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The UNIVERSITY of OKLAHOMA

Analysis of Socioeconomic, Psychological, and Moral Factors in Shaping Public Trust in Water Recycling Initiatives

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Research Report

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Abstract

As water scarcity becomes more common, water recycling initiatives are becoming more important. When considering water recycling, public trust in the initiatives is crucial for success. To address this, we investigate the factors influencing public trust in water recycling using a nationally representative sample in the United States and find that socioeconomic factors such as income, gender, and geographic location play a significant role, with higher-income individuals, men, and those living in suburban areas showing more trust in water recycling. Self-assessed health and happiness are also positively associated with trust. Social capital increases trust, while conspiracy theory belief strongly decreases it. The moral foundations of loyalty and purity are significant predictors, with loyalty increasing trust and purity decreasing it. Interestingly, climate change beliefs, such as trust in climate scientists, influence the respondent's trust in water recycling, while belief in climate change risks, worry about global warming, and perceived personal/future harm from global warming do not. Fear, including fear of environmental disasters, has no significant influence on trust in our survey. These findings in the initial SPEER 2023 survey begin to provide insight for water management policies and public outreach strategies, highlighting the need to consider a wide range of socioeconomic, psychological, and moral factors when building trust in water recycling initiatives.

1. Introduction

Water scarcity has become an increasingly pressing issue globally, with many regions facing growing water stress due to factors such as population growth, urbanization, and climate change (UNESCO, 2021). As a result, water recycling initiatives have gained prominence as a potential solution to help meet the rising demand for water (e.g., Fielding et al., 2019). By treating and reusing wastewater, these initiatives offer a more sustainable approach to water management, reducing the strain on freshwater sources and promoting water security (e.g., Hurlimann & Dolnicar, 2016; Nkhoma et al., 2021). However, the success of water recycling initiatives is not solely dependent on technological feasibility. Public acceptance and trust in the safety and quality of recycled water are crucial factors that can significantly impact the implementation and long-term viability of these projects (Fielding et al., 2019;

Hurlimann & Dolnicar, 2016). Negative perceptions, concerns about potential health risks, and a lack of trust in water authorities can lead to public opposition, which has historically hindered the development of water recycling measures (Glick et al., 2019; Nkhoma et al., 2021). Therefore, understanding and addressing the factors that influence public trust in water recycling is essential for the successful adoption of these initiatives.

Previous studies have investigated various aspects of public attitudes towards water recycling, including demographic factors, psychological barriers, and the role of knowledge and information (e.g., Fielding et al., 2019; Glick et al., 2019; Hurlimann & Dolnicar, 2016). However, there is still a need for a more comprehensive understanding of the interplay between socioeconomic, psychological, and moral factors that shape public trust in water recycling initiatives. We aim to address this gap by examining a wide range of factors using a nationally representative sample in the United States in late spring 2023. Specifically, we attempt to answer the following research questions:

- How do socioeconomic factors (such as income, gender, and geographic location) relate to public trust in water recycling?
- What is the relationship between psychological factors, including self-assessed health and happiness, social capital, and conspiracy theory beliefs, and trust in water recycling?
- How do moral foundations, particularly loyalty and purity, influence trust in water recycling?
- Do climate change beliefs and fear of environmental disasters play a role in shaping trust in water recycling?

2. Literature Review

2.1 Previous Research on Factors Influencing Public Trust in Water Recycling

Numerous studies have explored the various factors that influence public trust and acceptance of water recycling initiatives. These factors include socioeconomic characteristics, psychological barriers, knowledge and information, and cultural and institutional contexts (e.g., Fielding et al., 2019; Hurlimann & Dolnicar, 2016; Smith et al., 2018). Several of the key psychological barriers is the role of disgust, risk perceptions, and affective reactions in shaping public attitudes towards water recycling (Dolnicar et al., 2011; Rozin et al., 2015; Smith et al., 2018). Disgust, often referred to as the "yuck factor" can be a powerful emotional response that influences people's willingness to accept recycled water, particularly for potable uses, and has been well studied.

Trust in water service organizations is another factor that influences risk perceptions and acceptance of water recycling (e.g., Fielding et al., 2019; Ross et al., 2014; Smith et al., 2018). It has been found that when the public trusts the authorities responsible for managing water recycling initiatives, they are more likely to perceive lower risks and show higher acceptance levels. This trust can be fostered through a process of technological 'legitimation', where public engagement activities help normalize and legitimize water reuse (Smith et al., 2018).

Cultural values, such as collectivism versus individualism, can also play a role in shaping attitudes towards water recycling (Guo et al., 2022). They found that societies with more collectivistic values may be more receptive to water recycling initiatives, as they prioritize the collective good over individual concerns. While these studies have provided interesting insights, there is much work that remains to understanding of how these factors interact and shape public attitudes towards water recycling.

2.2 Socioeconomic and Demographic Factors

Socioeconomic factors, such as income, gender, and geographic location, have been found to play a role in shaping public trust in water recycling. Studies have shown that individuals with higher incomes and education levels tend to be more supportive of water recycling initiatives (Hurlimann & Dolnicar, 2016; Nkhoma et al., 2021). For example, a meta-analysis by Li et al. (2020) found that higher education predicted greater acceptance of recycled water. However, these same high-income, highly educated groups may also underestimate their actual water consumption (Dolnicar et al., 2011; Fan et al., 2014), potentially influencing their perceived need for alternative water sources. Conversely in a meta-analysis of 43 studies, 25 of them found no significant link, and for those that did higher education was linked to more acceptance of recycled water (Fielding et al., 2019). In terms of income the meta-analysis by Fielding et al. (2019) found from 30 studies, 13 found no association with income, but 17 did report variation among income, with the largest four studies of those finding that higher income is associated with more acceptance of water recycling.

Gender differences have also been observed, with some studies suggesting that men are more likely to accept recycled wat er than women (Garcia-Cuerva et al., 2016; Nkhoma et al., 2021). Women may be more sensitive to disgust and contamination concerns (Wester et al., 2015). However, findings on gender have been mixed, from a meta-analysis of 62 studies where 36 found no association with gender, and most found men more accepting (Fielding et al., 2019), to a meta-analysis of 15 studies that found younger, educated women were more accepting (Li et al., 2020), or finding no significant gender differences among 309 British residents (Smith et al., 2015).

Additionally, geographic location, such as living in urban or rural areas, can influence attitudes towards water recycling, with urban residents generally showing higher levels of acceptance (Hurlimann & Dolnicar, 2016; Smith et al., 2018). This may be due to differences in water scarcity experiences or exposure to information about reuse. Cultural factors associated with different locations, such as individualism versus collectivism orientations, may also play a role, with more collectivistic cultures potentially more supportive of reuse when framed as benefiting the common good (Guo et al., 2022).

2.3 Social Psychological Factors

Social psychological factors, including self-assessed health and happiness, social capital, and conspiracy theory beliefs, have been less extensively studied in the context of water recycling acceptance. However, some research suggests that these factors may play a role in shaping public trust.

Fielding et al. (2019) conducted a comprehensive review of the literature on public acceptance of recycled water. They found that health risk perceptions consistently and negatively impact acceptance of recycled water, with higher health risk perceptions being related to lower acceptance for both potable and non-potable uses. While direct investigations are lacking, it is plausible that general physical and mental well-being, captured by self-reported health and happiness, could influence water reuse attitudes. Those with greater well-being may feel more resilient to any perceived risks.

Also, individuals with higher levels of social capital, which encompasses trust, social networks, and community engagement, may be more likely to trust water authorities and support water recycling initiatives (Ross et al., 2014). Social capital can create a sense of shared identity and fate between the public and water management entities. Conversely, those who hold conspiracy theory beliefs may be

more skeptical of water recycling and less trusting of the authorities involved (Nkhoma et al., 2021). Conspiracy beliefs can fuel perceptions of ulterior motives or hidden risks.

2.4 Psychological Factors

Moral foundations (Graham et al., 2009; 2011), such as loyalty and purity, have been identified as potential psychological factors influencing public attitudes towards water recycling. The purity foundation, which is associated with concerns about contamination and disgust, has been found to be a significant barrier to acceptance of recycled water (Rozin et al., 2015). Individuals who place a higher value on purity may be more resistant to the idea of consuming water that was once wastewater, even after treatment (Nkhoma et al., 2021). Disgust and contamination fears can override assurances of safety and act as a "gut-level" barrier (Rozin et al., 2015; Wester et al., 2015).

The loyalty foundation, which emphasizes in-group loyalty and patriotism, may also play a role in shaping trust in water authorities and support for water recycling initiatives, albeit in potentially conflicting ways. On one hand, loyalty to local or national authorities could increase trust in their ability to manage recycled water safely (Nkhoma et al., 2021). Appeals to protecting one's community could increase acceptance. On the other hand, if water reuse is perceived as being driven by outside groups or benefiting other communities, in-group loyalty could fuel opposition.

In a related vein, the moral foundation of sanctity/degradation, which values traditions and customs, has been found to positively predict acceptance of recycled water for uses like toilet flushing and cleaning, but negatively predict acceptance for cooking and drinking (Welsch, 2020). Thus, how loyalty and sanctity/purity map onto water reuse attitudes likely depends on what aspects are salient. More research is needed to unpack these dynamics across different contexts.

2.5 Additional Factors

Trust in climate scientists, climate change beliefs, and fear of environmental disasters are additional factors that may influence public attitudes towards water recycling. Studies have shown that individuals who trust climate scientists and believe in the reality and risks of climate change are more likely to support sustainable water management practices, including water recycling (Dolnicar et al., 2011; Fielding et al., 2019). Climate change concerns can drive perceived need for alternative water sources, increasing acceptance of reuse.

However, the relationship may not be straightforward. Welsch (2020) found that while moral foundations like fairness and care predicted climate change mitigation behaviors, group-focused foundations like loyalty did not, potentially because climate change transcends in-group boundaries. Water scarcity, in contrast, often has more localized impacts. Conceptually distinguishing between generalized environmental concern versus perceived local risks from water stress as predictors of recycled water acceptance is an important direction for future research.

Fear of environmental disasters, such as droughts or water scarcity, may motivate individuals to support water recycling as a means of ensuring water security (Nkhoma et al., 2021). However, fear could also amplify risk perceptions around reuse. Examining how the influence of fear may vary depending on whether the threats emphasized relate to a lack of water versus perceived contamination risks could yield more insights.

3. Data and Methods

3.1 Data

The analysis draws on data from the SPEER23 Survey, an online questionnaire developed and administered by researchers at the University of Oklahoma (OU). Data collection occurred from May to June 2023, with participant recruitment facilitated by Qualtrics. The final dataset comprises responses from 2,188 non-incarcerated U.S. adults. To achieve a representative sample, quota-based sampling techniques were employed, aligning the participant demographics with U.S. population distributions across age, gender, income, education, race/ethnicity, and census region. The research protocol (number #15823) received approval from OU's Institutional Review Board, ensuring compliance with ethical standards for human subject research. For comprehensive information on the data collection process and survey instruments, readers are directed to the survey report authored by Bedle et al. (2024).

3.2 Dependent Variable

The study's dependent variable focused on public trust in recycled water systems, a crucial factor in the context of increasing water scarcity. Participants' attitudes were assessed using a single-item measure from the SPEER 2023 survey. The question posed was:

> *"If droughts become more prevalent in portions of the U.S., previously used water may need to be recycled. How much trust do you have in your local water authority to ensure that the water treated through a recycling process is healthy and safe for you to use in your household?"*

Respondents were presented with a four-point Likert scale to indicate their level of trust, ranging from "A great deal of trust" to "Some trust," "Very little trust," and "No trust at all."

This measure aimed to capture the spectrum of public confidence in local water authorities' ability to manage and implement water recycling processes effectively.

3.3 Independent Variables

To address the research questions, we examine several key independent variables. These include measures of moral foundations; self-assessed health and happiness as indicators of overall well-being; social capital; and beliefs in conspiracy theories. We also incorporate variables related to climate change attitudes, including the belief in anthropogenic causes of climate change, trust in climate scientists, and fear of environmental disasters. These variables were selected to provide a comprehensive exploration of the socioeconomic, psychological, moral, and environmental factors that may influence trust in water recycling processes. By including this diverse set of predictors, we aim to capture the multifaceted nature of public attitudes towards water recycling in the context of potential future water scarcity. For detailed information on the specific measures used and the statistical distribution of responses for each variable, readers are directed to the SPEER 2023 survey report (Bedle et al., 2024).

3.4 Control Variables

Our analysis incorporates a range of control variables to account for potential confounding factors. Given the well-established connection between political views and environmental attitudes, as documented in numerous studies, we include measures of both political affiliation and ideological orientation in our model. Additionally, we incorporate a comprehensive set of socioeconomic and demographic variables that have been linked to environmental and climate change attitudes in previous

research. These variables include age (analyzed as a mean-centered variable, with a quadratic term included where significant to capture potential non-linear effects), gender, racial identification, educational level, household income, marital status, parental status, frequency of participation in religious services, self-identification as an evangelical Christian, perspectives on religious texts, residential setting (categorized as rural, suburban, or urban), and geographic region within the United States. This extensive set of control variables allows us to isolate the effects of our primary variables of interest while accounting for the complex interplay of factors that water recycling attitudes.

3.5 Analysis

To investigate the relationship between the independent variables and trust in water recycling, while controlling other variables, we employed a series ordinary least squares (OLS) regression analysis. The dependent variable for all models is the linear measure H2Otrust.

4. Results

We begin by exploring standard socioeconomic factors, followed by an examination of the roles of self-assessed health and happiness. We then investigate social factors, including social capital and conspiracy theory beliefs. The influence of moral foundations is subsequently analyzed, followed by an investigation of how climate change beliefs relate to trust in water recycling. Finally, we explore the potential impact of fear on public trust in these initiatives. Figure 1 provides a visual representation of the average trust in recycled water across different states in the U.S., offering a geographical context for our findings.

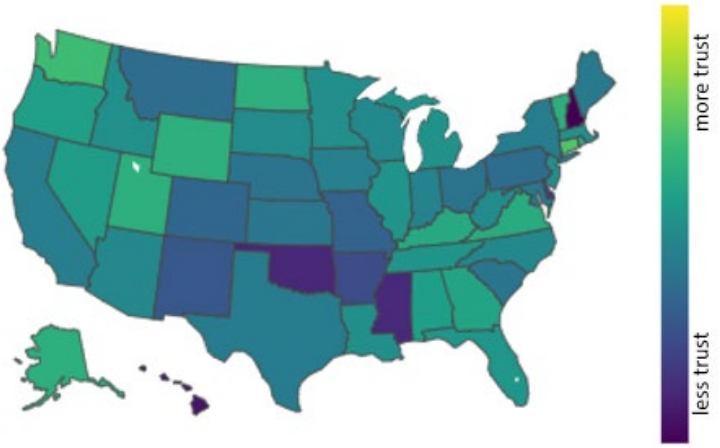


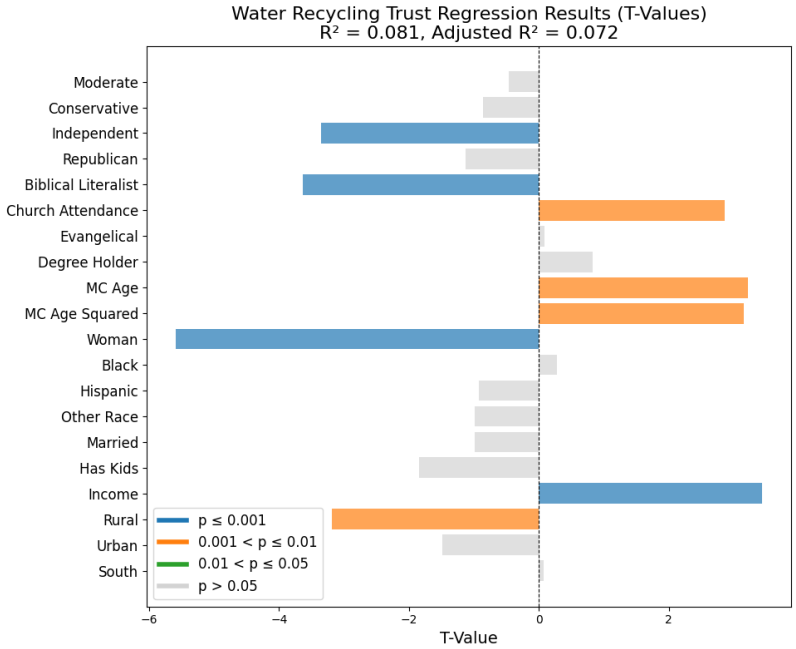
Figure 1: Average trust in recycled water by state

The subsequent analyses build upon this overview, providing detailed insights into each factor's contribution to shaping public trust in water recycling initiatives.

4.1 Standard socioeconomic factors

The results of this regression (Figure 2) demonstrate that standard socioeconomic factors play a significant role in shaping public trust in water recycling initiatives. Higher income levels are associated with increased trust in water recycling, suggesting that individuals with greater financial resources may

be more receptive to these initiatives. In terms of gender, the findings indicate that women are less supportive of water recycling compared to men. Geographic location also emerges as a key factor, with people in rural communities exhibiting lower levels of trust in recycled water compared to those in suburban areas.

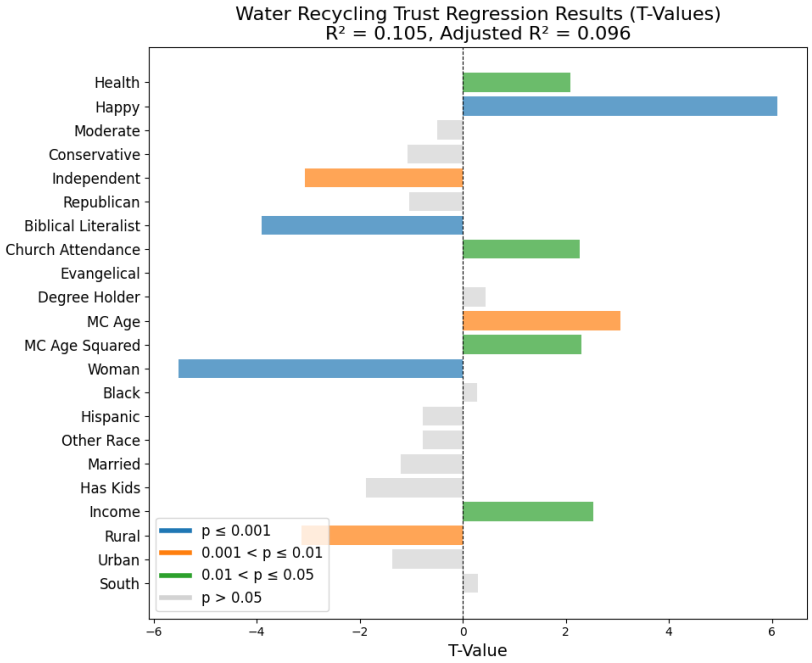


IV	coef	std err	t	P>|t|	2.5%	97.5%
Moderate	-0.020	0.044	-0.464	0.643	-0.107	0.066
Conservative	-0.049	0.056	-0.864	0.387	-0.159	0.062
Independent	-0.145	0.043	-3.359	0.001	-0.229	-0.060
Republican	-0.064	0.057	-1.126	0.260	-0.175	0.047
Biblical Literalist	-0.189	0.052	-3.632	0.000	-0.291	-0.087
Church Attendance	0.025	0.009	2.853	0.004	0.008	0.042
Evangelical	0.004	0.049	0.087	0.931	-0.091	0.100
Degree Holder	0.032	0.039	0.830	0.406	-0.044	0.108
MC Age	0.004	0.001	3.216	0.001	0.001	0.006
MC Age Squared	0.000	0.000	3.150	0.002	0.000	0.000
Woman	-0.194	0.035	-5.588	0.000	-0.261	-0.126
Black	0.018	0.065	0.271	0.786	-0.111	0.146
Hispanic	-0.057	0.061	-0.924	0.356	-0.177	0.064
Other Race	-0.049	0.050	-0.986	0.324	-0.146	0.048
Married	-0.040	0.040	-0.989	0.323	-0.119	0.039
Has Kids	-0.078	0.042	-1.851	0.064	-0.162	0.005
Income	0.044	0.013	3.430	0.001	0.019	0.069
Rural	-0.140	0.044	-3.183	0.001	-0.225	-0.054
Urban	-0.060	0.041	-1.489	0.137	-0.140	0.019
South	0.003	0.040	0.071	0.943	-0.075	0.080

Figure 2: OLS regression with control variables.

4.2 Health and Happiness

Self-assessed health and happiness are found to be positively associated with trust in water recycling (Figure 3). Individuals who report higher levels of self-assessed health demonstrate greater trust in the water recycling initiative. Similarly, those with higher self-assessed happiness also exhibit increased trust in water recycling.

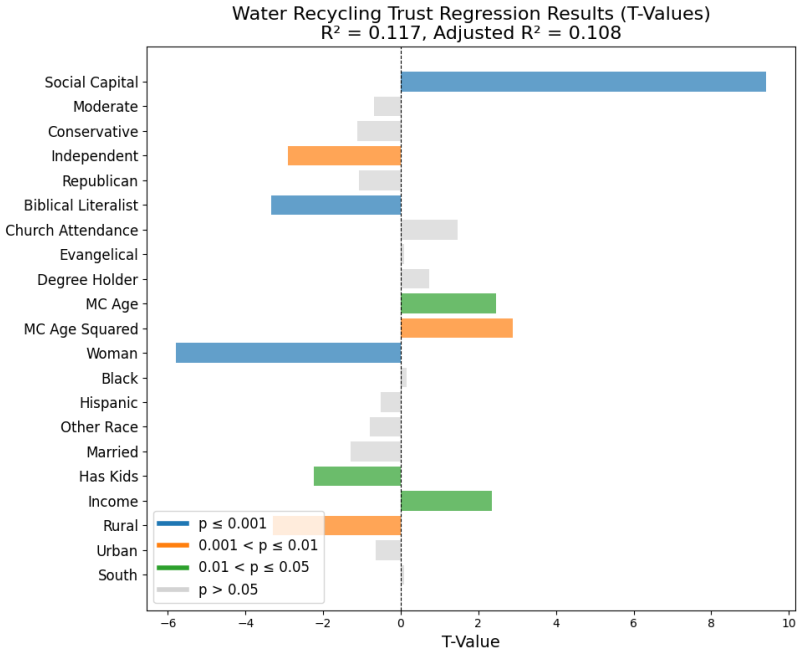


IV	coef	std err	t	P>|t|	2.5%	97.5%
Health	0.053	0.025	2.087	0.037	0.003	0.102
Happy	0.181	0.030	6.101	0.000	0.123	0.240
Moderate	-0.021	0.043	-0.490	0.624	-0.107	0.064
Conservative	-0.060	0.056	-1.070	0.285	-0.169	0.050
Independent	-0.131	0.043	-3.065	0.002	-0.214	-0.047
Republican	-0.058	0.056	-1.042	0.298	-0.168	0.052
Biblical Literalist	-0.201	0.051	-3.906	0.000	-0.302	-0.100
Church Attendance	0.019	0.009	2.278	0.023	0.003	0.036
Evangelical	0.000	0.048	0.005	0.996	-0.094	0.094
Degree Holder	0.017	0.038	0.444	0.657	-0.058	0.092
MC Age	0.004	0.001	3.064	0.002	0.001	0.006
MC Age Squared	0.000	0.000	2.307	0.021	0.000	0.000
Woman	-0.189	0.034	-5.514	0.000	-0.256	-0.122
Black	0.018	0.065	0.282	0.778	-0.109	0.145
Hispanic	-0.047	0.061	-0.783	0.433	-0.166	0.071
Other Race	-0.038	0.049	-0.772	0.440	-0.134	0.058
Married	-0.048	0.040	-1.203	0.229	-0.126	0.030
Has Kids	-0.079	0.042	-1.883	0.060	-0.161	0.003
Income	0.032	0.013	2.541	0.011	0.007	0.057
Rural	-0.135	0.043	-3.124	0.002	-0.220	-0.050
Urban	-0.054	0.040	-1.362	0.173	-0.133	0.024
South	0.012	0.039	0.297	0.767	-0.065	0.088

Figure 3: OLS regression with control variables, adding in self-assessed health and happiness ratings.

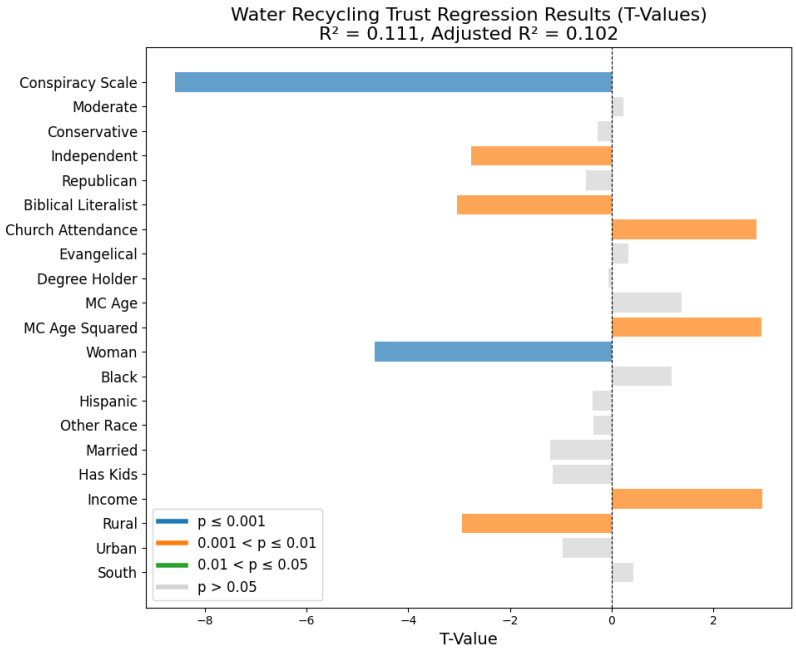
4.3 Social Factors

Social capital and conspiracy theory beliefs emerge as significant predictors of trust in water recycling (Figure 4 and Figure 5). Individuals with higher levels of social capital, which encompasses factors such as trust, social networks, and community engagement, are more trusting of water recycling initiatives. Conversely, people who hold stronger conspiracy theory beliefs are found to be highly distrustful of water authorities responsible for implementing water recycling projects.



IV	coef	std err	t	P>|t|	2.5%	97.5%
Social Capital	0.035	0.004	9.408	0.000	0.027	0.042
Moderate	-0.029	0.043	-0.681	0.496	-0.114	0.055
Conservative	-0.062	0.055	-1.124	0.261	-0.171	0.046
Independent	-0.123	0.042	-2.915	0.004	-0.206	-0.040
Republican	-0.060	0.056	-1.082	0.279	-0.169	0.049
Biblical Literalist	-0.170	0.051	-3.333	0.001	-0.270	-0.070
Church Attendance	0.013	0.009	1.476	0.140	-0.004	0.029
Evangelical	0.004	0.048	0.088	0.930	-0.089	0.098
Degree Holder	0.028	0.038	0.742	0.458	-0.046	0.102
MC Age	0.003	0.001	2.462	0.014	0.001	0.005
MC Age Squared	0.000	0.000	2.894	0.004	0.000	0.000
Woman	-0.197	0.034	-5.788	0.000	-0.263	-0.130
Black	0.010	0.064	0.157	0.875	-0.116	0.136
Hispanic	-0.031	0.060	-0.511	0.609	-0.149	0.087
Other Race	-0.038	0.049	-0.788	0.431	-0.134	0.057
Married	-0.051	0.039	-1.284	0.199	-0.128	0.027
Has Kids	-0.093	0.042	-2.233	0.026	-0.174	-0.011
Income	0.030	0.013	2.353	0.019	0.005	0.054
Rural	-0.141	0.043	-3.290	0.001	-0.226	-0.057
Urban	-0.026	0.040	-0.649	0.516	-0.104	0.052
South	0.003	0.039	0.088	0.930	-0.073	0.080

Figure 4: OLS regression with control variables, adding in social capital scale.

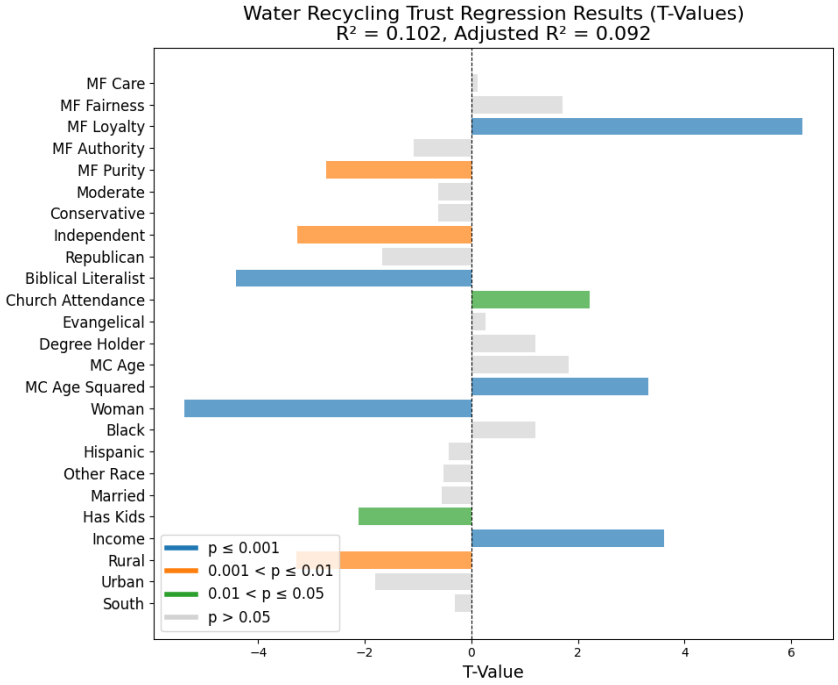


IV	coef	std err	t	P>|t|	2.5%	97.5%
Conspiracy Scale	-0.028	0.003	-8.586	0.000	-0.034	-0.021
Moderate	0.010	0.043	0.225	0.822	-0.075	0.095
Conservative	-0.015	0.056	-0.269	0.788	-0.124	0.094
Independent	-0.117	0.043	-2.760	0.006	-0.201	-0.034
Republican	-0.029	0.056	-0.509	0.611	-0.138	0.081
Biblical Literalist	-0.156	0.051	-3.035	0.002	-0.257	-0.055
Church Attendance	0.024	0.008	2.841	0.005	0.007	0.041
Evangelical	0.015	0.048	0.323	0.747	-0.078	0.109
Degree Holder	-0.002	0.038	-0.060	0.952	-0.077	0.073
MC Age	0.002	0.001	1.377	0.169	-0.001	0.004
MC Age Squared	0.000	0.000	2.943	0.003	0.000	0.000
Woman	-0.160	0.034	-4.659	0.000	-0.227	-0.093
Black	0.076	0.065	1.177	0.239	-0.051	0.203
Hispanic	-0.022	0.060	-0.368	0.713	-0.141	0.096
Other Race	-0.017	0.049	-0.356	0.722	-0.113	0.079
Married	-0.048	0.040	-1.217	0.224	-0.126	0.029
Has Kids	-0.049	0.042	-1.165	0.244	-0.131	0.033
Income	0.037	0.013	2.958	0.003	0.012	0.062
Rural	-0.127	0.043	-2.941	0.003	-0.212	-0.042
Urban	-0.039	0.040	-0.972	0.331	-0.117	0.039
South	0.016	0.039	0.422	0.673	-0.060	0.093

Figure 5: OLS regression with control variables, adding in the respondent's belief in conspiracy theories.

4.4 Moral Foundations

The moral foundations of ingroup loyalty and purity play a crucial role in shaping public trust in water recycling (Figure 6). Higher levels of loyalty are associated with increased trust in local water authorities and their ability to manage recycled water effectively. In contrast, individuals who place a greater emphasis on purity exhibit less support for and trust in water recycling initiatives.

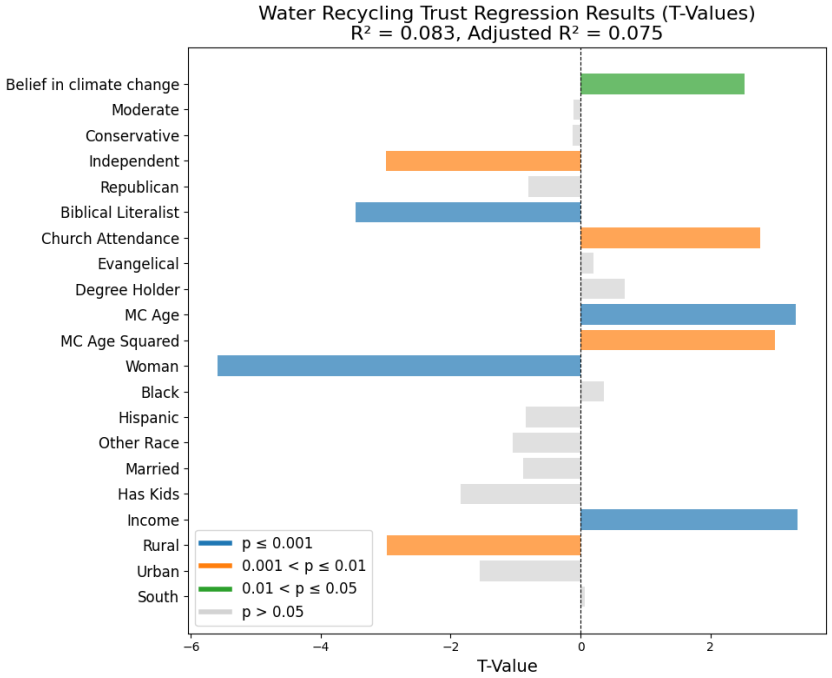


IV	coef	std err	t	P>|t|	2.5%	97.5%
MF Care	0.001	0.006	0.123	0.902	-0.012	0.013
MF Fairness	0.012	0.007	1.712	0.087	-0.002	0.026
MF Loyalty	0.035	0.006	6.206	0.000	0.024	0.046
MF Authority	-0.007	0.006	-1.088	0.277	-0.019	0.005
MF Purity	-0.014	0.005	-2.731	0.006	-0.024	-0.004
Moderate	-0.028	0.045	-0.622	0.534	-0.116	0.060
Conservative	-0.036	0.058	-0.623	0.533	-0.149	0.077
Independent	-0.140	0.043	-3.271	0.001	-0.224	-0.056
Republican	-0.094	0.057	-1.666	0.096	-0.206	0.017
Biblical Literalist	-0.230	0.052	-4.421	0.000	-0.332	-0.128
Church Attendance	0.019	0.009	2.220	0.027	0.002	0.036
Evangelical	0.013	0.048	0.265	0.791	-0.082	0.108
Degree Holder	0.046	0.039	1.195	0.232	-0.030	0.122
MC Age	0.002	0.001	1.817	0.069	-0.000	0.005
MC Age Squared	0.000	0.000	3.318	0.001	0.000	0.000
Woman	-0.186	0.035	-5.383	0.000	-0.254	-0.118
Black	0.079	0.066	1.207	0.228	-0.049	0.208
Hispanic	-0.026	0.061	-0.420	0.674	-0.145	0.094
Other Race	-0.026	0.049	-0.529	0.597	-0.123	0.071
Married	-0.023	0.040	-0.565	0.572	-0.101	0.056
Has Kids	-0.089	0.042	-2.112	0.035	-0.171	-0.006
Income	0.046	0.013	3.621	0.000	0.021	0.070
Rural	-0.143	0.043	-3.286	0.001	-0.228	-0.058
Urban	-0.073	0.040	-1.811	0.070	-0.152	0.006
South	-0.012	0.039	-0.306	0.760	-0.089	0.065

Figure 6: OLS regression with control variables, adding in Moral Foundation scales.

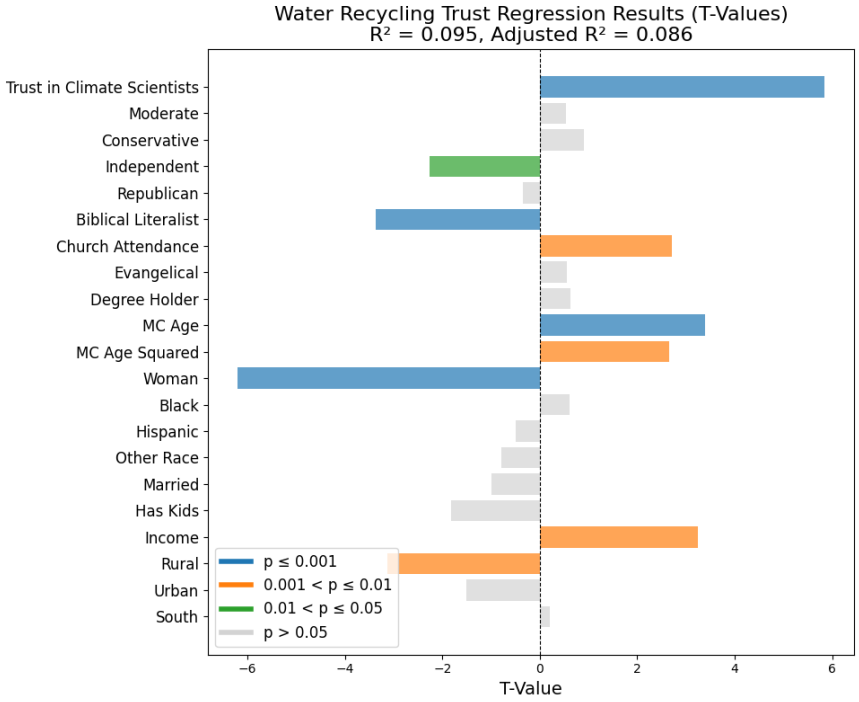
4.5 Climate Change Beliefs

Belief in anthropogenic causes of climate change (Figure 7) and trust in climate scientists emerges as a significant predictor of trust in water recycling (Figure 8). Individuals who have higher levels of trust in climate scientists are more likely to trust local water authorities in their ability to recycle water safely. Interestingly, beliefs about climate change risks, worry about global warming, and perceived personal or future harm from global warming do not appear to significantly influence trust in water recycling. The study finds no statistical significance between experiencing water shortages, perceptions of drought or future drought, believing that climate change is a risk in predicting higher trust in water recycling. Similarly, there is no significant relationship between the level of worry about global warming and trust in water recycling.



IV	coef	std err	t	P>|t|	2.5%	97.5%
Belief in climate change	0.031	0.012	2.523	0.012	0.007	0.056
Moderate	-0.005	0.044	-0.108	0.914	-0.092	0.082
Conservative	-0.007	0.059	-0.125	0.901	-0.122	0.108
Independent	-0.130	0.043	-2.993	0.003	-0.215	-0.045
Republican	-0.046	0.057	-0.808	0.419	-0.158	0.066
Biblical Literalist	-0.180	0.052	-3.460	0.001	-0.283	-0.078
Church Attendance	0.024	0.009	2.764	0.006	0.007	0.041
Evangelical	0.010	0.049	0.202	0.840	-0.085	0.105
Degree Holder	0.027	0.039	0.688	0.491	-0.049	0.102
MC Age	0.004	0.001	3.317	0.001	0.002	0.006
MC Age Squared	0.000	0.000	2.997	0.003	0.000	0.000
Woman	-0.194	0.035	-5.598	0.000	-0.261	-0.126
Black	0.024	0.065	0.366	0.714	-0.104	0.152
Hispanic	-0.052	0.061	-0.840	0.401	-0.172	0.069
Other Race	-0.052	0.050	-1.040	0.298	-0.149	0.046
Married	-0.035	0.040	-0.878	0.380	-0.114	0.044
Has Kids	-0.078	0.042	-1.842	0.066	-0.161	0.005
Income	0.042	0.013	3.338	0.001	0.017	0.067
Rural	-0.131	0.044	-2.981	0.003	-0.217	-0.045
Urban	-0.063	0.040	-1.558	0.119	-0.142	0.016
South	0.003	0.040	0.065	0.948	-0.075	0.080

Figure 7: OLS regression with control variables, adding in belief in climate change from anthropomorphic greenhouse gases.



IV	coef	std err	t	P>|t|	2.5%	97.5%
Trust in Climate Scientist	0.004	0.001	5.846	0.000	0.003	0.005
Moderate	0.024	0.044	0.533	0.594	-0.063	0.111
Conservative	0.052	0.058	0.897	0.370	-0.062	0.167
Independent	-0.098	0.043	-2.258	0.024	-0.183	-0.013
Republican	-0.019	0.057	-0.339	0.735	-0.131	0.093
Biblical Literalist	-0.175	0.052	-3.365	0.001	-0.277	-0.073
Church Attendance	0.023	0.009	2.714	0.007	0.006	0.040
Evangelical	0.026	0.048	0.547	0.584	-0.068	0.121
Degree Holder	0.024	0.038	0.622	0.534	-0.051	0.099
MC Age	0.004	0.001	3.397	0.001	0.002	0.006
MC Age Squared	0.000	0.000	2.654	0.008	0.000	0.000
Woman	-0.214	0.034	-6.208	0.000	-0.282	-0.146
Black	0.040	0.065	0.612	0.541	-0.088	0.167
Hispanic	-0.030	0.061	-0.500	0.617	-0.150	0.089
Other Race	-0.039	0.049	-0.792	0.428	-0.136	0.058
Married	-0.040	0.040	-0.993	0.321	-0.118	0.039
Has Kids	-0.077	0.042	-1.819	0.069	-0.159	0.006
Income	0.041	0.013	3.253	0.001	0.016	0.066
Rural	-0.137	0.044	-3.133	0.002	-0.222	-0.051
Urban	-0.061	0.040	-1.515	0.130	-0.140	0.018
South	0.008	0.039	0.207	0.836	-0.069	0.085

Figure 8: OLS regression with control variables, adding in trust in climate scientists.

4.6 Fear

The results indicate that general fear and fear of environmental disasters do not significantly influence trust in water recycling. The study finds no statistical significance between these fear-related variables and public trust in water recycling initiatives.

5. Discussion

The SPEER23 survey reveals information on several new factors influencing public trust in water recycling initiatives and highlights the complex interplay between socioeconomic, psychological, and moral dimensions. The findings related to standard socioeconomic factors, health and happiness, social factors, moral foundations, climate change beliefs, and fear both align with and extend previous research in this field. By comparing the results of our survey with the existing literature, we can identify areas of consistency and divergence, shedding light on the nuances and context-specific factors that shape public perceptions of water recycling. The following subsections go into each of these areas, exploring the implications of the findings for water management policies, public outreach strategies, and future research directions.

5.1 Standard Socioeconomic Factors

The findings related to standard socioeconomic factors in this survey both align with and diverge from previous research. The positive association between higher income levels and trust in water recycling is consistent with the meta-analysis by Fielding et al. (2019), which found that 17 out of 30 studies reported a similar relationship. However, the lower support for water recycling among women in this survey contradicts the findings of Li et al. (2020), who found that younger, educated women were more accepting of recycled water. This discrepancy highlights the need for further research to clarify the role of gender in shaping attitudes towards water recycling, taking into account potential interactions with other socioeconomic and contextual factors.

The lower levels of trust in recycled water among rural communities compared to suburban areas is a new finding that adds to the existing literature. This result suggests that geographic location and the associated differences in water scarcity experiences, exposure to information, and cultural factors (Guo et al., 2022) may play a significant role in shaping public perceptions of water recycling initiatives. Future research should explore the specific mechanisms through which geographic location influences trust in water recycling and how this information can be used to tailor public outreach and engagement strategies.

5.2 Health and Happiness

The positive associations between self-assessed health, happiness, and trust in water recycling are new contributions to literature. While previous studies have highlighted the importance of considering public health concerns and risk perceptions in the context of water recycling (Fielding et al., 2019), the role of self-assessed health and happiness has not been extensively explored. These findings suggest that individuals with greater overall well-being may be more receptive to water recycling initiatives, possibly due to increased resilience to perceived risks or greater cognitive and emotional capacity to process information about these projects.

The potential interactions between health, age, gender, and other factors mentioned in the results section reveal the complexity of the factors influencing public trust in water recycling. Future research could employ more sophisticated statistical models to disentangle these relationships and identify the most critical determinants of trust in different contexts. Understanding these interactions can inform the development of targeted interventions and communication strategies to build public support for water recycling initiatives.

5.3 Social Factors

The findings related to social capital and conspiracy theory beliefs are consistent with previous research and provide further evidence for the importance of considering these factors in the context of water recycling. The positive association between social capital and trust in water recycling aligns with the findings of Ross et al. (2014), who emphasized the role of social trust and shared identity in shaping public acceptance of recycled water. This result highlights the potential benefits of fostering strong community networks and engagement in building support for water recycling initiatives.

The strong negative influence of conspiracy theory beliefs on trust in water recycling is a concerning finding that merits further attention. As noted by Nkhoma et al. (2021), conspiracy beliefs can fuel perceptions of hidden risks and ulterior motives, eroding trust in the authorities responsible for managing water recycling projects. Addressing these beliefs through targeted information campaigns and trust-building measures may be crucial for the success of water recycling initiatives in some communities.

5.4 Moral Foundations

The significant roles of loyalty and purity moral foundations in shaping trust in water recycling are consistent with the findings of Rozin et al. (2015) and Welsch (2020). The positive association between loyalty and trust in local water authorities suggests that appeals to protecting one's community and in-group identity may be effective in building support for water recycling initiatives. However, the negative relationship between purity concerns and trust in water recycling highlights the need to address the deep-seated psychological barriers related to disgust and contamination fears (Rozin et al., 2015).

These findings highlight the importance of considering moral foundations when communicating about water recycling projects and engaging with the public. Tailoring messages and outreach strategies to align with the prevalent moral concerns in a given community may help to build trust and acceptance of these initiatives. Additionally, emphasizing the safety and purity of recycled water through transparent communication and demonstrations may be essential for overcoming the psychological barriers associated with the purity foundation.

5.5 Climate Change Beliefs

The finding that trust in climate scientists predicts trust in water recycling, while other climate change beliefs do not, is an intriguing result that adds nuance to the existing literature. Previous studies have suggested that individuals who believe in the reality and risks of climate change are more likely to support sustainable water management practices, including water recycling (Dolnicar et al., 2011; Fielding et al., 2019). However, the lack of significant associations between climate change risk

perceptions, worry about global warming, and trust in water recycling suggests that these relationships may be more complex than previously thought.

One possible explanation for these results is that trust in climate scientists may serve as a proxy for a broader trust in scientific expertise and institutional knowledge, which could translate into greater trust in water authorities and their ability to manage recycled water safely. In contrast, general beliefs and concerns about climate change may not necessarily influence attitudes towards specific water management practices, particularly if these practices are perceived as having more localized impacts (Welsch, 2020).

Further research is needed to clarify the relationship between climate change beliefs and support for water recycling initiatives. Future studies could explore the potential mediating role of trust in scientific expertise and examine how the framing of water recycling projects (e.g., as a local solution versus a global climate change adaptation strategy) may influence public perceptions and trust.

5.6 Fear

The lack of significant associations between general fear, fear of environmental disasters, and trust in water recycling is an unexpected finding that contrasts with some previous research. For example, Glick et al. (2019) and Nkhoma et al. (2021) suggested that fear of drought and water scarcity could motivate individuals to support water recycling as a means of ensuring water security. However, the results indicate that generalized fear may not be a strong predictor of trust in water recycling initiatives.

A potential explanation for this discrepancy is that the influence of fear on attitudes towards water recycling may depend on the specific context and framing of the issue. If water recycling is presented as a solution to a salient and immediate threat (e.g., severe drought), fear may indeed motivate support for these initiatives. However, if the risks associated with water recycling itself are emphasized (e.g., contamination concerns), fear may have a negative impact on trust and acceptance. Additionally, research would need to be done to understand the nuance of the context of fear in these situations, as SPEER 2023 only assessed more generalized fear.

6. Conclusion

The SPEER 2023 survey findings highlight the multifaceted nature of public attitudes towards water recycling, influenced by a range of socioeconomic, psychological, and moral factors.

Key findings include:

- Socioeconomic factors such as higher income levels and suburban residence are associated with increased trust in water recycling, while women and rural residents show lower levels of trust.
- Self-assessed health and happiness positively correlate with trust in water recycling initiatives.
- Social capital enhances trust, while strong conspiracy theory beliefs significantly diminish it.
- Moral foundations play a crucial role, with loyalty increasing trust and purity concerns decreasing trust.
- Trust in climate scientists predicts greater trust in water recycling, and general climate change beliefs also positively predict trust in water recycling.

- Contrary to expectations, fear, including fear of environmental disasters, does not significantly influence trust in water recycling.

The survey results highlight the need for integrated approach when designing strategies to build public trust in water recycling initiatives. Water management policies and public outreach efforts should consider a more diverse array of factors influencing public perceptions, including socioeconomic backgrounds, psychological well-being, social dynamics, moral foundations, and trust in scientific expertise.

Transdisciplinary studies are necessary to address these multiple dimensions to better help policymakers and water authorities to develop more effective, targeted approaches to enhance public acceptance of water recycling. This may involve tailoring communication strategies to different demographic groups, addressing purity concerns through education and transparency, leveraging social networks to build trust, and emphasizing the scientific basis for water recycling safety.

Future research should further explore the interactions between these factors and investigate how they may vary across different cultural and geographic contexts. As water scarcity becomes an increasingly important global issue, understanding and addressing the complex beliefs in the public trust in water recycling will be ever more critical for the successful implementation of sustainable water management strategies.

Data and Code Availability

As much as is allowed by the IRB and survey collection agreements, data and code can be made available by contacting speer@ou.edu.

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