Playing 4 the Planet: Exploring the Link Between Gamification User Types and Environmental Consciousness

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Abstract

Sustainable consumption, a key component of the UN Sustainable Development Goals, aims to foster the responsible use of resources for present and future generations. A common tool to promote sustainable consumption is gamification. However, studies show mixed results, indicating that a one fits all gamification approach is not feasible. Tailored gamification, and in particular the use of Gamification User Types (UT), combined with the concept of Environmental Consciousness (EC) offer the opportunity to achieve desired behavior change outcomes. We analyze the relationship between different UTs, and EC based on self-determination theory. An online survey (n=1,010) reveals significant relationships between EC and three of the four intrinsically motivated UTs. Applying goal-framing theory, we argue that tailored gamification can help bridge the motivation-behavior gap in sustainable consumption by combining altruistic and egoistic goals to support behavioral change and promote sustainable practices.

Keywords

Gamification User Types, Environmental Consciousness, Sustainable Consumption.

Introduction

The core idea of gamification is to influence human behavior, attitudes, and other states with game-derived interventions by creating a valuable game-like experience, e.g., fun, satisfaction and immersion (Hamari et al., 2014; Krath et al., 2021; Landers et al., 2018). In general, gamification can be defined as the use of game elements in non-game contexts (Deterding et al., 2011; Huotari & Hamari, 2017). Gamified applications are found mainly in the fields of education, learning, e-commerce, as well as health (Aulia et al., 2022; Koivisto & Hamari, 2019; Tobon et al., 2020). Also, gamification is a promising way to influence motivation for eco-friendly behavior or sustainable consumption (Guillen et al., 2021).

As part of the Sustainable Development Goals (SDGs), sustainable consumption refers to the responsible use of resources to meet the consumption needs of the present without compromising the ability of future generations to meet their own needs. Previous research suggests that gamification can be an effective way to influence motivation for pro-environmental behavior or sustainable consumption (e.g., Fernández Galeote et al., 2021; Guillen et al., 2021; Sharma et al., 2024). However, studies on the impact of gamification on sustainable consumption show mixed results (Krath et al., 2023b). For example, Aulia et al. (2022) found that 16 out of 30 analyzed studies show a strong heterogeneity regarding the usage of gamification to change the impact on sustainable consumption. These results may have occurred due to a lack of consideration of individuals' motivational needs and preferences (Krath et al., 2023b), as it cannot

be assumed that a single gamification design solution is suitable for every person and situation (Koivisto & Hamari, 2019). Therefore, the adaptation of game elements and content to the specific needs of the individual is proclaimed as an emerging research direction of tailored gamification (Klock et al., 2020). Among various characteristics (e.g., gender or age), player typologies have become the most popular concept for tailoring gamification design (Klock et al., 2020; Krath et al., 2023a; Santos et al., 2025). In the context of sustainable consumption, however, another characteristic plays an important role in the player-specific gamification design: Environmental Consciousness (EC). Environmental and social consciousness (Zafar et al., 2024), along with affective and cognitive attitudes toward the environment (Hsu & Chen, 2021), form the basis for individuals' tendency toward sustainable behavior. EC involves specific psychological factors related to an individual's propensity to engage in pro-environmental behaviors and make green decisions (Schlegelmilch et al., 1996). The level of EC influences the sustainable behavior of individuals. Thus, EC influences the relationship between gamification and sustainable consumption outcomes. Tailored game design to promote sustainable consumer behavior should thus consider both the Gamification User Type (UT) and the player's EC. Therefore, our research question (RQ) is:

RQ: How do Gamification User Types influence Environmental Consciousness?

The Hexad framework, developed by Marczewski (2015), categorizes users into six types based on their motivation: Philanthropists, Socialisers, Free Spirits, Achievers, Players, and Disruptors. This model has been validated and linked to personality traits (Kirchner-Krath et al., 2024a; Tondello et al., 2019), but not explicitly to EC. Currently, there are no scientific studies examining the relationship between Hexad UTs and EC. Hence, this is the first study to analyze the relationship between UT and EC. To investigate our RQ, an online survey of 1,010 U.S. citizens was conducted. We first provide a deeper overview of the different UTs according to the Hexad model. We then provide a literature-based analysis of the relationship between gamification and sustainable consumption. It is shown that both UTs and their level of EC play an important role in influencing the success of gamification in sustainable consumption. Based on this, we derive our hypotheses. In the next step we present our survey data (n=1,010) and the results of our analyses to measure the relationship between UTs and EC. Moreover, we develop proposals for a player-type specific design of gamification that consider EC. We conclude with a discussion, limitations, practical and theoretical implications, and an outlook for future research.

Gamification User Types

Being the process of applying game elements and game-design techniques to non-gaming contexts (Deterding et al., 2011; Werbach & Hunter, 2020), gamification is most often used to add an abstraction level on software applications, apps, or websites. The goal of gamification is to influence human behavior, attitudes, and other states by involving humans in game-derived interventions to create a gameful experience and to trigger a certain outcome (Kapp, 2012; Krath et al., 2021). This includes adding elements such as badges, points and leaderboards, but also full gamification in the sense of generating a game-based experience to create immersive environments (e.g., Kapp, 2012). Werbach and Hunter (2020) provide a structure for this in their taxonomy of dynamics, mechanics and components. Components (e.g. points) are used to generate mechanics (competition) and thus create dynamics (emotions). However, studies show that individuals perceive game elements differently (e.g., Tondello et al., 2017). As a result, numerous studies examine how gamification affects different groups of individuals with common attributes or behaviors, focusing on UTs (Hamari & Tuunanen, 2014; Kirchner-Krath et al., 2024b). The resulting UT models aim to capture the differences between the individuals with respect to game elements and applications. For a comprehensive literature review, see Lopez and Tucker (2019).

Based on the self-reported game preferences of Multi-User Dungeon (MUD) players, Bartle (1996) presented one of the first player type models, proposing a classification of four player types: Achiever, Explorer, Socialiser, and Killer. The construct of player types is deeply rooted in gamification research. Hamari and Tuunanen (2014) identify 22 typologies that distinguish players in individual contexts in terms of behavioral psychology, motivational psychology and gaming behavior. Kirchner-Krath, et al. (2024a) take up the types and set up the Archetype model according to Yee (2005), the BrainHex model (Nacke et al., 2014) and the Hexad model (Marczewski, 2015) and systematize them from the perspective of motivation theory. In this context, the authors particularly highlight the Hexad model due to its conceptual considerations based on self-determination theory (Kirchner-Krath, et al., 2024a; Ryan &

Deci, 2017). The self-determination theory (SDT), one of the theoretical concepts often linked to gamification, highlights its effectiveness in motivating users (Guillen et al., 2021). SDT posits that human behavior can be both intrinsically (acting with a sense of volition, i.e. autonomous) and extrinsically (acting with a sense of pressure, i.e. controlled) motivated, depending on the level of the three basic human psychological needs: autonomy, competence and relatedness (Ryan & Deci, 2017). The Hexad model categorizes players into six different types, where four types (Socialiser, Free Spirit, Achiever and Philanthropist) can be assigned to the intrinsic types, one type (Player) to the extrinsic types and one type (Disruptor) to the disruptive types. Similar to Bartle's types, the breakdown of types is based on the axes of (inter)action and environment. Based on their motivation, many authors offer a categorization of game design elements according to these types (Kim, 2015; Marczewski, 2018; Tondello et al., 2017, 2019):

(1) Socialisers: Prefer social interactions, e.g., teams, guilds and friends lists.
(2) Free Spirits: Like autonomy and discovery, e.g., open worlds, exploration, and creative building.
(3) Achievers: Are motivated by challenges and goals, e.g., leaderboards, badges, and missions.
(4) Philanthropists: Value meaning and purpose, such as community goals or helping others.
(5) Players: Respond well to rewards and incentives, e.g., points, levels and virtual currencies.
(6) Disruptors: Seek to innovate and change, e.g., find ways to disrupt the system or challenge others.

These insights aim to make gamification elements more effective by addressing the specific motivations and preferences of UTs. For example, Players tend to prefer external rewards (e.g., winning a prize or earning a voucher), which can increase participation and engagement. For UTs who are intrinsically motivated, gamification needs to provide different types of incentives that appeal to them. Marczewski (2018) points out that these UTs may not be clearly assignable or may even lack any characteristics. Nevertheless, offering elements that are differentiated according to player types provides an opportunity to promote motivation and consequently participation (Krath et al., 2022; Tondello et al., 2019).

Gamification and Sustainable Consumption

Sustainable consumption refers to the responsible use of resources to meet the consumption needs of the present without compromising the ability of future generations to meet their own needs. It is a core objective of the 17 SDGs and aims to balance economic growth, environmental protection, and social well-being (United Nations, 2015) by minimizing waste, reducing carbon footprints, and promoting ethical and environmentally friendly consumption patterns. It spans several areas, including energy and water conservation, green tourism, waste management, sustainable mobility, and consumption of green products (Lim et al., 2025). The concept of sustainable consumption is widely applied in both the public and private sectors. Governments set policies, offer incentives, and conduct awareness campaigns. Businesses adopt sustainable practices such as circular economy models, and corporate social responsibility initiatives. On a personal level, people can contribute e.g., by energy and water conservation, eco-friendly travel, waste management, car sharing, and green product purchase.

Integrating game elements into non-game contexts not only enriches the user experience, but also encourages participation and supports behavior change through incentives and rewards. Some studies show a positive influence of gamification on sustainable consumption (e.g., Lim et al., 2025; Tobon et al., 2020). The interactive nature of gamified activities usually increases user engagement (Xi & Hamari, 2019). Thus, gamification is a promising approach to address those needs with the potential to drive a shift toward sustainable consumption because it generates both intrinsic and extrinsic motivations for routine or everyday human activities. Zhou et al. (2023) find that the playful experience created by gamification is a critical factor in promoting environmentally friendly behavior. Mulcahy et al. (2021) show that gamification significantly improves sustainable behavior outcomes. Other studies show the effectiveness of gamification in promoting sustainable behavior in the context of water conservation (Koroleva & Novak, 2020), eco-driving (Günther et al., 2020), or sustainable tourism (Negruşa et al., 2015). For a comprehensive literature review on gamification and sustainable consumption, see Lim et al. (2025). However, studies on gamifications impact on sustainable consumption show mixed results (Aulia et al., 2022; Krath et al., 2023b). These results may have occurred due to a lack of consideration of individuals' motivational needs and preferences (Krath et al., 2023b). Therefore, the adaptation of game elements and content to the specific needs of the individual is required as part of tailored gamification (Klock et al., 2020). Another key aspect influencing the success of gamification in sustainability is EC, referring to a specific psychological factor related to an individual's propensity to participate in eco-

friendly behavior. This concept includes a person's awareness, attitudes, and beliefs about sustainability (Hsu & Chen, 2021; Schlegelmilch et al., 1996; Zafar et al., 2024). Research suggests that people who are more environmentally conscious are more likely to engage in sustainable behaviors, especially in digital and gamified settings (Mulcahy et al., 2021).

Connecting these concepts, the usage of a typology seems feasible to systematize and customize gamification regarding the individual needs. Among several characteristics (e.g., gender or age), the most popular for tailoring gamification are player typologies (Krath et al., 2023a; Santos et al., 2025). Studies on gamification and sustainability have rarely considered player types as an approach to design gamified interventions. Furthermore, the relationship between UT and EC has not been considered so far. Understanding this relationship could enhance the design of sustainability-focused gamified systems. The present study is the first to analyze this relationship.

Hypotheses Derivation

According to Marczewski (2015) individuals engage with gamification elements differently. For instance, Philanthropists are motivated by altruism, while Achievers seek mastery and challenges. Socialisers prefer collaborative experiences, whereas Free Spirits value autonomy, linking towards the SDT developed by Deci and Ryan (1985). Deriving from this idea, UTs are expected to behave in a certain way regarding their degree of motivation, whether they are intrinsically or extrinsically motivated as well as based on the offered interaction addressing their motivation (Kim, 2015; Santos et al., 2021). Only the Disruptor is motivated by change and domination, being the only UT that was not derived from SDT, but rather from empirical observations of user behavior (Tondello et al., 2019). Individuals who are intrinsically motivated (e.g. Free Spirit, Socialiser, Achiever, Philanthropist) tend to have positive attitudes toward the environment, as environmentalism may align with their personal values. Existing studies suggest that user motivation affects behavior in sustainability contexts (e.g., Lim et al., 2025). For example, Socialisers may be influenced by social norms related to environmental responsibility, while Philanthropists may be intrinsically motivated to engage in eco-friendly behaviors. Since different gamification UTs are driven by different motivations, their levels of EC may also differ. This suggests a potential relationship between UT and EC. Accordingly, we formulate the following hypothesis (H):

H1: *The Gamification User Types significantly predict Environmental Consciousness.*

Individuals who score high in cooperative and altruistic motivations (e.g., Socialisers and Philanthropists) might demonstrate high EC due to their concern for collective well-being. Achievers and Free Spirits may exhibit EC depending on whether sustainability aligns with their goals or autonomy. Free Spirits are motivated by autonomy and self-expression (Lopez & Tucker, 2019; Tondello et al., 2019), as they want to create and explore (Tondello et al., 2016). Free Spirits can be considered a very environmentally conscious type, as many environmental movements align with their values of individuality and creative expression, also taking their consciousness of their surrounding by aiming for autonomy into consideration. Free Spirits may embrace sustainability efforts as part of their personal lifestyle, such as through eco-friendly fashion or sustainable living. Socialisers can become environmentally conscious through social influence in particular. Socialisers want to establish and deepen social relationships (Yue & Guo, 2023). If sustainability and environmental issues are relevant in their social circle, they are likely to adopt these values to fit in or strengthen relationships. Philanthropists are particularly focused on altruistic goals and the well-being of others in general, including people outside their social circle. They are willing to give without receiving, and prefer to be satisfied by sharing their knowledge with others (Yue & Guo, 2023), in alignment with their aim for relatedness and autonomy. Philanthropists are motivated by their own ability to change or improve the situation, so their actions are primarily altruistic. Based on the assumption that Philanthropists act more reflectively and responsibly than other types, for example with the intention of reducing their own carbon footprint or engaging in environmental protection (Ye et al., 2021). People with a high EC who care about the planet and society may be more likely to belong to this UT. Accordingly, we hypothesize:

H2: *Intrinsic User Types such as Achievers, Free Spirits, Socialisers, and Philanthropists have a positive relationship with Environmental Consciousness.*

Contrasting to that, Disruptors are motivated by competition, dominance and control (Lopez & Tucker, 2019). They enjoy exercising power over others and winning. Disruptors may be the least environmentally

conscious as their motivation is usually focused on prioritizing their own needs and not necessarily environmental protection. If present, their EC may be influenced more by a desire to outdo others than by a genuine interest in the planet. Players generally respond positively when rewards or incentives are involved. However, there are usually no extrinsic rewards associated with EC. Therefore, we hypothesize:

H3: *Disruptors have a negative relationship with Environmental Consciousness.*

H4: *Players have no relationship with Environmental Consciousness.*

Research Method

Research Design, Data Collection, and Sample Characteristics

To examine the research question and to test the hypotheses, an online survey was conducted with U.S. citizens using the research platform "Prolific". Within the questionnaire, participants responded to statements assessing their EC, UT, and finally provided demographic information. All responses were recorded on a seven-point Likert scale ranging from 1="strongly disagree" to 7="strongly agree". Established scales from prior literature were employed to measure the constructs: EC was assessed using the green scale by Haws et al. (2014), e.g., "I am concerned about wasting the resources of our planet". Haws et al. (2014) developed their green scale based on existing measures of environmental consumption and environmental consciousness. The authors show that their green scale is strongly related to other measures of environmental consumption and general environmental consciousness. UT was measured using the Gamification User Types Hexad scale by Tondello et al. (2019). We conducted a pretest before the main data collection to ensure the clarity and logical consistency of the questionnaire. The survey took place in May 2024, yielding 1,022 responses. Following data cleaning, participants who failed control or attention-check questions were excluded, resulting in a final dataset of 1,010 valid responses. The Prolific panel has enabled the recruitment of a sample that is diverse in age, gender and education, representing a broad segment of society. Table 1 shows the demographic characteristics of the sample.

Total: 1,010 (100%)	**Percentage**
Gender	
Male	50.7%
Female	47.1%
Non-binary	2.2%
Average Age	39.48 years (SD: 13.3)
Education	
High School or equivalent	31.3%
Bachelor's Degree	45.0%
Master's Degree	13.1%
Other	10.6%

Table 1. Sociodemographic Data

Validity and Reliability

Since all variables were self-reported, our dataset may be subject to common method bias. To assess this, we conducted Harman's one-factor analysis. The results showed that a single factor accounted for 27.0% of the variance, which is well below the 50% threshold. This suggests that common method bias is unlikely to have had a significant impact on our data. We evaluated the validity and reliability of the measures through an exploratory factor analysis (EFA) to identify and confirm the most significant independent factors

Variables		**Items**	**Loadings**	**CA**	**CR**	**AVE**
Environmental Consciousness (EC)		EC I	.884	.948	.952	.769
		EC II	.909			
		EC III	.904			
		EC IV	.847			
		EC V	.861			
		EC VI	.854			
Gamification User Types (UT)	Philanthropist	p1	.731	.831	.741	.422
		p2	.569			
		p3	.539			
		p4	.735			
	Socialiser	s1	.809	.873	.877	.641
		s2	.822			
		s3	.730			
		s4	.838			
	Achiever	a1	.750	.813	.747	.430
		a2	.728			
		a3	.504			
		a4	.610			
	Player	r1	.522	.683	.762	.525
		r2	.857			
		r3	excluded			
		r4	.754			
	Free Spirit	f1	.770	.699	.743	.497
		f2	excluded			
		f3	.782			
		f4	.536			
	Disruptor	d1	.634	.719	.819	.533
		d2	.692			
		d3	.789			
		d4	.793			

Table 2. Validity and Reliability Assessment

(latent variables). The EFA results demonstrated that each observed variable exhibited adequate factor loadings on its respective latent construct (EC and UT). In the course of EFA, "r3" and "f2" were excluded due to cross loadings. To ensure the appropriate selection of variables, we followed established guidelines from the EFA literature (e.g., Conway & Huffcutt, 2003).We employed the maximum likelihood method with varimax rotation. Bartlett's test of sphericity was significant (p<.001), and the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was .917, indicating a "marvelous" factor structure (Field, 2013). We analyzed internal consistency by looking at Cronbach's alpha (CA) and composite reliability (CR), with a recommended criterion of .700 (McCrae et al., 2011; Zait & Bertea, 2011), and evaluated convergent validity using average variance extracted (AVE), with a recommended criterion of .500 (Fornell & Larcker, 1981). Our internal consistency is good for all items except for Player (CA=.683) and Free Spirit (CA=.699) being slightly below the threshold. Convergent validity is acceptable for all items except for Philanthropist (AVE=.422), Achiever (AVE=.430), and Free Spirit (AVE=.497), indicating that these factors may not be sufficiently distinct. Since all estimates are >.400 we conclude that convergent validity is adequate, with room for improvement in the AVE estimates for Philanthropists, Achiever, and Free Spirit (see Table 2).

Results and Discussion

We assigned the participants to the different UTs according to Krath et al. (2023a) to identify dominant traits of UT. This was done by calculating the average scores per UT and then comparing the scores across the 6 UTs. If a person had their high score (e.g., 7) for both Achiever and Philanthropist, that person was assigned to both groups (i.e., double counted). Table 3 shows the distribution of the UTs in our data as well as the EC mean scores and the standard deviation (SD) per UT. Most of the participants have high tendencies for Free Spirits, Philanthropists, Players, and Achievers. Only a few people can be assigned to Socialisers and almost none are Disruptors. An examination of the correlations between the UTs shows that some types are strongly correlated with each other. Also, we observe that Socialisers and Philanthropists appear to have the highest mean EC, while Players and Disruptors have the lowest.

			EC	
UT	Count	Share	Mean	SD
Achiever	306	21%	5.01	1.45
Philanthropist	343	23%	5.10	1.41
Player	342	23%	4.69	1.53
Free Spirit	373	25%	5.08	1.38
Socialiser	101	7%	5.20	1.67
Disruptor	15	1%	4.56	1.73

Table 3. Descriptive Statistics

We conducted a multiple linear regression analysis to assess whether the Hexad User Types significantly predict the level of Environmental Consciousness. This analysis with EC as the dependent variable and UTs as the explanatory variables is significant (F(6,1003)=30.218; p<.001, see Table 4). The adjusted R^2=.148 indicates that the UTs explained 14.8% of the variance. Therefore, we accept our H1 that the UT significantly predicts EC. Moreover, our results show that having higher tendencies in Philanthropist (β=.333, t=5.070, p<.001), Free Spirit (β=.310, t=5.348, p<.001) and Socialiser (β=.091, t=2.281, p=.023) are positively significant in predicting EC. The higher the Philanthropist, Free Spirit or Socialiser tendencies, the higher EC. Philanthropists seem to be the strongest predictors of EC in our data. This supports the assumption that Philanthropists are deeply motivated by altruism and social responsibility, which naturally aligns with EC. They may view sustainability not just as a personal value, but also as a moral duty to protect the planet for future generations. Furthermore, the Achiever UT (β=.042, t=.628, p=.530) does not significantly predict EC in our data. Therefore, we only partially accept H2. Achievers may not be particularly environmentally conscious if it is not their clear goal. If EC is portrayed as a sacrifice rather than a success, it may conflict with their ambitious attitude. Our results show no significant relationship between EC and the Disruptor tendency (β=.044, t=1.201, p=230). Consequently, we reject H3. Disruptors' engagement with environmental issues is likely to be inconsistent and context-dependent. While they may participate in sustainability efforts when framed as a competitive challenge, their focus on personal gain may override environmental concerns unless sustainability offers a clear advantage. However, Disruptors are primarily motivated by change (negative or positive). In this sense, disruptors could also be motivated to create

				95% CI	
Variable	**β**	**t**	**p**	**Lower CI**	**Upper CI**
Philanthropist	.333	5.070	<.001	.204	.462
Socialiser	.091	2.281	.023	.013	.170
Achiever	.042	0.628	.530	-.088	.172
Player	-.160	-3.101	.002	-.261	-.059
Free Spirit	.310	5.348	<.001	.196	.424
Disruptor	.044	1.201	.230	-.028	.115
Constant	1.337	3.898	<.001	.664	2.010
adjusted R^2=.148; F(6, 1003)=30.218; p<.001					

Table 4. Multiple Regression Results

positive change in the world rather than resist sustainability efforts. This clearly warrants further research. We also found that a higher Player tendency leads to a reduced EC (β=−.160, t=−3.101, p=.002). Accordingly, we reject H4.

According to Kirchner-Krath et al. (2024a) the above analyses were not performed on the basis of dichotomous UTs; instead, we treated the UTs as a continuous representation in the form of UT tendencies. Correspondingly, Figure 1 shows the relationship between EC and the continuous representation of the intrinsically motivated UTs Philanthropist, Socialiser and Free Spirit. In this sense, Figure 1 compares the results of all study participants in terms of EC and the level of their respective UT tendency. It shows that the higher the tendency to be a Philanthropist, Socialiser, or Free Spirit, the higher the level of EC.

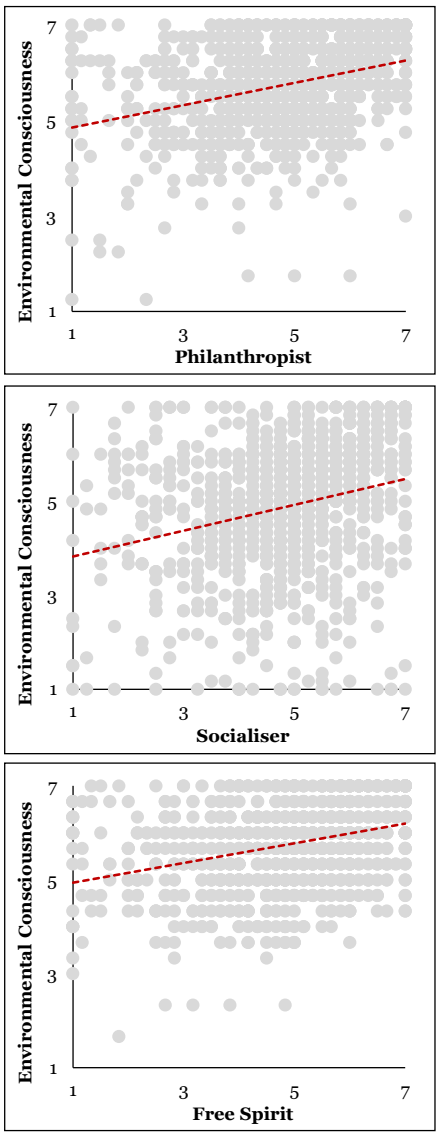

Figure 1. Selected Correlations

Our findings provide insights into the design of gamified, player type-specific applications. Research indicates the usage of certain game elements to address the individual motivational traits of UTs (Klock et al., 2020). For gamified applications that aim to promote eco-friendly behavior, our analysis leads to further insights: We were able to show that EC varies depending on the UT. For UTs with a relatively low level of EC (e.g., Players), the game elements suitable for them (e.g., points, badges, and leaderboards) should be designed to be more egoistic than environmentally (i.e., altruistic) oriented. For example, the gamification elements used could be linked to a personal or monetary benefit rather than social or environmental goals, such as "If you get 100 points, we will plant a tree". However, such motivational interventions alone do not necessarily lead to behavior change (Geng et al., 2017). The separation of egoistic and altruistic incentives can be seen as an important factor in the gap between motivation and behavior with regard to sustainable behavior (Schlaile et al., 2018). Economic, social and convenience factors can interfere with eco-friendly actions, creating a motivation-behavior gap. Environmental motivation is a necessary but insufficient condition for sustainable behavior. According to the goal-framing theory, goals are the key factors that guide behavior (Lindenberg & Steg, 2013). Although egoistic goals may be the primary motivation for behavior, altruistic goals can strengthen or weaken the effects and thus collectively influence behavior (Tang et al., 2020). To achieve the desired behavioral impact, gamified approaches should feature a duality of altruistic and egoistic incentives (Yang et al., 2020). Sustainable behavior may result from the interrelation of this duality (Schlaile et al., 2018; Shaw et al., 2016). For UTs with low EC, egoistic goals (e.g., achieving a certain score) should be integrated into gamified applications to promote sustainable behavior, together with altruistic goals via appropriate game elements. For UTs with high EC, egoistic goals should be included in addition to altruistic, eco-friendly goals.

Conclusion, Limitations, and Outlook

Since different UTs respond differently to sustainability incentives, gamified interventions should be tailored to the UT's preferences and level of EC. In this way, EC plays a key role in determining how effective gamification is in promoting sustainable consumption. Our study contributes to the understanding of these factors by answering the RQ how the UTs influence EC. We show that three of the four intrinsically motivated UT tendencies (Socialiser, Free Spirit, and Philanthropist) significantly predict the level of EC. These UTs are significantly positively correlated with EC in our study. This suggests that the higher the tendency for those intrinsically motivated UTs (Socialiser, Free, Spirit, or

Philanthropist), the higher the level of EC is. This finding may help to design gamification strategies to encourage long-term engagement and positive environmental behavior. In addition, future research should examine whether different dimensions of EC (e.g., personal responsibility vs. collective action) resonate more strongly with different UTs. This could provide deeper insights into these relationships and further refine the understanding of how gamification can effectively promote sustainable behavior. Furthermore, our findings indicate that individuals rarely fit into a single UT, but rather are a mixture of several UTs. Consistent with existing literature, this complexity makes it difficult to design gamification strategies tailored to specific UTs. Instead, we conclude that gamification should be adapted to UT profiles that account for the diversity within individuals, rather than forcing them into specific types. Future research could investigate whether UTs naturally form broader clusters that allow for more scalable and effective customization. Identifying these clusters could help to make gamification more engaging to drive behavior change, especially in fixed groups such as students in a class. However, this approach is less feasible for highly dynamic and anonymous settings with high user fluctuation, such as online shopping. Additionally, the weakness of UTs in terms of stability should also be considered in order to adapt game design to dynamic processes in different contexts. As a solution, we propose to design a gamification approach that implements different game elements that appeal to multiple UTs simultaneously. Since most individuals are a mix of different UTs, this would ensure that there are appealing elements for each UT, making gamification more effective in encouraging sustainable behaviors. However, some studies on the effects of gamification on sustainable consumption show mixed or negative effects (Aulia et al., 2022; Krath et al., 2023b). In line with Krath et al. (2023b), we therefore agree with the customization of game elements to individual needs in the sense of tailored gamification. A flexible, modular design with personalized game paths is then one way to meet individual needs while still appealing to a broad audience (e.g., like in "Minecraft", where players choose to be "builders" or "shooters"). Designing a modular and flexible gamification approach that incorporates a variety of game elements that appeal to different UTs, while also accounting for different levels of EC within each type, is a promising tool to increase motivation for sustainable consumption according to SDT. Nevertheless, the implementation of different goals remains essential to overcome the motivation-behavior gap. Integrating a motivational gamification approach with both altruistic and egoistic incentives, as outlined in goal-framing theory, may help overcome this gap and support the successful transition to a sustainable society.

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