

EXPLORING THE RELATIONSHIP BETWEEN UNIVERSITY STUDENTS' MEDIA EXPOSURE AND CONSERVATIONAL BEHAVIOR REGARDING WATER SCARCITY ISSUE IN PAKISTAN

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ABSTRACT

The problem of water scarcity in Pakistan is attributed to; population increase that leads to reduced water availability for household use, over exploitation of the aquifer, limited supply of fresh water, high consumption of water in homes, pollution of water sources and losses of water that could have been put to use. These challenges affect the quality of life, wellbeing of the population and achievement of the Sustainable Development Goal 6(clean water and sanitation) by 2030. To address these challenges media plays a crucial role in disseminating the news and raising awareness of the severity of water shortage to the public. The study investigated the relationships between university students' exposure to water scarcity related media content and their water scarcity concerns, efficacy beliefs (with two dimensions: self-efficacy and collective efficacy), and water conservational intentions. A quantitative cross sectional survey design was utilized and data were collected online from 202 university students aged 19-29 using convenience sampling. The data were analyzed using Partial Least Square Structural Equation Modeling (PLS-SEM). The findings revealed a multimodal media exposure landscape where social media especially Facebook, along interpersonal sources play a dominant role in disseminating water scarcity concern. The results further indicate that media exposure played a central role in influencing water scarcity concerns, self and collective efficacy rather than directly affecting behavior alone. Water scarcity concern emerged as strongest predictor of water conversation behavior. Self Efficacy showed a significant negative relationship with water conservation behavior highlighting a suppression effect and a distinct attitude behavior gap under conditions of high concern. The study highlights the importance of strategic environmental communication in promoting sustainable water conservation behavior among university students.

Keywords: Media exposure, Water Scarcity, Concerns, Efficacy, SDG 6, Conservation Behavior

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1. INTRODUCTION

Water scarcity is a severe issue in the world, and it has been predicted that by 2030 the world will face higher demand of the fresh water resources compared to supply 40-fold (WRI, 2023). Over 2.3 billion of the population is living in water-stressed nations and this number is likely to increase to 5 billion in 2050 (UNWWDR, 2023). Pakistan is one of the most water-stressed countries in the world, as it is ranked 14th in the global water crisis list (WRI, 2023). Having only 908 cubic meters per capita water supply, which is far less than 1,000 cubic meters, the necessary water scarcity criterion, the country is soon developing the condition of an absolute water shortage (PCRWR, 2022). It is a crisis that threatens food security, human health, and economic stability and hamper the achievement of Sustainable Development Goal 6 (clean water and sanitation) (Khan et al., 2023; UN -Water, 2025).

Water shortage in Pakistan is motivated by various factors. The population of the country has already surpassed 247 million and continues growing by 1.5 per cent every year (World Bank Open Data, 2023), further increasing the pressure on the population and on the water resources. Another significant issue is the depletion of groundwater since over-exploitation has led to an annual shortage of one-half trillion cubic meters of groundwater, and in some areas, aquifers are sinking up to one and a half meters annually (PCRWR, 2022). Climate change increases the speed of melting glaciers, alters the patterns of rainfall, and raises temperatures and increases water stress (IPCC, 2022). The situation is also worsened by pollution and ineffective management practices, whereby of the total wastewater, only 27 percent of the water is treated, leading to the pollution of freshwater sources (PCRWR, 2023).

Although the government has been working on it, including the National Water Policy (2018), and rainwater harvesting projects of Pakistan Council of Research in Water Resources, the effectiveness is low because of the gaps in governance and the lack of awareness among people (Janjua et al., 2021).

1.1 The Role of Media in Shaping Water Conservation Behavior

The media is a key catalyst to raise societal awareness and impact the behavior of the environment (Ozen et al., 2022). Media exposure promotes the increased awareness and behavior of the people about environmental issues such as water conservation. Merry (2024) indicates that exposure to climate-related news increases the perception of risk and leads to taking pro-environmental behavior. However, the media has continued to cover water issues in Pakistan sparingly and without feasible solutions (Jamil & Appiah-

Adjei, 2024). The students of the university as a new cohort of policymakers and influencers are an important group to study the behavioral reactions to environmental crises (Chakraborty et al., 2017).

The mass media is important in spreading the information about the environmental hazards and in encouraging the change of behavior (Thompson et al., 2024). The available empirical evidence shows that the perception of risk and intentions to conserve are heightened through exposure to news on climate and water issues (Schaefer et al., 2014). The awareness is however not an assurance to action and self-efficacy and collective efficacy is necessary in translating concern to tangible behavior (Bandura, 2000).

University students and young adults, in particular, are one of the main stakeholders of the sustainability programs, as their attitudes can define long-term trends in society (Wiek et al., 2011; Swaim et al., 2014). Studies show that environmentally conscious youth are more likely to adopt sustainable practices and advocate for policy changes (Ojala, 2012). By focusing on this group, the study provides insights into how educational and media campaigns can be tailored to enhance water conservation behaviors.

1.2 Problem Statement

The media plays a crucial role in disseminating the news and raising awareness of the severity of water shortage to the public. This study investigated the relationships between university students' water scarcity media exposure and water scarcity concerns, efficacy beliefs (with two dimensions: self-efficacy and collective efficacy), and pro-conservational intentions. This study fills a gap by examining how media exposure interacts with efficacy beliefs to predict pro-conservation water intentions among university students, a key demographic for future policymaking. As part of the implementation of the SDG 6, this study explains how knowledgeable citizens can help in solving the problem of water scarcity and how they can contribute to the global sustainability goals.

1.3 Research Objectives

1. To assess how exposure to media content on water scarcity influences university students' concern about the water crisis in Pakistan.
2. To examine the link between media exposure and students' intentions to engage in water conservation practices.

2. LITERATURE REVIEW

Water scarcity is becoming a major concern around the world. Especially as climate change causes more extreme weather like

droughts, floods and shrinking water supplies. These changes contribute to reduced water availability through declining soil moisture, rapid surface water evaporation, increased irrigation demands, saltwater intrusion into aquifers, and overall depletion of freshwater resources (Mahato et al., 2022). Climate change is significantly impacting both surface and groundwater resources. Surface water is increasingly threatened by reduced recharge, over extraction due to urbanization and agriculture, and saltwater intrusion in coastal areas.

The freshwater resources on the earth are available in only a small percentage and also the water is gradually getting worse due to the fertilizer pollution, sewage and flooding. Such decays threaten the availability of water, the balance of ecosystems, agricultural output and the health of people (Mishra, 2023). In this regard, the media plays a central role in relaying information to the masses, and create a common understanding and act of response to such predicaments. The media reporting about the water problem, however, is not always uniform; a study carried out in Mexico showed that the water shortage received moderate media coverage (García Lirios, 2021). The local reporting in the Floridan Aquifer area was more focused on the economic and health effect but it often ignored the ecological consequences. Media discourses that preempt individual and social issues to the detriment of environmental ones shape the social and personal priorities of the population and determine issues that the policymakers will prioritize later on (Hundemer et al., 2022). Besides, awareness and individual attitudes among the population are also important elements in the conservation of water.

Zulqarnain and Khan (2024) say that awareness of water shortage has a significant effect on the positive attitude and behavior towards water conservation. They used the Theory of Planned Behavior in their research in Islamabad and focused on the public awareness and household water-saving behaviors. The results showed that increased awareness had a positive relationship with the conservation behaviors in laundry, gardening, and house cleaning. Dwelling characteristics and household appliances were also found to influence water use, which is why emphasizes the need to implement interventions that are highly specific and specific to a particular context. On the same note, a Spanish study found a personal involvement as a decisive factor when it comes to decision-making regarding water conservation (Rodríguez-Sánchez & Sarabia-Sánchez, 2020). People living in water-deprived regions showed high rates of participation and performed more conservation behavior. Cauberghe et al. (2021) argue that people who value water as a unique and non-renewable resource are better placed to change their behavior, especially when they feel that it is their moral responsibility to do so. Effective communication can further support this shift. For instance,

messages that include practical water saving tips and focus on people's ability to act have been shown to increase motivation and intention to conserve water at home. These effects were conciliated by enhanced self-efficacy, motivation and perceived opportunity. The study concludes that targeted strategy based communication are more effective in driving behavioral change for water conservation (Addo et al., 2019; Ehret et al., 2021). Other factors like age, gender, education, the kind of house people live in, and the types of water saving devices they use also play a role in shaping conservation behavior (Zulqarnain & Khan, 2024; Cauberghe et al., 2021).

To address water scarcity in developing countries, a socio-cultural approach emphasizing community leaders and diverse communication modes can complement existing economic and institutional strategies and fostering awareness (Emile et al., 2022). Khalil and Kabir (2015) study focused on water wastage and attitudes towards conservation in Dhaka. It emphasized the importance of understanding psychological factors influencing water conservation behaviors. Research highlights that individual are motivated to conserve water due to concerns for future generations and through observing the habits of others. The study emphasizes the need to understand these psychological factors to design effective campaigns promoting water conservation. Hove and Osunkunle (2020) argued that social media platforms use for water conservation education can be effective, but 75 per cent of respondents of their study did not know about the municipal committee's social media platforms. The administrative committee should create awareness about its social media platforms to employs persuasive strategies for participation. Another research suggests that self-efficacy and collective efficacy play important roles in water conservation behaviors and community engagement. Collective efficacy defined as shared beliefs about a group's capabilities to accomplish tasks. It is associated with greater support for water conservation policies and activist behaviors (Thaker et al., 2019; Bostrom et al., 2019). Cuadrado et al. (2021) found that collective efficacy directly influences pro environmental behavior and interacts with personal values to enhance recycling and energy saving practices.

All these lessons lead to the relevance of a well-informed media coverage and specific strategies of raising public awareness. With the media, policymakers, and community leaders working together in creating awareness and encouraging responsible water use, then the real change can be realised in handling the growing problem of water scarcity.

3. METHODOLOGY

3.1 Theoretical Framework

3.1.1 Cultivation Theory

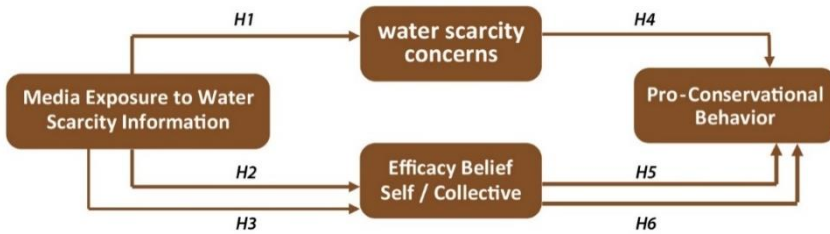
The present study is based on the Cultivation Theory that explains the impacts of media exposure on the water conservation behavior. Cultivation Theory is a theory developed by George Gerbner in the 1960s and 1970s and it assumes that media influence the perceptions of reality after being exposed to it many times (Gerbner, 1998). A constant bombardment with water scarcity messages creates increased anxieties on the subject of water. The frequent exposure to the content of water crisis in the news, documentaries, and social networks makes heavy users of media view water scarcity as worse.

3.1.2 Social Cognitive Theory

This is a theory that was advanced by Albert Bandura in 1986. The framework discussed by Bandura (1989) provides an explanation of how people acquire knowledge and learn behaviors by means of observation, imitation and mind. It deals in the role that self-efficacy (individual belief in the ability to do) and collective efficacy (group belief to act together) plays in behavior (Bandura, 2000). Media present role models and success stories which increase both forms of efficacy. Pro-conservation is a direct motivation of efficacy beliefs.

3.1.3 Conceptual Model

3.2 Hypotheses



H1: Media exposure to water scarcity information positively influences water scarcity concerns

H2: Media exposure to water scarcity information positively influences self-efficacy belief

H3: Media exposure to water scarcity information positively influences collective efficacy belief

H4: Water scarcity concerns positively influence pro-conservational behavior

H5: Self-efficacy belief positively influences pro-conservational behavior

H6: Collective efficacy belief positively influences pro-conservational behavior

3.3 Research Design

This study employed a quantitative research design to examine the relationships between media exposure, water scarcity concerns, efficacy beliefs, and pro-conservation behavior among university students. Quantitative methods were selected to enable statistical analysis and predictive modeling of behavioral intentions (Croucher & Cronn-Mills, 2019).

3.4 Sampling and Data Collection

The participants of this study were University of Karachi students. The relevance of participants is considered future leaders and decision-makers, making their views on water scarcity and behavioral intentions crucial for shaping future policies and educational strategies. A non-probability sampling method was utilized and its subtype was convenience sampling.

To collect the data, 1000 participants from different departments of Arts and Social Sciences faculty were approached to fill out the online survey administered using a Google Form in March 2025. The response rate was 20 % and only 202 participants filled out the form. The minimum sample size guideline for the PLS-SEM, Barclay et al. (1995) proposed the 10-times rule: ten times the number of arrows pointing at a variable (Hair et al., 2014). In this study, a total of 6 arrows point to the variables in the conceptual model. According to the 10 times rule requirement is 60. The 202-sample size is well above the required level (Latif et al., 2020).

Table no.1: Respondents’ Demographics

Variables	classification	frequency	percentage
Gender	Male	73	36.1
	Female	129	63.9
Age	19 - 24	176	87.1
	25 - 30	26	12.9
Departments	Mass Communication	112	55.4
	Psychology	18	8.9
	Sociology	15	7.4
	Philosophy	14	6.9
	Economics	25	12.3
	General History	7	3.5
	Education	6	3.0
	Political Science	5	2.5

The demographic characteristics presented in Table 1 indicate that 63.9% of the respondents are female and 36.1% are male. The majority of respondents belong to the age group of 19-24 (87.1%), followed by those aged 25-30

(12.9%). The Mass Communication department has the highest representation (55.4%), followed by Economics (12.3%). Smaller representations come from departments such as Political Science (2.5%), Education (3.0%), and General History (3.5%).

3.5 Measurement Instruments

The questionnaire included measurement items that were adapted from previously published research studies. All measurements were adopted from previously published research with some modifications to reflect the study's context. Media Exposure (ME) was adopted from Ogunbode et al. (2022) and contained twenty-four items. Water Scarcity Concerns (WSC) was adapted by Ojala (2012) and incorporated ten items. Negatively worded items WSC 4 and 5 within the scale WSC were reverse coded prior to statistical evaluation. Self-Efficacy (SE) and Collective Efficacy (CE) were adopted from Maduneme (2024) and involved four items for each. Conservational Behavior adapted by Sarabia-Sánchez et al. (2014) and contained eleven items. All scales were measured with a five point Likert scale except media exposure which was measured by seven-point Likert scale.

Table no. 2: Internal Reliability and Convergent Validity

	Cronbach's alpha (α)	Composite (rho_a) pA	Composite reliability (rho_c) pC	Average variance extracted (AVE)
CB	0.904	0.917	0.920	0.519
CE	0.789	0.804	0.861	0.609
ME	0.790	0.776	0.232	0.160
SE	0.753	0.836	0.838	0.566
WSC	0.802	0.891	0.848	0.403

(α) ≥ 0.70; pA, pC ≥ 0.70; AVE ≥ 0.50

Internal consistency reliability is assessed using Cronbach's Alpha and composite reliability. Convergent validity is measured using AVE. CB has strong internal consistency (α = 0.904; pA = 0.917; pC = 0.920) and acceptable convergent validity (AVE = 0.519). CE meets all reliability (α = 0.789; pA = 0.804; pC = 0.861) and validity thresholds (AVE = 0.609).

ME has acceptable reliability (α = 0.79; pA = 0.776; pC = 0.232) because Cronbach Alpha value and Composite reliability (pA) is higher than threshold value. Composite reliability (pC) and AVE are far below threshold. PLS-SEM maximizes prediction by including both common and unique variance, often yielding lower R² but higher practical relevance (Hair et al., 2017). The significant beta coefficients (p < 0.05) further validate the

theoretical contribution, even as future work may expand the model to account for additional variance. SE has good reliability ($\alpha = 0.753$; $\rho_A = 0.836$; $\rho_C = 0.838$) and convergent validity ($AVE = 0.566$). The Reliability is good for WSC ($\alpha = 0.802$; $\rho_A = 0.891$; $\rho_C = 0.848$) and moderate convergent validity ($AVE = 0.403$).

Table no.3: Discriminant Validity (Heterotrait-Monotrait Ratio HTMT)

Matrix	CB	CE	ME	SE	WSC
CB					
CE	0.528				
ME	0.480	0.343			
SE	0.325	0.767	0.391		
WSC	0.726	0.598	0.589	0.606	

Discriminant validity was assessed using the Heterotrait-Monotrait Ratio (HTMT) criterion. According to Henseler et al. (2015) an HTMT value below 0.85 (conservative criterion) or 0.90 (liberal criterion) indicates adequate discriminant validity between constructs. All HTMT values are below the threshold of 0.85, supporting the presence of discriminant validity among the constructs.

4. DATA ANALYSIS

4.1 Descriptive Statistics

4.1.1 Media Exposure (ME1–ME21)

The media exposure construct explored the level of attention paid to water scarcity information (ME1), the frequency of information received from various traditional and digital sources (ME2–ME14) and the nature of information received (ME15–ME20) as well as overall media usage behavior (ME21).

The Media Exposure (ME) items (ME1 to ME25) were evaluated for mean and standard deviation values. For ME1 the (mean = 3.23; SD = 1.16) indicates a moderate level of attention paid to water scarcity issues among respondents. It suggesting awareness exists but may not be highly prioritized by all. The frequency of information received from family, friends and colleagues (ME8) recorded the (mean = 4.70, SD = 1.99). The highest mean value highlighting that interpersonal communication plays a crucial role in shaping awareness of water scarcity issues. TV news (ME2) (mean = 4.02; SD = 1.824) and newspapers (ME3) (mean = 3.51; SD = 1.904) also serve as important sources. Radio (ME4) (mean = 2.23; SD = 1.389) and Books/Magazines (ME5) (mean = 2.72; 1.517) scored lower, indicating they are

less frequently consulted for water scarcity-related information. Information from Facebook (ME9) (mean = 4.35; SD = 1.820) and YouTube (ME12) (mean = 3.83; SD = 1.821) emerged as the most prominent platforms for water-related content according to respondents. The case of Instagram (ME10) (mean = 4.27; SD = 1.960) and Tik Tok (ME11) (mean = 2.94; SD = 1.834) is of divergence, which could possibly be due to the difference in platform demographics and types of content. The lowest score was related to Snapchat (ME14) (mean = 1.93; SD = 1.659), which implies that it is not very useful in the sharing of the serious environmental issues. Respondents indicated that there was a lot of information in different aspects of water scarcity including impacts (ME16) such as droughts, reduced agricultural productivity and declining access to clean drinking water, received the highest mean score (mean = 4.03; SD = 1.866), indicating that these issues were highlighted frequently in media. Information concerning the causes/drivers of water scarcity (ME15) including overextraction of ground water, mismanagement of water resources, population growth, impacts of climate change such as reduced rainfall and melting glaciers and water pollution (mean = 3.98; SD = 1.855) were highly reported. These findings suggests that media coverage is not only emphasizes the consequences of water scarcity but also provides substantial attention to underlying structural and environmental factors contributing to the crisis. There was also strong exposure to information regarding water shortage issues affecting respondent's local area or city (ME18) (M = 4.09; SD = 2.050) and national climate issues affecting the country (ME19) (mean = 4.04; SD = 2.013), which means that it is relevant to the everyday life. The finding suggests that media exposure is effectively related to climate related concerns with people's social and geographical realities. Global water issues (ME20) (mean = 3.56; SD = 1.801) were slightly less emphasized, possibly because of a perceived low urgency. The most common average was 4.56 (SD = 0.95) which was scored by Social Media (ME24), which means that the respondents use social media (e.g., Facebook, YouTube, Instagram) to consume the media in general extensively. The use of television (ME21) (mean = 3.02; SD = 1.416) is a relatively frequently used traditional medium and this implies that television is still relevant in terms of dissemination of formal information. The use of newspapers (ME23) (mean = 2.41; SD = 1.239) and radio (ME22) (mean = 1.62; SD = 0.946) is less common, which proves the decreasing role of the print and audio-only media, especially among younger or digitally-oriented groups.

4.1.2 Water Scarcity Concern (WSC1 – WSC10)

This construct presents respondents' cognitive, emotional, and behavioral engagement with water scarcity. It includes personal action, interpersonal communication, information-seeking, apathy, and worry about the consequences for different groups.

Descriptive statistics indicate that the average score of the participants is rather high in the domain of the concern about the water scarcity, as the mean scores exceed 3 in most of the items (WSC1; WSC2; WSC4; WSC5). The lowest value is on item WSC3, and its mean is 2.85 and SD 1.073, which means that the personal search of information and provision of assistance with the issue of water scarcity have relatively less concern or disagreement. Those that have the most concern are WSC6 to WSC10 especially in terms of animals and nature (mean = 3.94, SD = 1.53) and as to oneself (WSC6) (mean = 3.88, SD = 1.532). The empathy index becomes less and less pronounced towards other people who live in disadvantaged areas (WSC9) (mean = 3.56, SD = 1.492).

4.1.3 Self-Efficacy (SE1 – SE4)

This section assesses respondents' self-efficacy in addressing water scarcity and contributing to climate-related solutions. The items explore individual belief in personal ability, policy influence, and behavioral commitment. The general scores of self-efficacy of the participants are moderate, which allows concluding that the respondents demonstrate a certain extent of confidence in the ability to take actions to address the problem of water shortage and climate change. The maximum self-efficacy score is also achieved under item SE4 (mean = 3.55, SD = 0.957) implying that a more comprehensive dedication to environmental stewardship can be more significant than the perspective associated with issue-related actions. Conversely, item SE2, which deals with the potential of impacting governmental policy, has the lowest mean (M = 3.14, SD = 0.949), which means that the people consider themselves more or less powerless in the political sphere, perhaps due to systemic and institutional impediments. Standard deviations (SD ↑ -0.93 -0.98) are rather close to one another, which indicates that there is a similar tendency of moderate self-efficacy among the sample.

4.1.4 Collective Efficacy (CE1 – CE4)

This section evaluates respondents' perceptions of collective efficacy, specifically the shared belief among young students that they can contribute meaningfully to preventing water scarcity through awareness, action, and policy development. It shows that the participants have a biased positive view

on conservation efficacy. CE2 had the highest mean (mean = 3.89, SD 0.93), which expresses a strong conviction in practical actions of behavior that includes minimization of water wastage. In the case of CE1 and CE4, the means were 3.74 (SD 0.969) and 3.68 (SD 0.858), respectively, which means that the overall perception towards the ability of youth to bring a change in solving the problem of water scarcity was favorable. CE3 that deals with policy-making returned a mean of 3.66 (SD 0.928), but also with slightly lower results and thus reflecting positive perception. These results highlight the possibility of the willingness of people to participate in or be involved in conservation-related programs.

4.1.5 Conservational Behavior (CB1 – CB11)

This section assesses the water conservation behaviors of respondents through various daily practices and levels of awareness, ranging from practical actions (e.g., closing taps, using dual-flush systems) to behavioral consciousness (e.g., monitoring leaks, being aware of consumption levels). CB1 (mean = 4.56; SD = 1.586) and CB8 (Mean = 4.53; SD = 1.513) values indicating that the most common behaviors involve turning off taps during hygiene and a general intention to save water is very frequently practiced. Other consistently practiced behaviors include (CB10) controlling water usage (mean = 4.49 ; SD = 1.394) and (CB9) being aware of saving methods (mean = 4.41; SD = 1.402). The lowest value for CB2 (mean = 3.49; SD = 1.754) suggesting that shifting from baths to showers is less commonly adopted. It is possibly due to cultural preferences or limited bathroom infrastructure.

5. RESULTS

5.1 Structural Model Assessment

The structural model was assess using Partial Least Square Structural Equation Modeling (PLS-SEM) with smartPLS 4 (Ringle et al., 2024). The significance of the hypothesized relationships was assessed using a bootstrapping procedure with 5000 subsamples. A one-tailed test applied at the significance level 0.05, consistent with the directional nature of hypotheses (Cho & Abe, 2013). Path Coefficients (β), t -values, and p -values were used to evaluate the hypotheses. 95% confidence intervals were examined to confirm the robustness of the relationship. When the t -values exceeded 1.645 the path was considered statically significant and the confidence interval did not include zero.

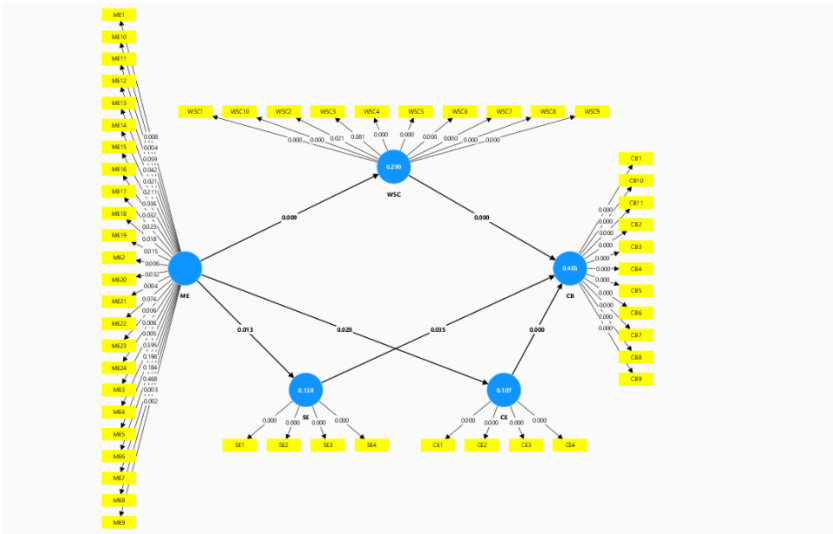


Figure no.1: Structural Model based on the SmartPLS output
Results of Hypotheses Testing

Table no. 4: Hypotheses testing result (Direct Relationships)

Hypotheses	M	SD	ρ	β	t	p	Result
H1: ME -> WSC	0.519	0.227	0.408	0.538	2.375	0.009	Accepted
H2: ME -> SE	0.372	0.168	0.160	0.372	2.217	0.013	Accepted
H3: ME -> CE	0.324	0.171	0.120	0.327	1.910	0.028	Accepted
H4: WSC -> CB	0.578	0.061	0.459	0.573	9.389	0.000	Accepted
H5: SE -> CB	-0.137	0.078	0.021	-0.140	1.809	0.035	Accepted
H6: CE -> CB	0.296	0.080	0.094	0.296	3.719	0.000	Accepted

All six hypothesized relationships are statistically significant ($p < 0.05$) under the one-tailed test. Media Exposure (ME) shows a significant positive influence on Water Scarcity Concerns (WSC) ($\beta=0.538, t=2.375, p=0.009$) suggesting that increases in ME lead to higher levels of WSC. This represents one of the strongest relationships in the model. Similarly, ME significantly affects Self Efficacy (SE) ($\beta=0.372, t=2.217, p=0.013$) and collective Efficacy (CE) ($\beta=0.327, t=1.910, p=0.028$) indicating that ME plays a consistent role in shaping multiple endogenous constructs. Among all predictors of Conservational Behavior (CB), Water Scarcity Concerns exhibit the strongest positive effect ($\beta=0.573, t=9.389, p < .001$) identifying it as the most influential determinant of CB. Self Efficacy (SE) has negative standardized path coefficient but statistically significant effect on CB based on one-tailed testing ($\beta=-0.140, t=1.809, p=0.035$). The magnitude is relatively small and

needs further theoretical reflection. Collective Efficacy (CE) positively influences CB ($\beta = -0.296$, $t = 3.719$, $p < .001$) confirming its role as a meaningful contributor of Conversational Behavior.

To further evaluate the practical importance of these relationships, effect size (f^2) values were examined. The result reveal that ME has a large effect on WSC ($f^2 = 0.408$) while WSC has also demonstrates a large effect on CB ($f^2 = 0.459$) confirming its dominant predictive role. In comparison, ME shows a moderate effect on SE ($f^2 = 0.160$) suggesting its contribution to SE is meaningful but less substantial. ME is small to moderate effect on CE ($f^2 = 0.120$) indicating limited but notable explanatory power. Among the predictors of CB, CE shows a small effect ($f^2 = 0.094$) and SE has minimal effect ($f^2 = 0.021$) despite being statically significant. These findings highlight that although all relationships are statically significant, their practical contributions vary substantial, with WSC emerging as the most influential construct in the model.

6. DISCUSSION

This study examined the structural mechanism between Media Exposure (ME), Water Scarcity Concern (WSC), Self Efficacy (SE), Collective Efficacy (CE) and Water Conservational Behavior (CB). All hypothesized relationships are statically significant, but their practical importance vary. Grounded in Gerbner's Cultivation theory and Bandura's Social Cognitive theory. The empirical findings shed light on how a multimodal media ecosystem translate into environmental action among university students.

Cultivation theory (Gerbner et al., 2002) posits that prolonged exposure to media shapes individuals' perceptions of social reality. The strong relation between ME and WSC ($\beta = 0.538$, $f^2 = 0.408$, $p = 0.009$) supports this theoretical perspective and validating H1. The finding suggests that respondents who encountered more water crisis information in the media displayed an equal elevation in concern, demonstrating that media discourse successfully frames water scarcity as an applicable matter. ME appears to act as a key driver that cultivates concern which subsequently influence behavior. The dominant role of WSC in predicting CB ($\beta = 0.573$, $f^2 = 0.459$, $p < 0.001$) aligns strongly with cultivation theory and validating H4. The result indicate that once individuals develop heightened concern thorough media exposure, this perception significantly translates into behavioral outcome. Media exposure first shape understanding and then influence behavior. The findings outline a multimodal media exposure environment, whereby social media and interpersonal sources are dominating to disseminate information on water-related matters, although traditional media platforms, including

television and newspapers, still have significant effects. These results are in line with those of the study conducted by Gentilviso and Aikat (2019), who indicate that younger generations depend on online sources of news extensively, whereas traditional media is still a reliable source of information about environmental concerns. The increased level of exposure to local and nationwide water and climatic issues indicates that the level of contextual relevance improves retention and attention. Radio and Snapchat have not been used to this end, which is an opportunity, since researchers believe that personalized content on these platforms can promote interaction among certain demographics (Anderson and Jiang, 2018; Arrojo, 2022). The evidence supports the hypothesis that specific communication tactics in both conventional and online platforms could be effective in changing attitudes towards conserving water (Gentilviso and Aikat, 2019).

Media exposure significantly enhances both Self Efficacy ($\beta = 0.372$, $f^2 = 0.160$, $p = 0.013$) and Collective Efficacy ($\beta = 0.327$, $f^2 = 0.120$, $p = 0.028$) supporting H2 and H3. This indicates that media strengthens confidence in both personal and collective capacity to act. The respondents felt confident in taking personal water-saving measures but doubted the impact of policy, which is consistent with general patterns in environmental self-efficacy (Bandura, 2000). According to Zumeta et al. (2022), collective efficacy can be developed with the help of civic education or participatory programs, which would help individuals sense systemic impact (Errenst et al., 2023). Self and Collective Efficacy effects are weaker than Water Scarcity Concern ($\beta = 0.538$, $f^2 = 0.408$) suggesting that media is more effective in shaping concern than efficacy beliefs. In line with Cultivation theory media primarily influences general perceptions of reality, deeper efficacy beliefs require reflection, experience and social interaction. Media messages about useful solutions, achievement stories, and role models who are easy to relate to must have helped in the strengthening of these efficacy beliefs. The outcomes reveal a discrepancy between affective concern and action-based intervention a well-known phenomenon in environmental psychology (Godfrey and Feng, 2017; Kollmuss and Agyeman, 2002). The respondents reported high activity levels in low effort daily curtailment behaviors such as turning off taps, their engagement in structural modifications or policy driven solutions was moderate and low. Also, the results indicate that apathy and ignorance are critical obstacles to act, which is why the special awareness campaigns that do not only raise the concern but also convert it into sustainable water-saving strategies are needed (Schultz, 2014).

Collective Efficacy (CE) emerged as a stable and positive predictor of water behavioral execution ($\beta = 0.296$, $f^2 = 0.094$, $p < 0.001$) validating

H6. According to Bandura (2000) individual agency is vital, structurally complex ecological crises require collective agency. When people perceive that their broader social group or community unified in enacting water shortage policies and resource monitoring, their motivation to conform to conservation practices increase significantly. Although the effect size is small it indicates that cognition evaluation plays a meaningful role in guiding behavior. An increased inclination to take direct action (e.g., cutting water waste) as compared to systemic action (e.g., affecting policy) indicates a general tendency of many youth environmental action: people feel more enabled to act on a local, behavioral level than on an institutional one. These lessons support the incorporation of peer driven campaigns, student led campaigns, and youth policy forums as meaningful venues of putting collective efficacy into practice. This potential can be increased by improving the youth involvement in the decision making processes. The statistics show that majority of the respondents are very active in their water-conservation behaviors especially those that can be practiced very easily in day-to-day activities like turning of taps and monitoring of their use. The high degree of awareness (CB9, CB11) also implies that information based interventions and educational campaigns reach the target audience well. However, behaviors that involve structural or lifestyle modifications (e.g. use of particular home devices or change of bathing habits) have slightly lower adoption rates, which highlights the necessity of incentive-based programmes, infrastructure provision in the local area, or the extended access to water-saving technology. Next time campaigns should focus on increasing the awareness towards regular action.

The most theoretically intriguing findings of this study is the significant yet negative path from Self Efficacy to Water Conservational Behavior (CB) ($\beta = -0.140$, $r^2 = 0.021$, $p = 0.035$) validating H5. The hypothesis is supported base on directional one tailed testing but the negative coefficient contradict with Social Cognitive Theory assumption that higher individual confidence linearly increases positive behavioral execution (Bandura, 1986). This inverse relationship could be can be robust justified by three complementary lenses. The first is Behavioral Complacency and Scale Decoupling Effect. Within environmental literature an elevated sense of personal Self Efficacy can paradoxically generate a state of overconfidence or perceived behavioral sufficiency (Nguyen et al., 2025). When students feel completely secure in their individual capability to save water at will they can become complacent in repetitive daily task. Media Exposure simultaneously cultivates an intense macro level of concern of structural crisis WSC ($\beta = 0.538$) a phenomenon of scale decoupling occurs. This dampens the

motivation to engage in individual curtailment even if internal confidence remains high. The second complementary lens is Measurement Intent. According to Singha et al. (2022) Self Efficacy can have a negative relationship with water conservational behavior if the behavior is heavily constrained by high Response Cost like high price of installing dual flush toilets, water flow restrictors or automatic watering system. Respondents have high Self Efficacy for easy curtailment behaviors like closing taps but their overall Self Efficacy score is neutralized or dragged down when confronting high cost efficiency behaviors (buying structural hardware) creating a mismatch in the aggregated CB scale. The third complementary lens is Suppression. Statically this negative beta represents a classic suppressor effect within Structural Equation Modeling (SEM). Because Media Exposure drives WSC, SE and CE simultaneously these constructs share a substantial amount of overlapping positive variance. When entered into the structural model to predict the water Conservational Behavior (CB) the Overwhelming predictive weights of WSC ($\beta = 0.573$) and Collective Efficacy ($\beta = 0.296$) completely absorbs the shared variance. Once controlled for the remaining unique residual variance of Self Efficacy flip signs mathematically to balance out the shared variance (Bazrafkan et al., 2022).

This finding dose not suggests that individual Self Efficacy is inherently detrimental to water conservation in a vacuum. It demonstrates that when acute crisis concern and collective macro focused agency are operating at peak capacity the unique isolated effect of individual confidence shifts to a secondary pessimistic adjustment in immediate behavioral choices.

7. CONCLUSION

This study provides a multifaceted yet encouraging picture of how youth interact with water conservation and climate issues contributing valuable empirical nuances to Cultivation Theory and Social Cognitive Theory. A multimodal media ecosystem successfully cultivates high concern among university students. A distinct discrepancy remains where affective concern dose not seamlessly transform into systematic action. Apathy and structural inertia emerge as the primary barriers highlighting an urgent need for targeted communication strategies designed to bridge this persistent attitude behavior gap. Even though social media and personal interactions provide young people with a wealth of information concerning water, their emotional concern does not transform to action. Inaction and apathy are the two major barriers that exist which indicates a need for

precise communication strategies that address the gap between concern and action.

In particular, respondents have moderate trust regarding their capacity to individually conserve water but tend to doubt their ability to change policies at the institutional level. This gap indicates that response strategies should not only promote water-saving personal actions but also encourage collective civic participation. Through such strategies, campaigns can easily empower young people to influence conservation policy through peer-to-peer initiatives, youth-managed policy forums, and other participatory frameworks.

From an analytical perspective, the behavioral data shows high engagement in practices that are easy to adopt, while lifestyle and structural activities pertaining to routine activities are less embraced. These points to the need for action to focus on the construction of community infrastructure and the provision of technologies that enable water savings as well as through incentives that promote a behavioral change.

8. IMPLICATIONS

Media strategy integration along with the supplementary implementation including educational programs and community-based strategies, can be very successful. An isolated media campaign will raise the awareness of the population, but the implementation of a multi-layered approach, which also includes education and involvement of local people, is more likely to produce a deep and lasting effect. The government and institutional programs are important in promoting sustainable water-use habits. A culture of responsible water usage can be developed by implementing policies that will encourage conservation alongside the campaign of public awareness. More empirical studies should be done in order to determine the best combination of policy tools and media interventions. During the campaigning of the media, the threat messages should include the concern-related messages that should be accompanied with action-oriented solutions that help to increase the perceived efficacy. The policymakers ought therefore to come up with specific media campaigns and education programs aimed at encouraging sustainable water consumption. By ensuring that people act accordingly and follow the targets in the Sustainable Development Goal 6, Pakistan will be able to take the water crisis off its shoulders and be assured of a long term supply of water.

9. LIMITATIONS

The study has certain limitations regarding sampling and generalizability. The data were collected from a single public university within the Faculty of Arts and Social Sciences. The findings should be interpreted within this academic context rather than generalized to all university students in Pakistan. The primary objective was examining the relationships between construct rather than population level estimation. Future studies may extend this research by including students from diverse universities and disciplines to enhance external validity.

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