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The role of emotional appeal in water conservation communication: a framework for social media engagement

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Abstract

Amidst growing concerns about water shortages, harnessing the potential of social media emerges as a crucial strategy in attempts to conserve consumption While informative messaging in environmental communication has been widely acknowledged, the role of emotional appeal remains underexplored. This study aims to bridge this gap by proposing a comprehensive framework that integrates emotional appeal, evoked through video creativity and multimedia effects. Focusing on the UK context and informed by the Theory of Planned Behavior (TPB) and the Elaboration Likelihood Model (ELM), the study highlights the complex interplay between cognitive and affective factors in water conservation communication. By applying Structural Equation Modeling (SEM) to a dataset containing 443 responses, the analysis reveals that emotional appeal, when evoked through creativity, not only positively influences individuals' attitudes but also extends to shape perceived behavioural control. These findings further emphasise the ability of emotional appeal to serve as a complementary aspect that enriches individuals' motivational framework and influences their inclination towards engaging in the intended behaviour. The study has important implications for improving current marketing efforts and encouraging behavioural shifts among water consumers. By including emotional appeal in social media communication strategies, environmental communicators can build empathy and promote sustainability more effectively. Additionally, this study offers a valuable understanding of the complex nature of water conservation communication, providing practical strategies for enhancing environmental messaging and encouraging positive behaviour changes.

Keywords Effective communication · ELM · Emotional appeal · Informativeness · TPB · Water conservation

Introduction

Water shortages and related hazards are increasingly prevalent, primarily due to climate change, urbanisation, and demographic changes (Wang et al. 2020; Yang et al. 2015). As a result, water conservation is becoming a crucial topic that has been garnering more attention globally (Addo et al. 2019; Maduku 2021; Obringer and White 2023; Shahangian et al. 2022). Despite growing awareness and communication efforts, achieving widespread adoption of pro-environmental behaviours remains challenging (Katz et al. 2016; Vazquez-Casaubon et al. 2024).

In addition to traditional communication channels, the emergence of social media has transformed how environmental messages are disseminated and received. Social media platforms serve as interactive hubs for delivering environmental awareness and disaster preparedness information, and promoting pro-environmental behaviour (Czarnecka et al. 2022; Han and Xu 2020; Tang et al. 2015). Given this shift, there is a pressing need to optimise water conservation communications, particularly within audio-visual content in social media advertising.

While informative content is crucial for conveying facts and figures, the utilisation of emotional appeal in water conservation messaging remains relatively underexplored, despite its extensive investigation in marketing literature (Guo et al. 2020; Lee et al. 2018; Tan et al. 2021). This

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highlights the need for evolving communication frameworks that encompass diverse elements crucial for effective communication beyond mere information dissemination, including the incorporation of emotional appeal. Such frameworks should aim to inform, persuade, and motivate behavioural changes, as demonstrated by Abu Bakar et al. (2021).

Specifically focusing on the United Kingdom perspective, this study provides valuable understandings directly applicable to the unique context of water conservation awareness and behaviour change. By offering informative communication strategies for water conservation on social media, this study aims to test the proposed effective communication model for social media water conservation campaigns developed by Abu Bakar et al. (2021), which includes emotional appeal as a key element. This research seeks to validate the efficacy of integrating emotional appeal within audio-visual content in social media advertising to foster sustainable water practices.

This paper is organised as follows: First, a comprehensive review of existing literature on persuasive communication elements is presented to provide a solid foundation for the study. Following this, the development of hypotheses based on findings from the literature and the framework is outlined. Next, the research area and rationale for the focus are delineated. Subsequently, the research methods employed to test these hypotheses, including data collection procedures and analytical techniques, are described. The results section will then present the empirical findings of the study, followed by a discussion of their implications and connections to existing knowledge and theories. Finally, the paper concludes with a key summary and acknowledgement of its limitations.

Existing knowledge

When faced with water scarcity, behaviour change through conservation campaigns becomes crucial to ensure the sustainable use of the available water resources (Antwi et al. 2022). However, despite extensive research on understanding water-saving behaviours and promoting environmental sustainability (Jenkins and Ward 2017; Moglia et al. 2018; Syme et al. 2000), campaigns aimed at encouraging water conservation still face significant challenges (Katz et al. 2016; Maduku 2021).

Given the challenges in traditional campaigns, the significance of modern communication platforms becomes increasingly crucial. Social media have spread across modern life, with billions of active users worldwide. The platforms offer advertisers a powerful tool to reach a vast audience and shape their attitudes and behaviours (Deng et al. 2023), allowing users to instantly interact and exchange information (Siddiqui and Singh 2016). Additionally, social media is capable of persuading users and influencing their beliefs, abilities, and motivation (Dwivedi et al. 2021). Hence, social media can amplify awareness of prevailing water-related challenges and inspire the general public to actively engage in preparing their local communities to tackle these issues. However, despite these advantages, the social media water conservation communication framework remains underdeveloped in reflecting behaviour and intention development (Abu Bakar et al. 2021).

As social media increasingly becomes a vital communication tool for promoting conservation efforts, understanding persuasive advertising within this context is important. At its core, in relation to advertisement, the theory of persuasiveness is built on several key principles, typically through the elements of informativeness, credibility and emotional appeal (Budiharja et al. 2020; Keller 2020; Lee and Hong 2016; Yeo et al. 2020). Additionally, it has been demonstrated that creativity and multimedia effects are essential to the success of persuasive advertising, particularly in terms of evoking and amplifying emotions (Nelson-Field et al. 2013; Pan et al. 2019), and are applicable in environmental-related communication (Boykoff 2019). Thus, a well-designed advertisement should provide information, capture the audience's attention, stimulate their emotions, and motivate them to take positive action.

Informativeness

Informativeness plays a pivotal role in communication campaigns (Andor et al. 2022; Wichman 2017). Firstly, it establishes trust with the audience by providing comprehensive and well-researched information, hence related to the element of credibility (Peters et al. 1997). Secondly, informativeness educates the audience, which is often a prerequisite for bridging the knowledge-action gap (Frick et al. 2021; Roche et al. 2021). For example, in water conservation campaign communications, informativeness plays a vital role in educating the public about water-related issues and promoting sustainable behaviour (Howarth and Butler 2004; Pérez-Urdiales and García-Valiñas 2016; Renwick and Green 2000; Syme et al. 2000). These studies thus demonstrate the necessity for persuasive messages to be informative, as individuals require factual data and relevant information to make well-informed decisions.

Emotional appeal

While informativeness provides the rational basis for decision-making, emotional appeal contributes vital connections to the message. Recent research highlights emotions' role in attention (Guerreiro et al. 2015; Rodrigues 2018), information processing (He and Hu 2022; Kwak et al. 2011), social interaction for sustainability (Son et al. 2022); and persuasion (Cockrill and Parsonage 2016; Grigaliunaite and Pileliene 2016). In addition, emotional connections through online social media platforms significantly influence purchase decisions and engagement metrics such as "likes" and "shares" (Nelson-Field et al. 2013; Teixeira et al. 2012; Tellis et al. 2019; Kaushik et al. 2023). It is also known that emotions enhance the learning process and environmental knowledge that can shape environmental behaviour (Carmi et al. 2015). Therefore, emotional appeal can be a powerful motivator, adding depth to persuasive messages.

Creativity and multimedia effects to elicit emotions

Building on the importance of emotional appeal in communication strategies, the creative use of advertising and multimedia effects serves as a potent means to evoke emotions effectively (Cheung et al. 2022; Fernández-Aguilar et al. 2019; Ferrer et al. 2015; Janssens and De Pelsmacker 2005; Korpad 2020; Rosengren et al. 2020; Siedlecka and Denson 2018). Advertisement creativity, characterised by novelty, unexpectedness, and innovative concepts, is central to the persuasion process (Das et al. 2023; Haberland and Dacin 1992). Similarly, multimedia effects, which satisfy audiences' desire for immersive experiences and heightened enjoyment, contribute significantly to message effectiveness (Ibrahim et al. 2015). Hence, these two elements create a more immersive experience and contribute to a message's emotional impact, making it more resonant and persuasive.

The current study: developing hypotheses and conceptual framework

The previous section reviews the elements of informativeness, emotional appeal, creativity, and multimedia effects in marketing and how they may be relevant to water conservation campaigns. While facts, figures and logical arguments play an important role in conveying information to persuade audiences, connecting with audiences on an emotional level is equally important in capturing their attention and inspiring action. It is therefore imperative to include the element of emotional appeal in designing effective communication. This raises the main research question of this study: *how does the integration of emotional appeal in water conservation communication campaigns affect individuals' intention to adopt water-saving behaviours?*

In order to answer the research question, the researchers integrate the elements of informativeness and emotional appeal into two prominent theoretical models, the Elaboration Likelihood Model (ELM) and the Theory of Planned Behavior (TPB), to develop a framework for effective water conservation campaigns, as proposed previously by Abu Bakar et al. (2021). The TPB suggests that attitudes, subjective norms, and perceived behavioural control are the primary determinants of intention to perform a behaviour (Ajzen 1991). In the context of water conservation, a person's attitude (belief in the importance of conserving water), their perceptions of social norms (belief that friends and family also conserve water), and their perceived ability to control their water usage (belief in having the necessary knowledge and resources) can all influence their intention. The ELM proposes that attitudes can be formed through two different routes: the central route, which involves careful consideration of the arguments and evidence presented, and the peripheral route, which relies on superficial cues such as emotional appeal and creativity (Petty and Cacioppo 1986).

When applying the TPB and ELM to a water conservation campaign on social media, the communication should be designed to appeal to both central and peripheral routes to affect intention. In this research, the central route involves informativeness, providing detailed information about water scarcity, while the peripheral route involves emotional appeal, evoked through creativity and multimedia effects. Thus, this research proposes that by using messages that appeal to both routes, a water conservation campaign can increase the audience's motivation and ability to process the information, ultimately influencing their intention to conserve water.

In developing the framework, this research however does not consider the role of subjective norms in the TPB as this research is centred on understanding the impact of communication strategy rather than exploring the impact of external influence from other people. Specifically, the TPB can help the campaign identify and address the attitudes and perceived behavioural control factors that may be influencing water conservation behaviour. Furthermore, the attitude in the TPB is divided into attitude to water conservation campaign and attitude to empathy expressions as proposed by Abu Bakar et al. (2021) (Abu Bakar et al. 2021). This will provide a comprehensive understanding of persuasive

communication to promote water conservation behaviour on social media platforms.

Informativeness

By examining relevant literature, it becomes evident that "informativeness" is crucial for effective communication. Accordingly, the first three hypotheses are proposed:

H1 The informativeness of a water conservation campaign video will be significant and positively associated with attitude toward water conservation.

H2 The informativeness of a water conservation campaign video will be significant and positively associated with the attitude toward empathy expression.

H3 The informativeness of a water conservation campaign video will be significant and positively associated with perceived behavioural control.

Emotional appeal

Despite being a peripheral cue, emotional appeal is a key element of effective communication in this research. This study sought to test the following hypotheses:

H4 The emotional appeal of a water conservation campaign video will be significant and positively associated with attitude toward water conservation behaviour.

H5 The emotional appeal of a water conservation campaign video will be significant and positively associated with the attitude toward empathy expression.

H6 The emotional appeal of a water conservation campaign video will be significant and positively associated with perceived behavioural control.

Creativity and multimedia effects

Multimedia effects and video creativity affect emotion by simulating reality and creating illusions. By combining compelling visuals, engaging audio, and creative storytelling techniques, advertisers can create a powerful emotional experience that resonates with their target audience. Therefore, the following hypotheses are formulated:

H7 The creativity in the water conservation campaign video will be positively associated with its emotional appeal.

H8 The multimedia effects in the water conservation campaign video will be positively associated with its emotional appeal.

Intention

The idea of intention, which is characterised as the driving force behind an individual's decision to participate in a certain action, lies at the foundation of the TPB. In this research, three primary components affect intention: attitudes to water conservation, attitudes to empathy expressions, and perceived behavioural control.

H9 Consumers' attitude toward water conservation behaviour will significantly and positively predict their intention to conserve water.

H10 Consumers' attitude toward empathy expression will significantly and positively predict their intention to conserve water.

H11 Consumers' perceived behaviour control will significantly and positively predict their intention to conserve water.

Crucially, this research extends the three components mentioned above to the role of emotional appeal that would better predict the intention. Recent studies have suggested that emotional appeals may play an important role in predicting attitudes and behaviours beyond the TPB variables (Ajzen 2011; Berki-Kiss and Menrad 2022; Londono et al. 2017). Emotional appeals may be an important missing variable in the TPB (Brookes 2023; LaMorte 2022). Hence, the research also hypothesises that:

H12 The emotional appeal will significantly and positively predict consumers' intention to conserve water.

Figure 1 below shows the proposed framework - a socio-psychological water conservation conceptual framework for use on social media platforms.

Study area

Despite perceptions of abundant water resources, water shortages are a growing concern in the UK, driven by factors such as dry seasons, geological features, climate
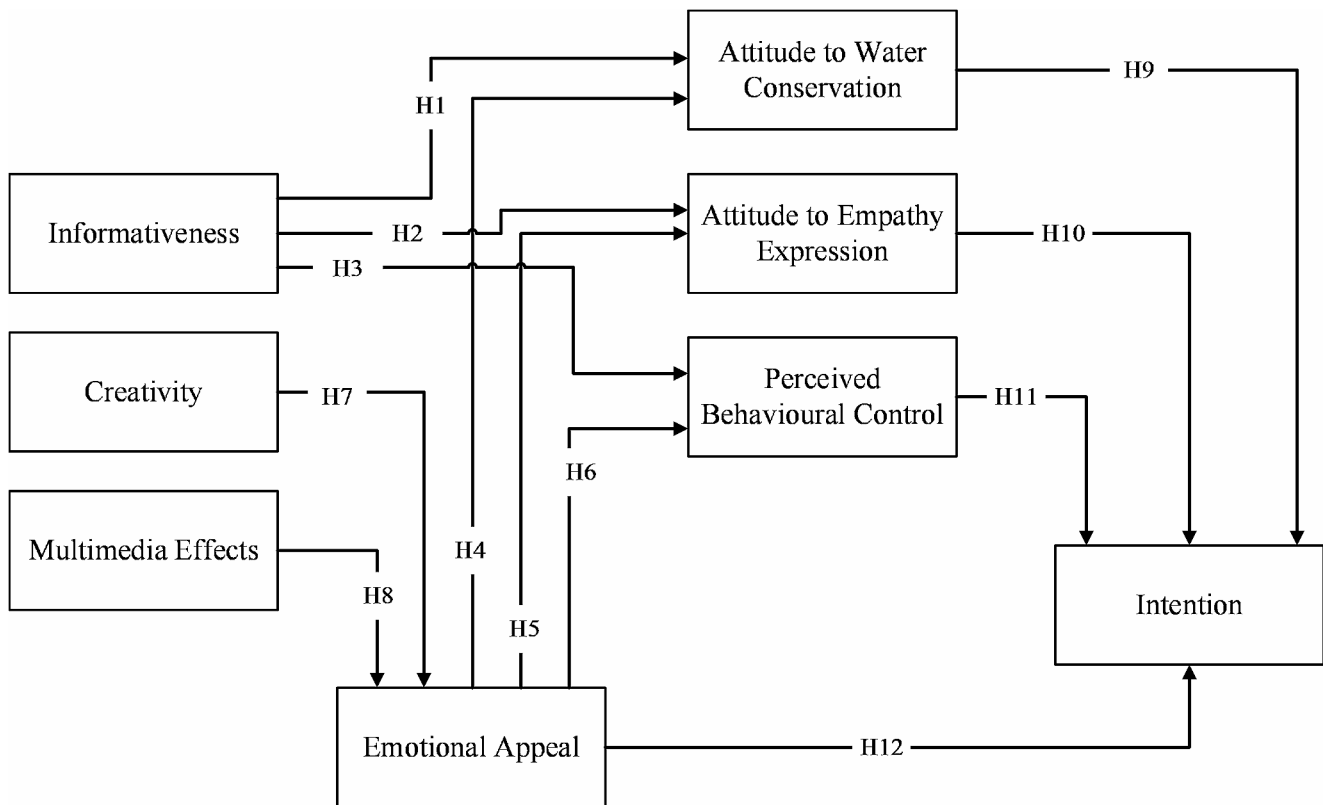
Fig. 1 Integrating informativeness and emotional appeal: a framework for effective water conservation communication on social media platforms

change, urbanisation, and population growth (Chan et al. 2022; Lange and Cook 2015). Predictions indicate that England may face a water shortage within the next 25 years, with some regions at risk of running out of water within a decade (Bryan et al. 2019; Environmental Agency 2019). Recent meteorological droughts have emphasised the vulnerability of the water supply system, requiring proactive measures to mitigate their impact (Osborne and Weedon 2021; Turner et al. 2021). However, the perception of the UK as an island country with abundant water resources often obscures the reality of water scarcity issues faced by water utilities, particularly during the summer months (Lu et al. 2019; Mace 2020; Ward and Wentworth 2021; Watts et al. 2015). Moreover, these issues are often overshadowed by more familiar environmental concerns such as flooding, leading to a lack of preparedness and awareness among the public (Bryan et al. 2019; Carvalho and Spataru 2023; Garde-Hansen et al. 2016; Hannaford et al. 2018). To address these challenges effectively, prioritising raising awareness, and promoting behavioural changes is essential. These steps are crucial for building resilience against water-related issues and ensuring a sustainable water future in the UK.

Research methods

Research design

This study utilises a mono-quantitative approach. Surveys are employed to collect data on public perceptions, attitudes and behaviours related to water conservation. The use of a questionnaire survey as the data-gathering instrument in this study is justified for several reasons. Firstly, a questionnaire survey ensures consistency in data collection, reducing bias and increasing reliability by providing the same set of questions to all participants (Hyman et al. 2006). This approach facilitates the examination of attitudes, intentions, and behaviours towards water conservation in a systematic and structured manner. This also provides a comprehensive understanding of the target population's perspectives; which may not be directly observable or measurable through other data-gathering methods, thus providing a valuable understanding of the effectiveness of emotional appeal (Wallbott and Scherer 1989). In addition, employing an online questionnaire survey proves to be a cost-effective, efficient, and convenient data collection method (Wright 2005). It enables researchers to collect data from a wide geographic area or a diverse range of individuals across the UK (Mazhar et al. 2021). However, it is important to acknowledge the

limitations of the research design and these are stated in the conclusions.

Creative content development: designing the stimulus

The two-minute water conservation video content is crafted to succinctly convey crucial information on both present unsustainable water usage and anticipated scarcity in the future. Tailored specifically for relevance in the UK, the video persuades water consumers to take proactive measures. While the inclusion of tips for reducing water consumption at home could be deemed unnecessary, as it is commonly regarded as common sense and widely known (CCWater 2016; Gilbertson et al. 2011), the central goal remains to enhance awareness and encourage meaningful action among viewers. Nevertheless, incorporating information regarding water consumption in the UK is likely to foster improved comprehension, as the majority of water consumers remain unaware of water-related threats or tend to prioritise other environmental concerns (Mace 2020; WaterUK, 2020). Such perceptions can render water consumers more susceptible to water-related threats, posing challenges to communities striving for resilience. Therefore, the strategy primarily concentrates on raising awareness.

The content video was designed to evoke a variety of emotions, including calm, guilt and sadness to produce more altruistic behaviour under the condition of preventative orientation, improve attractiveness and promote a positive attitude toward water conservation. These three emotions are considered environmentally relevant (Landmann 2020). While guilt and sadness are well-known to be significant for pro-environmental behaviour, the role of calm is still understudied. The decision to include these three emotions was based on the attempt to make the emotion within the content to be dynamic.

To evoke a sense of guilt, the content portrays the environmental consequences resulting from ignorance. This can be achieved by including visuals depicting the impact of drought, which would assist viewers in making informed decisions and recognising any potential trade-offs (Nisbet and Gick 2008). Inducing calm mainly focuses on portraying the value of nature and the water body (Li et al. 2021a; Peng et al. 2018; Nordin et al. 2021; White et al. 2010). Furthermore, the content depicts environmental values to provide a sense of relationship with nature (Nisbet et al. 2010; Schultz 2000) and a sense of connectedness to the environment (Nisbet and Gick 2008). This approach stimulates positive emotions and ultimately creates disincentives for engaging in unsustainable actions (Nisbet and Gick 2008). In sum, guilt is manipulated by varying the severity of the visual presentation, the description of the negative effects of excessive consumption and the sound of water slushing. Sadness is manipulated by images of reservoir levels, the melancholic nature and music, while calm is manipulated by the visual presentation and slow music.

Materials and procedures

The survey questionnaire included six parts: participant information; consent form; pre-exposure questions on attitudes and behaviours toward water consumption; stimulus exposure; post-exposure questions which mainly measure variables from ELM and TPB; and socio-demographic-related questions. The measurement items were predominantly derived from pertinent prior studies and subsequently modified to align with the specific contextual requirements of this study. Table 1 below provides a summary of the variables and measures. Respondents were required to choose one from the six-point Likert scale (strongly agree; agree; moderately agree; moderately disagree; disagree; or, strongly disagree). Furthermore, two questions were asked to make sure that respondents watched the video until the end. These questions are asking about the message of the video and what was included in the video. Since the questions in this part of the questionnaire are long, two statements would detect if the respondents really focus on the questions. For example, there is a statement that says "*Please choose moderately disagree*" and "*Rate the same here as your rating to the previous statement*".

Data collection

Data collection spanned from November 2022 to February 2023, employing convenience sampling through random posts on social media platforms like Facebook and Instagram. This sampling method offers distinct advantages, including the ability to quickly reach a large and diverse pool of participants, ensuring the inclusion of individuals with varied backgrounds and characteristics. However, it is crucial to acknowledge that not all individuals actively engage in public posts, potentially affecting sample representativeness (Jawale 2012). Additionally, the use of the online research platform SurveyCircle (SurveyCircle 2023) as a recruitment method further facilitated access to a wider number of potential participants.

Participants

The population of interest for this research is defined as UK water consumers above 18 years of age who use social media. Individuals in this age group are legally considered adults and are more likely to have the autonomy to make decisions about water consumption and engage in water

Table 1 Measures of variables

Variables	Definitions	Questions	Items' Source
Informativeness	The extent to which online advertisement provides complete, relevant and up-to-date information (Ducoffe 1996).	**INF1**: Information obtained from the water conservation video would be useful. **INF2**: The video provides relevant information. **INF3**: The video is a good source of updated information. **INF4**: I think the information obtained from the video would be helpful.	Ducoffe (1996); Lee and Hong (2016)
Emotional appeal	The degree to which seeing the video triggered emotional reactions (Lee and Hong 2016).	**EA1**: After seeing this water conservation video, I had intense feelings. **EA2**: I found the key message about water-saving emotionally engaging. **EA3**: The emotional aspect of this ad leads me to appreciate the video. **EA4**: There is a strong emotional tie between me and the video.	Alessandri et al. (2006); Lee and Hong (2016)
Multimedia effects	The extent to which multimedia provides rich and sufficient effects, particularly on sound and visual (Hsieh et al. 2012).	**MME1**: The video is rich in sound effects (e.g., music, water sound). **MME2**: The video is rich in visual effects. **MME3**: The video is rich in multimedia effects (e.g., images, video footage, texts). **MME4**: The overall media used in the video produced sufficient effects.	Hsieh et al. (2012)
Creativity	The extent to which a video is original, unique, out of the ordinary, artistic and intriguing (Lee and Hong 2016; Mercanti-Guerin 2008).	**CRE1**: This video is original and unexpected. **CRE2**: The video is really out of the ordinary. **CRE3**: This video is artistic. **CRE4**: The video is intriguing.	Lee and Hong (2016); Mercanti-Guerin (2008)
Attitudes to water conservation	Psychological evaluation to express some degree of favour or disfavour regarding water conservation (Clark and Finley 2007).	**AWC1**: I believe it is important to conserve water; it is important to always conserve water to avert water shortages **AWC2**: If each household reduces the amount of water it uses by just a little, it will make a big difference to the community **AWC3**: People should use no more water in the home than is necessary **AWC4**: I feel a moral obligation to use water carefully	Clark and Finley (2007)
Attitude to empathy expression	Inclination to share and click "Like" on content in a favourable way (Lee and Hong 2016).	**AEE_L1**: I feel good about clicking "Like" for this water conservation video. **AEE_L2**: I feel positive about clicking "Like" for this water conservation video. **AEE_L3**: I feel favourable about clicking "Like" for this water conservation video.	Lee and Hong (2016)
Perceived behavioural control	Perception of the extent to which the behaviour is under volitional control (Ajzen 2020).	**PBC1**: I am confident that I could save water around the house and in my home landscape if I wanted to **PBC2**: The decision to save water around the house and in my home landscape is in my control **PBC3**: Whether or not I save water around the house and in my home landscape is entirely up to me **PBC4**: I am certain that I could save water around the house and in my home landscape if I wanted to.	Gibson et al. (2021)
Intentions	Willingness and readiness to perform the behaviour (the immediate precursor to conserving water).	**INT1**: I plan to save or conserve water in the next six months. **INT2**: I expect I will engage in everyday actions to save water in the next six months. **INT3**: I intend to engage in everyday actions to save water in the next six months. **INT4**: I DO NOT want to engage in everyday actions to save water in the next six months.	Fielding et al. (2012)

conservation behaviours (Clark and Finley 2007; Miller and Buys 2008). Their attitudes and behaviours regarding water conservation may be more reflective of independent decision-making, as they are less influenced by parental guidance or household dynamics.

A total of 443 responses were finalised for the analysis stage. This sample size of 443 responses was determined to be adequate for conducting this research. Careful consideration of statistical power, adherence to sample size guidelines for SEM, and alignment with the study's sampling strategy collectively support the robustness and reliability of the findings (Hair et al. 2018).

A significant proportion, constituting 56%, fell within the 18–24 age range. The 25–34 age group accounted for 21%, followed by the 35–44 age range at 14.9%. Participants aged 45–54 represented 5.9%, those aged 55–64 constituted 2%, and individuals above 65 comprised a minimal 0.2%. In terms of gender distribution, 42% identified as male, 54.6% as female, and 3.4% of others. Importantly, the age distribution reflects a noticeable skew toward younger participants,

particularly in the 18–24 age group. This demographic breakdown provides a foundation for an understanding of the study's findings, especially given the prominence of younger individuals in the sample.

Analysis

The SEM analysis involved several steps. Firstly, the researchers were required to investigate whether the number of variables of interest is related to a smaller number of unobservable factors through Exploratory Factor Analysis (EFA). Secondly, the researcher confirmed the validity and reliability of the measurement model by conducting a Confirmatory Factor Analysis (CFA). Thirdly, model fit assessment involves the process of evaluating how well the theoretical model fits the data - typically using goodness-of-fit indices such as the Chi-Square divided by the Degrees of Freedom (χ^2/df), Normed Fit Index (NFI), Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), Standardised Root Mean Squared Residual (SRMR) and Root Mean Square Error of Approximation (RMSEA). Then, the researcher checked for common method bias to ensure that it did not distort the results of the analysis. Lastly, the researchers assessed the structural model by estimating path coefficients and Squared Multiple Correlations (R^2).

Results

Exploratory factor analysis (EFA)

An EFA was performed using principal component analysis and varimax rotation. The minimum factor loading criteria was set to 0.50. The communality of the scale, which indicates the amount of variance in each dimension, was also assessed to ensure acceptable levels of explanation. The results show that all communalities were over 0.50 except *CRE1: This video is original and unexpected*; and, *AWC1: I believe it is important to conserve water; it is important to always conserve water to avert water shortages*.

One crucial task involved assessing the overall significance of the correlation matrix through Bartlett's Test of Sphericity, which is a statistical tool that evaluates the probability of significant correlations among the various components within the matrix (Bartlett 1950; Tobias and Carlso 1969). The obtained results demonstrated significance, χ^2 ($n = 153$) $= 3628.302$ ($p < 0.001$), thereby indicating the suitability of the data for factor analysis. Moreover, the Kaiser–Meyer–Olkin measure of sampling adequacy (MSA), which assesses the appropriateness of the data for factor analysis, was 0.716. In this regard, data with MSA values above 0.70 are considered appropriate for factor analysis

(KMO and Bartlett's test of sphericity, 2020). Finally, the factor solution derived from this analysis yielded eight factors for the scale, which accounted for 72.083 per cent of the variation in the data.

Nonetheless, in this initial EFA, one item (i.e. *CRE1: This video is original and unexpected*) failed to load on any dimension significantly, hence, the item was removed from further analysis. The researcher repeated the EFA without including CRE1. The results of this new analysis confirmed the eight-dimensional structure theoretically defined in the research. The Kaiser–Meyer–Olkin MSA was 0.716. The eight dimensions explained a total of 73.744 per cent of the variance among the items in the study. Bartlett's Test of sphericity proved to be significant and all communalities were over the required value of 0.50 except AWC1. However, at this stage, the researcher did not consider any further deletion as it does not seem to affect the overall structure. The eight factors identified as part of this EFA aligned with the theoretical proposition in this research.

Confirmatory factor analysis (CFA) and common method biased (CMB)

Confirmatory Factor Analysis (CFA) was also conducted in order to determine how well the created items represent their underlying construct (Awang 2015). In this study, CFA is conducted using AMOS 24.0. As part of confirmatory factor analysis, factor loadings were assessed for each item, and all factor loadings were greater than 0.50. Based on the initial analysis conducted in AMOS, covariation was suggested to improve model fit. The decision was based on theoretical considerations suggesting a potential relationship between the measure variables represented by error terms and that they significantly improve the model fit. The model-fit measures were used to assess the model's overall goodness of fit (χ^2/df, NFI, CFI, TLI, SRMR, and RMSEA) and all values were within their respective common acceptance levels (Bentler 1990; Kline 2005; Meyers et al. 2005; Tucker and Lewis 1973). The eight-factor model yielded a good fit for the data: χ^2/df $= 2.134$, NFI $= 0.932$, CFI $= 0.962$, TLI $= 0.956$, SRMR $= 0.0387$, and RMSEA $= 0.051$.

Composite reliabilities ranged from 0.772 to 0.981, above the 0.70 benchmarks (Hair et al. 2018). Hence, construct reliability was established for each construct in the study. All factor loadings are also significant and exceed the recommended 0.50 threshold (Hair et al. 2018). Convergent validity was further evaluated through the examination of CR (composite reliability) and AVE (average variance extracted) values. The obtained CR values exceeded the threshold of 0.70, while the AVE values surpassed the minimum benchmark of 0.50. These results indicate that both CR and AVE values exceeded the respective cutoff
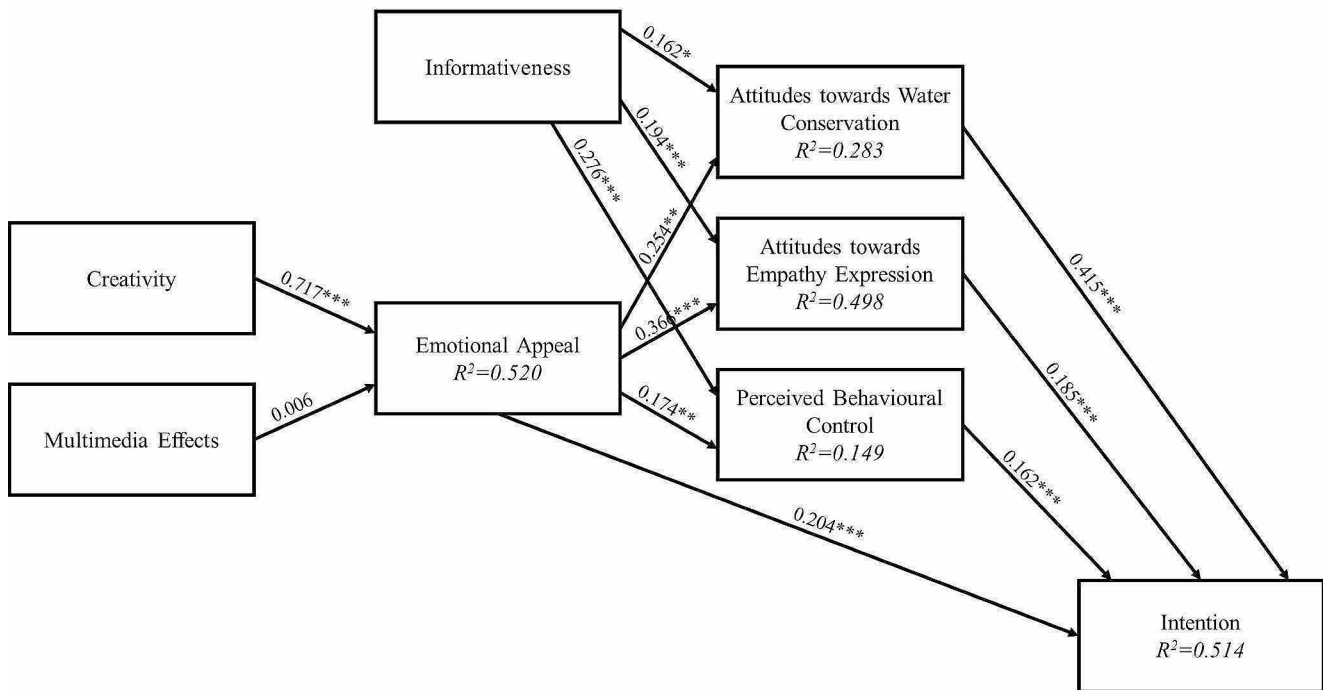
Fig. 2 AMOS results of structural model analyses. *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$

criteria, affirming the presence of convergent validity (Fornell and Larcker 1981; Hair et al. 2018). Additionally, each construct's square root of AVE was greater than its association with each of the other components, demonstrating discriminant validity (Fornell and Larcker 1981). Hence, the measurement model demonstrated satisfactory levels of reliability and validity.

In order to evaluate the potential presence of common method biases (CMB), Harman's single-factor test (Podsakoff and Organ 1986) was conducted. In this test, all variables in the model were subjected to unrotated exploratory factor analysis. The results revealed that the largest proportion of covariance explained by a single factor was 38.750%, which fell below the threshold of 50%. Therefore, it can be inferred that common method biases do not pose a significant concern for this study (Podsakoff and Organ 1986).

Structural model assessment and estimating path coefficient

A structural model demonstrates a mathematical representation of the inter-relationships among the variables of interest, typically based on theoretical or conceptual considerations (Awang 2015). The structural model includes eight latent variables: informativeness, emotional appeal, creativity, multimedia effects, attitudes to water conservation, attitude to empathy expression, perceived behavioural control and intention. This research examined the impact

Table 2 Standardised estimate, standard error (S.E), critical ratio (C.R) and p-value. ***$p < 0.001$

	Estimate	S.E.	C.R.	P
H1	0.162	0.063	2.534	0.011
H2	0.194	0.065	3.86	***
H3	0.276	0.054	4.955	***
H4	0.254	0.059	3.259	0.001
H5	0.366	0.062	5.864	***
H6	0.174	0.042	3.128	0.002
H7	0.717	0.079	10.298	***
H8	0.006	0.088	0.112	0.911
H9	0.415	0.043	7.23	***
H10	0.185	0.029	3.69	***
H11	0.162	0.032	3.857	***
H12	0.204	0.032	3.655	***

of informativeness and emotional appeal on water consumers' attitudes towards water conservation, attitudes toward empathy expression, and perceived behavioural control. The research also investigated the effects of creativity and multimedia on emotional appeal and factors that have significant positive effects on the intention to conserve water. The model is presented in Fig. 2 illustrating the hypothesised paths and the directionality of the relationships. The resulting indices indicated acceptable model fit (χ2/df = 2.619, NFI = 0.914, CFI = 0.945, TLI = 0.937, SRMR = 0.0788, and RMSEA = 0.061) (Bentler 1990; Kline 2005; Meyers et al. 2005; Tucker and Lewis 1973).

Table 2 displays the standardised estimate, standard error (S.E), critical ratio (C.R) and p-value for each hypothesis.

A total of 11 hypotheses were supported while one was rejected. The structural model's findings showed how important informativeness is in influencing water consumers' attitudes towards water conservation, attitudes toward empathy expression, and perceived behavioural control. Informativeness ($\beta = 0.162$, $p = 0.011$) is found to have a significant positive effect on attitude toward water conservation (H1). The results of the analysis also identified a significant positive relationship between informativeness and attitude to empathy expression ($\beta = 0.194$, $p < 0.001$) (H2) and perceived behavioural control ($\beta = 0.276$, $p < 0.001$) (H3).

As H4 suggests, emotional appeal ($\beta = 0.254$, $p = 0.001$) is found to have a significant positive effect on attitude toward water conservation. Emotional appeal ($\beta = 0.366$, $p < 0.001$) is also found to have a significant positive effect on attitude to empathy expression (H5) and perceived behavioural control ($\beta = 0.174$, $p = 0.002$) (H6). The researcher further analysed the results to see the effects of creativity and multimedia effects on emotional appeal. Creativity has a statistically significant positive effect on emotional appeal ($\beta = 0.717$, $p < 0.001$), supporting H7. However, the regression analysis showed a non-significant relationship between multimedia effect and emotional appeal ($\beta = 0.006$, $p = 0.911$), thus H8 was not supported.

In terms of directly predicting the intention to conserve water, attitudes toward water conservation ($\beta = 0.415$, $p < 0.001$), attitudes to empathy expression ($\beta = 0.185$, $p < 0.001$), and perceived behavioural control ($\beta = 0.162$, $p < 0.001$) are all have a significant positive effect on the intention. Most importantly, emotional appeal has a significant positive effect on intention ($\beta = 0.204$, $p < 0.001$). Hence, all H9, H10, H11, and H12 are supported.

It was revealed that 52% of the variance in the emotional appeal was explained by a combination of creativity and multimedia effects. The results of the analysis showed informativeness and emotional appeal jointly explained 28.3% of the variance in attitudes to water conservation. Moreover, 49.8% of the variance in attitudes towards empathy expressions was explained by a combination of informativeness and emotional appeal; 14.9% of the variance in perceived behaviour control was explained by a combination of informativeness and emotional appeal; and, 51.4% of the variance in intention was explained by a combination of emotional appeal, attitudes to water conservation, attitude to empathy expression, and perceived behavioural control.

Discussions and implications

This study aimed to assess the effectiveness of a communication framework in promoting water conservation through social media, focusing on the integration of emotional appeal within audio-visual content. The research sought to test the proposed effective communication model for social media water conservation campaigns developed by Abu Bakar et al. (2021). Through the application of SEM, the study empirically evaluated the proposed model and delineated the factors influencing individuals' responses to water conservation messages on social media platforms. The findings not only affirm existing literature but also offer new perspectives on the dynamics of communication strategies for encouraging sustainable water practices.

Informativeness

This study initially investigates the significance of informativeness in driving effective water conservation communication. The findings suggest that the informative nature of the stimulus significantly supports water consumers' intention to change their behaviour. As informativeness levels increase, individuals exhibit a propensity towards more favourable attitudes regarding water conservation, aligning with prior research by Maduku (2021). Moreover, the results highlight that content perceived as valuable and informative garners higher levels of empathetic engagement from individuals, in line with the research by Lee and Hong (2016). Informativeness also emerges as a pivotal driver for enhancing individuals' perceived control over their behaviour, with the observations of Syme et al. (2000). Informativeness inspires action and contributes to a more sustainable future by accurately educating people about pertinent water-related issues. While prior research acknowledges the significance of this factor, this study offers a deeper comprehension of its impact on attitudes and behaviours towards water conservation.

Evoking emotional appeal

This study further explores the dynamics of emotional appeal in water conservation communication, particularly focusing on the influence of creativity and multimedia effects. Interestingly, the analysis reveals a significant positive correlation between creativity and emotional appeal, suggesting that original and artistic content tends to evoke stronger emotional responses from viewers. This finding aligns with prior research emphasising the role of novelty in fostering emotional connection (Rosengren et al. 2020; Vekovtseva and Plotnikova 2019). However, the relationship between multimedia effects and emotional appeal does not exhibit similar significance, indicating the need for further investigation. Several factors, such as stimulus characteristics, viewing environments, and variations in audio hardware, may contribute to this unexpected finding.

Emotional appeal

The study examines the effectiveness of emotional appeal in water conservation communication, particularly focusing on targeted emotions such as sadness, guilt, and calm. The results underscore the significant and positive impact of emotional appeal on promoting attitudes towards water conservation, empathy expression, and perceived behavioural control. Emotional appeals are particularly potent in motivating audiences who may initially lack interest or knowledge regarding the benefits of water conservation (de Vries 2020). By appealing to individuals' sense of responsibility, care, and concern, emotional messages serve as powerful catalysts for fostering positive attitudes and behavioural intentions. Contrary to Lee and Hong (2016), this finding also emphasises the significance of emotional appeal in shaping attitudes toward empathy expression. Additionally, emotional appeal plays a crucial role in enhancing individuals' sense of control over their behaviour. This may be attributed to the persuasive nature of emotional appeals, which are more effective in convincing individuals to take action when they perceive a greater sense of control over the outcome (Moons and De Pelsmacker 2012).

Intention

Furthermore, the study reveals the role of attitudes towards water conservation, attitudes towards empathy expression and perceived behavioural control in influencing behavioural intentions related to water conservation. These factors collectively serve as motivational factors driving individuals' intentions to engage in water conservation actions. By integrating emotional appeal as a predictor within the traditional TPB framework, the study extends the understanding of the drivers of intention. Notably, the analysis found that emotional appeal plays a significant role in influencing individuals' intentions to engage in water conservation behaviours. This further suggests that leveraging emotional appeals in communication strategies can effectively motivate behavioural change and enhance the persuasiveness of conservation messages. Supplementing prior findings by Wang et al. (2022), emotion may be important in itself and is expected to be influential enough to explain intention.

The implications of this study extend across both academic research and practical applications in environmental communication and water conservation. Firstly, from a theoretical perspective, the study advances the understanding of environmental communication by offering fresh perspectives on the interplay between different communication elements. Specifically, the distinction between informativeness and emotional appeal contributes to the theoretical foundations of communication theories, such as the TPB and ELM.

By demonstrating the predictive power of emotional appeal in influencing behavioural intentions, the study extends the boundaries of existing theoretical frameworks and opens new avenues for future research. Secondly, from a practical perspective, the findings have important implications for the design and implementation of water conservation campaigns, particularly those on social media platforms. By acknowledging the efficacy of emotional appeals in engaging audiences and driving behaviour change, communication practitioners can refine their strategies to elicit desired responses from target audiences. Incorporating elements of creativity to evoke emotional responses can enhance the effectiveness of communication efforts and amplify their impact on attitudes and behaviours related to water conservation.

Conclusions, limitations and research directions

Overall, this study elucidated the complex relationships between key elements in water conservation communication campaigns, highlighting the interplay of informativeness and emotional appeal. The findings emphasise the significant influence of informativeness on shaping attitudes, empathy expression, and perceived behavioural control, crucial aspects for fostering intention towards water conservation and behavioural change. Creativity, serving as a conduit for evoking emotional resonance, emerges as a potent tool in engaging audiences and stimulating curiosity. Notably, emotional appeal serves as a formidable catalyst, effectively bridging the gap for individuals less inclined towards conservation efforts and fostering positive behavioural intentions related to water conservation. The findings also underscore the pivotal role of emotions in driving intention, indicating that emotional appeal significantly contributes to the formation of positive intentions for water conservation.

While this study offers valuable findings, it is important to acknowledge several limitations. Firstly, the research focused on a specific geographic area, potentially limiting the generalisability of the results to other regions or demographic groups. Additionally, the reliance on self-reported data and a cross-sectional design may introduce biases and hinder the establishment of causal relationships. Furthermore, the measurement of emotional appeal and other constructs may be subject to interpretation, leading to potential measurement errors. Future research should aim to address these limitations by employing longitudinal designs, conducting studies in diverse settings, and utilising objective measures to assess emotional appeal.

Drawing from the findings of this study, several opportunities for future research emerge. Longitudinal studies are warranted to investigate the enduring effects of emotional appeal on behavioural intentions and actual behavioural changes over time. Additionally, comparative research across various cultural contexts can provide a valuable understanding of the universal applicability of emotional appeals in environmental communication. Finally, exploring the moderating role of individual differences, such as personality traits and environmental values, on the effectiveness of emotional appeals deserves attention.

Declarations

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