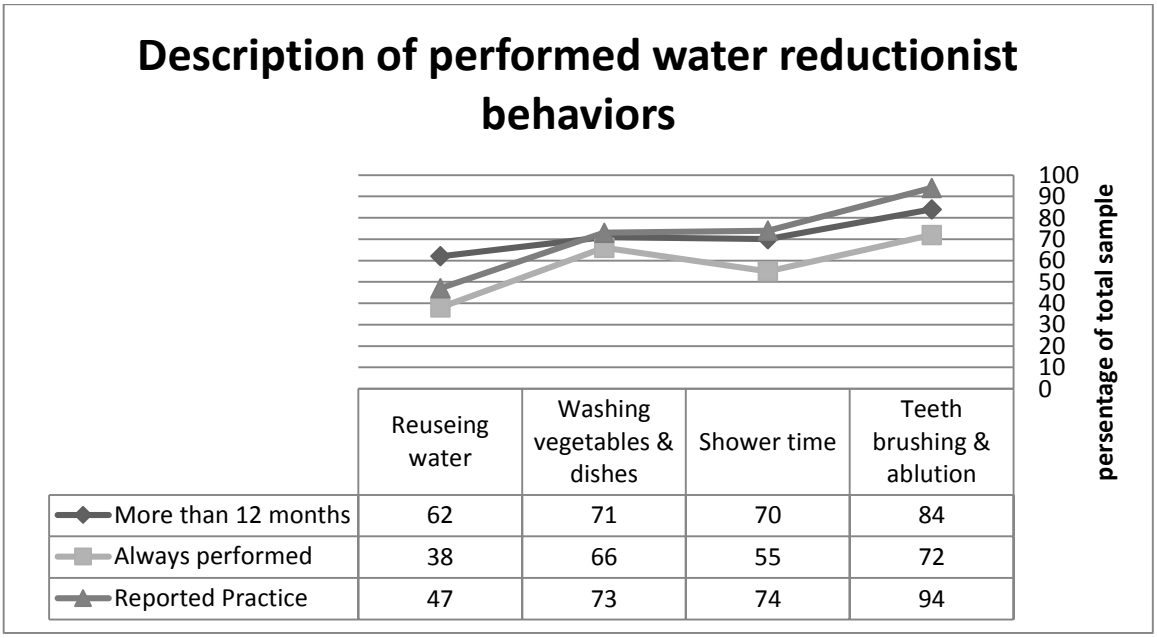
When asked about the degree of water cutoffs, 40% reported that the water is never cut off in their houses, and 36% described the cutoffs as a yearly incident and 25% as a weekly/monthly occurrence. On a scale from 1-5 (1 = minimal, 5 = high) 70% of the respondents described their experienced/felt difficulty with water accessibility at home as minimal and 10% as high.

Due to the significantly high internal consistency of the survey items as measured by Cronbach's Alpha Coefficient (0.95), and since the correlation coefficient between the "experienced/felt difficulty for water accessibility at home" and the other four struggle variables were all significant at the 0.01 level (2-tailed) ranging from (0.4-0.6), the experienced/felt difficulty was chosen to represent a struggle for water accessibility at home for further analysis.

Reasoning orientation/style of water reductionist behavior

a. performed behaviors

Of the total sample (n= 319), only those who revealed that they performed any of the four water reductionist behaviors were analyzed, to illustrate their justifying reasons for these behavior (see Fig 1



	Reuseing water	Washing vegetables & dishes	Shower time	Teeth brushing & ablution
More than 12 months	62	71	70	84
Always performed	38	66	55	72
Reported Practice	47	73	74	94

Fig. 1: Description of performed water reductionist behaviors

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The above figure 1 shows that the highest practiced curtailment behavior was "Minimizing amount of water used in teeth brushing, face washing, shaving and ablution" as revealed by 94% (n=273) of the total sample and "Reusing water for other purposes" was the lowest.

Even though 67 % report their house expenditure less than 3400 dollars per month, that falls into the low Saudi expenditure rate, they indicate that they practiced the four "light green" water reduction behavior with a percentage ranging from 47-94% .

Even though the undertaken "light green" behaviors are low on the environmental significant benefit, they were used in the survey questionnaire because they required little effort and inconvenience to undertake. According to (Zsoka et al., 2013), willingness to engage in certain behaviors often exceeded the perceived climatic benefits of those behaviors.

Of the total sample which revealed practicing water reduction behavior, we can see that almost half of the sample ranging from 38-72% revealed that they always practice the four curtailment water reduction behavior, and the majority of the sample ranging from 62-84% also revealed that they have been practicing these four behaviors for more than 12 months. Thus, a habit might be a good automatic response that might explain their water reduction behavior.

In the field of psychology, however, there is growing recognition that behavior is also guided by automatic processes such as habits or routines (Steg & Vlek, 2009) (P. C. Stern, 2000) P. C. Stern (2000). As defined by (Verplanken & Holland, 2002) , habits are "relatively stable behavioral patterns, which have been reinforced in the past… [and] are executed without deliberate consideration, and result from automatic processes, as opposed to controlled processes like consciously made decisions" (p.287). Habits are usually conceptualized and measured as the frequency of past behavior as it is thought that behaviors that are performed frequently form habitual patterns that become automatic responses in future situations (Ouellette & Wood, 1998).

The high percentage of duration and frequency illustrated above, highlight the importance of continuing the effort of managing water demand with university students as an essential element of future water security (Arbués, Garcia-Valiñas, & Martinez-Espiñeira, 2003); (Brooks, 2006); (Jeffrey and Gearey, 2006).

According to data provided in AFED (2010), the domestic consumption of water in the Arab region utilize on average about 10% of the natural renewable available water resources. Even with this small percentage, water demand management is a "no-regrets option" to cope with future vulnerability of water supplies in the face of climate change impacts (Bates, at. el, 2008)

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Table 1 : Reasoning mean for performed behavior .

Water reduction reasoning style	Performed behavior / Justifying reasons	Minimizing amount of water used in teeth brushing, face washing, shaving and ablution **N=190**	Reducing shower time and the amount of water used **N=143**	Reducing water used when washing vegetables and dishes **N=133**	Re-use of water for other purposes **N=83**	Grand mean	One-way ANOVA	
							Sig.	reasoning style grand mean
Sustainable Reasoning	Religious teaching	4.61	4.55	4.65	4.35	4.56	0.11	4.19
	Valuing water reduction	4.23	4.26	4.26	4.23	4.25	0.99	
	Considering future generation	3.99	4.06	3.99	3.89	3.99	0.80	
	Environmental	3.95	4.01	3.95	3.84	3.95	0.82	
Utilitarian Reasoning	Easiness of the behavior	3.73	3.75	3.89	3.82	3.79	0.69	3.15
	Saving water bill	2.74	3.08	3.17	3.07	2.98	0.05	
	Avoiding hardship of water shortage	2.49	2.74	2.70	2.93	2.67	0.14	

The above table shows the individual as well as the grand mean of seven reasons of performed behavior, the significance of the grand mean, and the differences between sustainable and utilitarian reasoning styles.

Looking at the highest grand mean (4.56), we can see, the participants' strongest reason to execute the four curtailment behaviors was based on religious teaching, whether we look at an individual behavior or collectively across the four behaviors. Thus, we can conclude that an over arching reported reason for performing "light green" water reduction behavior was because of "Religious teaching" not to waste water.

The second strongest reason whether for individual behavior or collectively was, "Valuing water reduction" (4.25), and the least was "avoiding hardship of water shortage" (2.67).

Looking at the "saving water bill" reason, even though 67 % of the sample fall into the range of less than 3400 Dollars monthly, reflecting low expenditure rate, the grand mean of "reducing water bill" reason ranked # six out of a total of seven reasons. The low grand mean of "saving water bill" might be responsive to the low water price in SA. Even a water tariffs increase from $.027 to $1.40 (SR) per cubic meter of water to encourage water conservation (U.S.-Saudi Arabian Business Council, 2009), "saving water bill" was not a strongly selected reason by the study sample who revealed performing water reduction behavior.

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The above findings echo Phipps et.al,. (2012), that environmentally significant behaviors are somewhat unique in that the behavior often involves making decisions with outcomes that affect the environment and/or others (human being), either directly or indirectly.

One-way ANOVA analysis shows that the grand mean of the hypothetical sustainable reasoning style (4.19) is significantly higher than the grand mean (3.15) of the hypothetical utilitarian reasoning style at the level of 0.05 (p=0.00). This would imply that the reasoning style does actually affect the grand mean of the seven reasons of the performed behaviors.

One-way ANOVA analysis results in table 1 indicate that the mean of each of the seven reasoning - except for the economic reason – as reported by those who claim that they do practice the four type of "light green" water reduction behaviors, was actually similar across the four behaviors. Thus, behavior type has no influence on the reasoning mean.

Of the whole sample (n=319), 10% reveals s severe struggle in accessing water at home, but when looking at those who reported practicing water reduction behavior, the percentage gets higher 14%. Thus the percentage of those who struggle severely is higher among the ones who practice water reduction behavior in comparison to those who do not. In table 2, the researcher descriptively analyzed this small sample to disclose the nature of their reasoning style.

Table 2: Reasoning percentage mean of performed behavior for those who struggle severely in accessing water at their homes

Water reduction reasoning style	Performed behavior / Justifying reasons	Minimizing amount of water used in teeth brushing, face washing, shaving and ablution **N=21**	Reducing shower time and the amount of water used **N=19**	Reducing water used when washing vegetables and dishes **N=19**	Re-use of water for other purposes **N=10**	Grand percentage mean
Sustainable Reasoning	Religious teaching	86%	90%	85%	90%	88%
	Valuing water reduction	76%	74%	74%	80%	76%
	Considering future generation	76%	74%	74%	80%	76%
	Environmental	72%	74%	74%	80%	75%
Utilitarian Reasoning	Easiness of the behavior	62%	58%	63%	90%	68%
	Saving water bill	49%	23%	63%	60%	49%
	Avoiding hardship of water shortage	57%	63%	58%	70%	62%

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The above table shows the individual as well as the reasoning percentage grand mean of performed behavior for those who struggle **severely** in accessing water at their homes.

Looking at the grand percentage mean in table 2, we can see that the strongest reason for executing the four curtailment behaviors as revealed by those who struggle **severely** in accessing water at their homes was because of religious teaching, whether we look at an individual's behavior or collectively across the four behaviors(88%). Also, we can see that the grand percentage means of the hypothetical sustainable reasoning style were higher than the utilitarian reasoning.

Thus, even though the above sample struggled severely in obtaining water at home, such a contextual determent factor did not change the reasoning orientation, which is, the chosen reasons were in favor of sustainable reasoning style. We can conclude that an over arching reason of the performed "light green" water reduction behavior was "Religious teaching", even with the group who struggle **severely** in accessing water at their homes! The overriding perspective in environmental psychology points out that individuals make rational and reasoned choices (Bamberg and Möser, 2007), an assumption that is equally evident in water reduction reasoning styles. Based on the results of my research, the emerging sustainable reasoning style for "light green" water reduction behaviors is an honored characteristic though, which educational programs can set the stage for. Ölander and Thøgersen's (1995) Motivation–Opportunity–Abilities (MAO) model include the role of habits and task knowledge (i.e., ability) and situational conditions (i.e., opportunity), to identify potential constraints and enablers of sustainable behaviors. Even though this model views a potential for contextual resource constraints to cause difficult trade-offs (Thøgersen, 2005), the current research does not align with the model expectation. It was not difficult trade-offs for those who strongly struggle to obtain water at home, to justify the reason for reducing water consumption based on religious beliefs instead of "avoiding hardship of water shortage".

Table 3 : Explanatory reasons' mean for expected behavior .

Water reduction reasoning style	Expected Behavior / Explanatory reasons	I am committed to water reduction **N=178**	Water reduction program would be successful when focusing on **N=173**	I will maintain a leaking faucet because of **N=168**	Reasons that encourage me to install water efficiency tools **N=168**	Grand mean	One-way ANOVA Sig.	One-way ANOVA reasoning style grand mean	
Sustainable Reasoning	Religious teaching	4.79	4.54	4.83	4.73	4.72	0.00	4.39	
	Valuing water reduction	4.35	4.35	4.73	4.67	4.53	0.00		
	Considering future generation	3.99	4.36	4.13	4.16	4.16	0.02		
	Environmental	4.03	4.28	4.14	4.11	4.14	0.24		

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Utilitarian Reasoning	Easiness of the behavior	4.02	4.34	3.54	3.91	3.95	0.00	3.78
	Avoiding hardship of water shortage	2.88	4.46	3.63	4.23	3.80	0.00	
	Saving water bill	2.91	4.00	3.78	3.72	3.60	0.00	

The above table shows the individual as well as the grand mean of expected behavior reasons, the significance of the grand mean, and the differences between sustainable and utilitarian reasoning styles.

Looking at the highest grand mean (4.72), we can see, the participants' strongest motivating reason to execute the four expecting behaviors was because of religious teaching, whether we look at an individual behavior or collectively across the four behaviors. Based on the descriptive analysis, we can conclude that an overarching reason for the expected/proposed "light green" water reduction behavior was "Religion"

The second strongest explanatory reason whether for individual behavior or collectively, was "Valuing water reduction" (4.53) and the least was "Saving water bill" (3.60).

Looking at the "Considering future generation" reasoning mean across the eight behaviors undertaken in this study (table1 and 3), we can see that the highest mean was for justifying the success of water reduction programs. That is, reasoning in relation to caring about future generation was relevant to valuing the goodness of educational water reduction programs, more than self-activated water reduction behaviors, such as reasoning about what encouraged him/her to install water efficiency tools.

One-way ANOVA analysis shows that the significance level for all the reasons- except for the sustainable concern- is less than 0.05. Therefore, there is a statistically significant difference in the mean of the justifying reasons of the four water reduction proposed/expected behaviors. Finding significant effects implies that the means differ more than would be expected by chance alone. This would imply that the four behaviors do actually affect the reasoning mean- except for the Environmental reasoning.

One-way ANOVA analysis shows that the grand mean of the hypothetical sustainable reasoning style (4.39) is significantly higher than the grand mean (3.78) of the hypothetical utilitarian reasoning style at the level of 0.05 (p=0.00). This would imply that the reasoning style does actually affect the grand mean of the seven reasons of the expected behavior. Based on Corral-Verdugo et al. [2003] study, when people thought about water as a limited resource that should be conserved, they were engaging in more water conservation behaviors.

Table 4: Correlation table for motivating reasons and behavior frequency, duration, and struggle

	Correlation between performed behavior reasons and …		
Motivating reasons	behavior **duration**	behavior **frequency**	**Struggle**
Religious teaching	0.322**	0.224**	-0.077

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Valuing water reduction	0.219**	0.267**	-0.058
Considering future generation	0.116**	0.157**	-0.038
Environmental	0.090*	0.177**	-0.025
Easiness of the behavior	0.116**	0.216**	0.007
Avoiding hardship of water shortage	0.067	0.102*	0.439**
Saving water bill	0.033	0.108*	0.164**

When correlating between the seven reasons for enacted/performed curtailment behavior and "behavior duration", the highest and significant correlation –even classified as positive weak correlation - was for "religious" and "valuing water reduction".

Also when correlating between the seven reasons for enacted/performed curtailment behavior and "behavior frequency", the highest and significant correlation –even classified as positive weak correlation - was for "religious" and "valuing water reduction". Thus, the more they practice water reduction behavior, they slightly base their reasoning on religion and values.

Looking at behavior duration and frequency correlation, we can see that all the correlations were weak positive. However, the majority were statistically significant. Thus, behavior duration and frequency has no empirical foundation to explain reasoning for water reduction behaviors.

When correlating between the seven reasons for enacted/performed curtailment behavior and "struggle in accessing water", the highest and significant correlation –classified as strong positive correlation - was for "avoid hardship of water shortage" reason (0.439). Thus, for those who revealed that they conserve water as measured by the four curtailment behaviors, the more they struggle in obtaining water at their homes, they would strongly justify the reason for water reduction in relation to "Avoiding hardship of water shortage

Figure 2: Visual comparison between performed and expected behavior for each reason

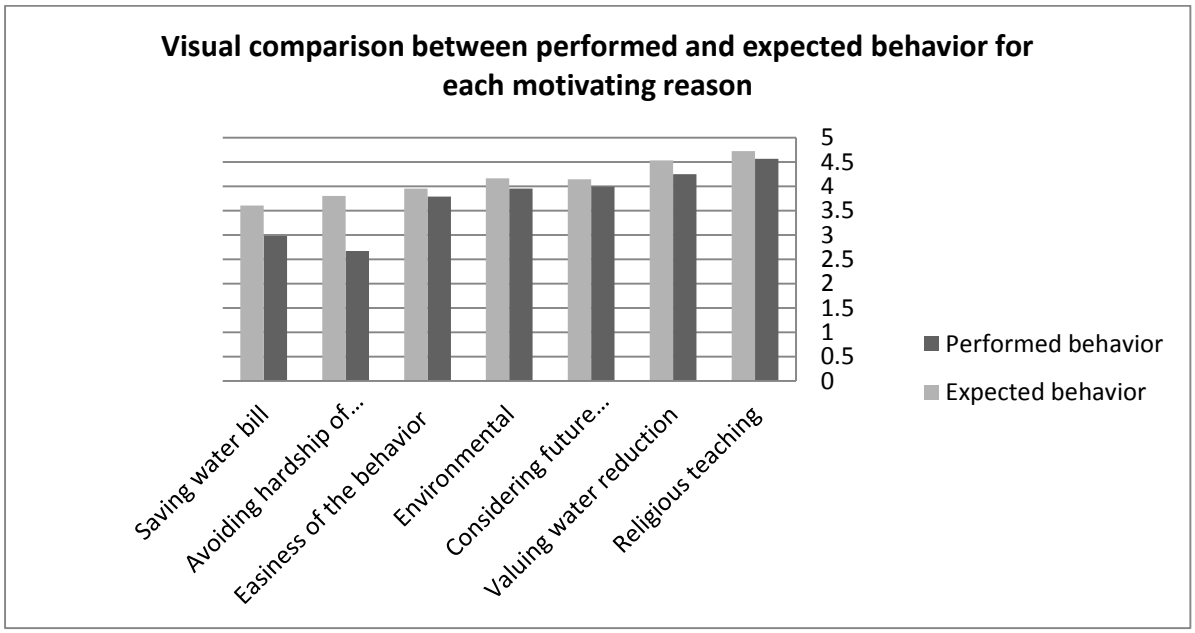

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Fig. 2 shows the grand mean of performed and expected water reduction behavior for each reason. We can see that the highest motivating reason is religious teaching, whether for performed or expected behavior.

It is also interesting to observe that the grand means of the expected behaviors are always higher that the performed behaviors across all the motivating reasons. However, analyzing such observation is beyond the scope of this research.

Significance of This Research

The first would be to inform the educational and environmental programs, and strengthen their behavior and impact on later families, educationalists, and careers, etc. The biggest challenge for environmental education seems to be how to support sustainable lifestyles and decrease the unsustainable lifestyles of students, by affording tools which are effective enough to make a wider societal impact (Fien, 2002) ; Sibbel, 2009 , pg. 79)

The disclosure of reasoning style (sustainable or utilitarian) underpinning water reduction behavior for Saudi college students, would be helpful to tailor pro environmental programs and thus increase water reduction practices individually or collectively , whether we rely on "antecedents" or "consequences" educational strategy.

Unveiling the motivation reasons (justifying or explanatory), based on reasons theory (Westaby & Fishbein, 1996), motivate behavior, because they help people justify and defend their actions (Westaby, 2005), which helps promote or protect their self-worth (Kunda, 1990).

According to functional theorizing, any effort to change behavior would be successful only if that effort attends to the specific functions or reasons underlying the behavior (Katz, 1960) and (Snyder, 1992). Thus, by allocating the reasons underlying water reduction, it would increase the tendency for the desired action. Based on (Burandt & Barth, 2010) view, when dealing with sustainability issues, the development of thinking skills, knowledge integration and handling uncertainty are more important than the acquisition of knowledge.

Limitations

- This research was limited to self-reporting data as opposed to modes of behavioral measurement. Future research might need to inspect objective behavioral criteria.
- Another limitation that may play an important role in residential water conservation is the variety of reasons that might underpin water reduction behavior. Even though seven different reasons have been identified, other reasons might still be a factor in water conservers' casual understanding, such as trust. For example, if people trust others to conserve water, they might use this to justify their motivation to conserve water. Community norms and household dynamics are another unaccounted reason that might be reconsidered in future research. Indeed, (Lam, 2006) suggested that beliefs about what others in the community would do to address water conservation positively impacted on efficiency intentions.

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RECOMMENDATION

Future research needs to conduct lengthy studies to track the causal association between water reduction/conservers' behavior and motivating reasons over time. Additionally, implementing qualitative methodology would unfalteringly elicit the underpinning reasons that would feed the survey questionnaire. Future water reduction educational program can assess the practical value of being informed with the result of reasoning orientation on forthcoming water conservation practices.

CONCLUSION

Regardless, the tremendous effort to delineate the determinants of an action, the true motive for a behavior, and a reasonable understanding of why people behave the way they do, a gap still exists among the researchers. Such understanding would be crucial when it comes to a threatening issue such as water scarcity, especially in the Arabian Gulf area. Different research attempts and structural initiatives has been persuaded to understand and deal with the water scarcity/issue, such as water demand management. No matter how effective and efficient it was, structural and research endeavors have enlightened policy makers and educationalist with some understanding to come up with recommendations, techniques and strategies that would lead to water reduction/conservation behavior

In Saudi Arabia, where this research is taking place, groundwork structural attempts have been implemented such as a water reduction campaign, free water efficiency tools , school programs and curriculum. However, the per capita water consumption in Jeddah is nearly twice the European average, and demand continues to increase. (Thamali, 2013). Salih (2011) reported that if current water use patterns in the region remain unchanged, water demand for the year 2030 is expected to increase to about 670 billion m3. Concerning water use efficiency, the Arab region is known for its inefficient utilization and significant water wastage in individual sectors. A comprehensive review by Inman and Jeffrey (2006) showed that demand management programs could reduce residential water consumption by 10-20% over a 10- to 20-year period.

In comparison to the preliminary structural effort in Saudi Arabia, water demand management research that would help us bridge the gap in our understanding of water conservation behavior was obviously limited- not to mention the global pressure of water sustainability.

This research basis its foundation on the psychological determinants of water demand management research, and it stresses the cognitive side, mainly reasoning, as a drive for understanding the motivations underlying people's water reduction behavior.

Thus we targeted those who self report that they reduce water use domestically and try to understand why they do so, for the purpose of uncovering their reasoning orientation. Motives, as profoundly studied by psychologist, can be conceptualized as more general drivers of people's behavior, in contrast to context-specific justifying and explaining reasons (in the case of this research) that are used to justify performed and explain anticipated behavior. Reasoning was applied for specific water reduction -related practices, and thus, the exact drivers appear to be contextual and behavior dependent.

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Beside focusing on context-specific reasons, the selected behaviors featured the "light green" pro-environmental behavior due to their high possibility for adaptation/ to be performed.

Light green water conservation behaviors, whether curtailment or efficient, were tackled in this research. Based on Gardner and Stern classification (1996), efficiency behaviors refer to once-off behaviors such as installing water-saving shower heads or rainwater tanks that facilitate constant water savings. In contrast, curtailment behaviors refer to individuals' actions that conserve water such as, only washing full loads of clothes, taking shorter showers and turning off the tap while brushing teeth. Distinguishing between these two types of behaviors is important because they are argued to be underpinned by different social and psychological drivers (Russell & Fielding, 2010).

In this research, we did not analyze the reasons there were to perform water reduction behavior, but what were the agent's justifying and explanatory reasons for performing past and expected behavior respectfully. Thus, in relation to understanding the motivations underlying people's behavior, anticipated behaviors that have justifiable and defensible reasons are more likely to be performed, and performed with confidence, as they may satisfy a number of psychological needs (Westaby, 2005).

The water reduction reasoning as delineated in this research is operating at the agent conscious self-knowledge. For example, letting the water running fully out of the faucet because she was sub- consciously overloaded by a family issue, is not conscious self-knowledge reasoning. Conscious self-knowledge reasoning varies in their power to satisfy a number of psychological needs and as a result remains a sustainable driving force for these needs. For example, a person who reports that he reduces water in his daily life, and justifies his action based on "other" related causes, would increase the tendency of sustaining his behavior as the "self" was out of the equation.

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