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Research Article

# 'Go with the flow' for gamification and sustainability marketing

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ABSTRACT

This paper explores the potential of gamification for sustainability marketing efforts, examining users' experiences with a gamified app designed to encourage the sustainable energy behavior of turning off electricity switches. Using data collected from 387 participants who partook in a week-long field study using a gamified app, we analyze the interrelationships between flow, customer engagement, value-in behavior, and intentions to perform sustainable behavior and continue use of a gamified app. We show how consumers' gameful experiences via flow enhance engagement with a gamified app, and how this results in enhancing the perceptions of value in performing a sustainable energy behavior. Further, we evidence how the value-in-behavior created by a gamified app not only influence behavioral intentions to perform a sustainable energy behavior, but also intentions to continue using the gamified app. These results provide important theoretical and practical insights as to the potential for gamification to be used for sustainability marketing and how gameful experiences (flow and customer engagement) can transfer to positive perceptions of sustainable behavior (value-in-behavior).

## 1. Introduction

Gamification, the use of game design elements in non-game contexts such as service experiences, to enhance overall value creation and realization for consumers (Huotari & Hamari, 2017; Tanouri, Mulcahy, & Russell-Bennett, 2019), is a relatively new approach being used by marketers to change attitudes and behaviors. Gamification, particularly on smartphone platforms, provides marketers opportunities to engage with consumers, with the industry growing rapidly (Högberg, Shams, & Wästlund, 2019). Marketing scholars have contributed understanding to the effectiveness of gamification across a variety of settings including tourism (Negruşa, Toader, Sofică, Tutunea, & Rus, 2015) and bank marketing (Bayuk & Altobello, 2019). However, a yet to be thoroughly explored or understood area of gamification is in the area of sustainability marketing. This research therefore sets out to contribute new theoretical and practical insight into how gamification can be used to enhance sustainability behaviors in the area of household electricity usage. We aim to provide this insight by examining the interrelationships between flow, customer engagement, and value-in-behavior, three constructs which are noted for providing insight into gamification but not yet thoroughly investigated for sustainability marketing efforts.

Sustainability marketing seeks to encourage consumer behavior to perform actions that result in decreases in adverse environmental impacts and use of resources (White, Habib, & Hardisty, 2019). Recently, there have been calls for understanding how sustainability marketing efforts can "shift" organizations and consumers towards sustainable behavior, using feelings, emotions and cognition (White et al., 2019), and address the issue of the attitude-behavior gap (Koroleva & Novak, 2020). Gamification uses game design elements to enhance emotions and cognition (Harwood & Garry, 2015), and past research has shown tentative evidence of its effectiveness in encouraging sustainable behavior for water conservation (Koroleva & Novak, 2020), eco-driving (Günther et al., 2020) and sustainable tourism practice (Negruşa et al., 2015). Although such evidence exists of gamification being useful for sustainability marketing, no studies have yet provided an understanding of how the gamified experience can manifest into value creation, which is a central tenet of gamification (Huotari & Hamari, 2017). Therefore, providing new evidence of how gamification experiences create value, which enhance sustainable behavior performance, and extending this into other priority areas of sustainability may help address such issues as the attitude-behavior gap. Further, in providing this insight, the current study will shed new theoretical insight and empirical evidence to

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demonstrate the utility of gamification to provide experiences which create value for sustainability marketing efforts.

Understanding how gamification can be used to encourage sustainability behavior, and more specifically energy efficiency, is important as reducing emissions within the energy sector is critical due to its contribution to climate change (Beck, Chitalia, & Rai, 2019). Dire environmental impacts resulting from human behavior have encouraged marketers to find new approaches, such as gamification, to encourage sustainable household energy behaviors. These behaviors are actions taken by consumers such as using ceiling fans rather than air conditioning appliances, using cold water rather than hot water for clothes washing, and turning off electricity switches, which can decrease the adverse environmental impacts of electricity demand and production which uses fuels such as coal and diesel (Höök & Tang, 2013). However, as identified in recent systematic reviews of gamification for sustainability (Beck et al., 2019; Johnson, Horton, Mulcahy, & Foth, 2017; Morganti et al., 2017), gamification used to encourage sustainable energy behaviors is greatly understudied and more research is needed.

Experiences of gamification are known to create desired states such as flow (Berger, Schlager, Sprott, & Herrmann, 2018) and engagement (Leclercq, Hammedi, & Poncin, 2018), but it is not thoroughly understood how these are connected in both the gamification and sustainability marketing literature. Flow is important as it provides a framework to understanding gameful experiences, thus aligning gamification's purpose of leveraging game design elements to improve consumer experiences (Hamari & Koivisto, 2014). Customer engagement is also important, but is distinctly different to flow, as it provides insights to how gamified experiences and increased interactions transition to influencing marketing outcomes such as value creation (Harwood & Garry, 2015; Hollebeek, Glynn, & Brodie, 2014). Examining the potential relationship between flow and customer engagement is also important as scholars suggest a need to understand how gameful experiences (i.e. flow) contribute to affective, cognitive and behavioral outcomes (i.e. customer engagement) (Hofacker, De Ruyter, Lurie, Manchanda, & Donaldson, 2016). Thus, although the literature suggests that relationships may exist between flow and customer engagement, the gamification and sustainability marketing literature has yet to thoroughly investigate the relationships between these two important concepts.

Another important consideration for gamification in sustainability marketing is the creation of customer value (Huotari & Hamari, 2017; Mulcahy, Russell-Bennett, & Iacobucci, 2020; Mulcahy, Zainuddin et al., 2020). In sustainability marketing, value can be unique in that marketing efforts often attempt to enhance the value-in-behavior of a sustainable behavior. The notion of value-in-behavior is a relatively new theoretical perspective to value in the literature and is yet to be examined in gamification (Gordon, Dibb, Magee, Cooper, & Waitt, 2018). This is somewhat surprising given that recent definitions of gamification are underpinned by value creation (Huotari & Hamari, 2017). As sustainability marketing studies in gamification are yet to investigate flow and customer engagement simultaneously to determine their role as antecedents for value creation toward sustainable behavior, this leaves a considerable gap in understanding how a consumer's experience of gamification influences value creation. This research therefore aims to examine how gamified experiences of flow and customer engagement contribute to value-in-behavior for the sustainability behavior of household energy efficiency.

The remainder of this paper is structured as follows. First, the gamification and sustainability literature is reviewed, followed by flow, customer engagement, value-in-behavior, and sustainability and gamification outcomes. Next, the conceptual model is presented with justification provided for the hypothesized relationships. The method and results are then outlined. A discussion of the findings and implications for theory and practice then follows. The paper concludes by outlining opportunities for future research.

## 2. Literature review and conceptual development

### 2.1. Gamification and sustainability marketing

Being characterized as a gameful experience, gamification is a hedonic tool for productivity which aims to motivate the user towards completing utilitarian goals (Hamari & Koivisto, 2015a). This emphasizes the value of gamification to incentivize the habituation of behaviors which possess a less hedonic (enjoyable) nature (Hamari, 2013). Research shows that the enactment of sustainable behavior can be influenced by enhancing emotional, symbolic, and social benefits. Hwang and Griffiths (2017) demonstrate that hedonic value and symbolic value can influence behavioral intentions to use a collaborative consumption service. White et al. (2019) suggest that sustainable behavior can also be guided by an individual's principles, values, beliefs, and adherence to social norms. Consumers can also experience emotional responses such as pride, guilt, excitement, disappointment, confidence, and distress when trading-off between sustainability, hedonic value, and utilitarian value within sustainable product decision-making contexts (Luchs & Kumar, 2017).

Though multiple motivators have been shown to influence the development of energy efficient sustainable behaviors, research by Gordon et al. (2018) identifies that current perspectives in the value literature are insufficient to adequately explain the value which individuals perceive towards enacting sustainable behaviors such as energy efficiency. As gamification uses game design elements which enhance value creation (Huotari & Hamari, 2017), a need therefore exists to understand how value can be enhanced towards enacting sustainable behavior using gamification.

In recent systematic reviews by Beck et al. (2019), Johnson et al. (2017), and Morganti et al. (2017) there is also consensus that gamification as a tool for sustainability efforts is under-researched. Further, as Johnson et al., (2017) review points out of studies of gamification for sustainability, many have key limitations such as small sample sizes, do not regularly use validated measures and controls, and merely report descriptive statistics. This research therefore sets out to address recent calls for research in gamification for sustainability.

To address the gaps in the gamification used for sustainability marketing, this research explores a model underpinned by key gamification and marketing constructs, including flow, customer engagement and value-in-behavior. As identified in Table 1, no studies in gamification or marketing have collectively drawn together these constructs to gain insights within the setting of sustainability marketing. Many studies in gamification and marketing are varied in their foci, with most focusing on only one of the three key constructs used in the current study. Thus, whilst research captures some element of the constructs used in the current study, they have yet to push further to include all elements and contribute a greater understanding of how the experience of gamification transfers into influencing the judgement and performance of sustainable behaviors. Next, the constructs of flow, customer engagement, and value-in-behavior are defined and reviewed.

### 2.2. Flow

Flow is the first construct which underpins this study's investigation of gamification for sustainability marketing. Flow can be defined as a psychological state of energized focus, intense involvement, and enjoyment – often referred to as the optimal experience. Flow can occur when an activity is optimally arousing, thereby making engagement satisfying and pleasurable, which encourages intrinsic motivation to continue engagement (Csikszentmihalyi, 1990). Gamification aids in establishing flow experiences due to its ability to emulate the rewarding

**Table 1**
Chronological overview of related sustainability-orientated gamification studies.

| Author(s)/Year | Flow | Customer Engagement | Value | Behavioral intentions for sustainable behavior | Behavioral intentions for continued gamified app use |
|---|---|---|---|---|---|
| Orland et al. (2014) | | | | Y | |
| Rai and Beck (2017) | | | | Y | |
| Mulcahy et al. (2018) | | | | Y | |
| Gatti, Ulrich, and Seele (2019) | | Y | | Y | |
| Günther et al. (2020) | | | | Y | |
| Koroleva and Novak (2020) | | | | Y | |
| Mulcahy, Russell-Bennett et al. (2020) | | | Y | Y | |
| Neubig et al. (2020) | | | | Y | |
| Oppong-Tawiah et al. (2020) | | | Y | Y | |
| **Current Study** | **Y** | **Y** | **Y** | **Y** | **Y** |

characteristics of play (Hamari & Koivisto, 2014). Continued interaction with game design elements requires concentration and the undertaking of challenges to stretch one's skills, which results in users experiencing a state of rewarding and enjoyable flow. In the literature, studies have provided evidence for flow being a useful construct for understanding the "gameful" experience of gamification and how it increases commercial marketing outcomes (Berger et al., 2018; Harwood & Garry, 2015). For instance, the study of Berger et al. (2018) finds gamification-induced flow experiences can enhance consumers' self-brand connections.

In the current study, flow is conceptualized as a multidimensional construct, which has been widely established and supported in gamification and gamification related literature (Hamari & Koivisto, 2014; Hamari et al., 2016; Hou & Li, 2014; Perttula, Kiili, Lindstedt, & Tuomi, 2017). In particular, the systematic review of the related area of serious games by Perttula et al. (2017) emphasizes the need for multidimensional approaches. In gamification, the Dispositional Flow Scale-2 (DFS-2), which conceptualizes flow as having nine dimensions, has shown to be particularly useful for understanding flow in gamification (see Hamari & Koivisto, 2014). There have also been suggestions in gamification research as to ways to categorize the nine flow dimensions into two distinct categories, conditions and outcomes. Since this structure of flow dimensions has been suggested to exist in gamification, it important to empirically test this theorized structure (Hamari & Koivisto, 2014). Next, we introduce each category of flow and their related dimensions and outline their relevance and application to gamification.

The first category of flow dimensions are conditions, (autotelic experience, challenge/skill balance, clear goals, feedback, and control), which are associated with obtaining mastery over the gamified activity (Hamari & Koivisto, 2014). For example, flow conditions may be generated when a user finds the gamified activity intrinsically rewarding and enjoyable, referred to as an autotelic experience. Flow conditions can be generated by users having their skills stretched by undertaking gamified challenges (e.g. progressively harder game levels), having clear goals to achieve success (e.g. game objectives), receiving feedback regarding performance (e.g. ratings, points, and badges), and being able demonstrate control over their experience (e.g. developing sufficient skills to minimize the possibility of failure).

The second category of flow dimensions are outcomes of flow experience (merging of action-awareness, concentration, loss of self-consciousness, and time transformation) which focus on the psychological outcomes which characterize the flow experience (Hamari & Koivisto, 2014). Merging of action-awareness occurs when the user feels that their actions are effortless and automatic. Concentration occurs when limited cognitive resources are available to process information outside the gamified activity. Loss of self-awareness arises when the user loses their concern for how their self is presented to others while engaging with the gamified activity. Lastly, users may also lose their perception of time during flow experiences within gamification, with perceived time passing more quickly or slowly.

### 2.3. Customer engagement

The second key construct of this research is customer engagement, which is defined as a "psychological state that occurs by virtue of interactive, cocreative customer experiences with a focal agent/object [e.g., a gamified technology] in focal service relationships … it is a multidimensional concept subject to a context- and/or stakeholder-specific expression of relevant cognitive, emotional and/or behavioral dimensions" (Brodie, Hollebeek, Jurić, & Ilić, 2011, p. 260). Customer engagement has shown to be an important explanatory construct, typically for smart home technology (Mulcahy, Letheren, McAndrew, Glavas, & Russell-Bennett, 2019) and areas such as online brand communities (Islam & Rahman, 2017; Kaur, Paruthi, Islam, & Hollebeek, 2020; Thakur, 2019), and we seek to extend this into gamification for sustainability marketing.

Gamification can assist the creation of customer engagement as it provides a platform for users to repeatedly interact with, enabling the development of long-term commercial or non-commercial relationships with the organization, with such relationships being interactive and cocreative (Brodie et al., 2011). In commercial retail contexts, gamifying online shopping experiences through competition has been suggested to enhance customer engagement, which can encourage online purchases (Insley & Nunan, 2014). In addition, Harwood and Garry (2015) demonstrate that gamification helps shape the customer engagement experience within brand communities, which leads to customer engagement emotions and behaviors being developed, culminating in purchase and loyalty outcomes. Gamification has been demonstrated to produce psychological states which influence customer engagement, which subsequently influences purchase behavior outcomes (Eisingerich, Marchand, Fritze, & Dong, 2019).

In the literature, customer engagement has been consistently conceptualized as a three-dimensional construct (Brodie et al., 2011; Hollebeek et al., 2014; Mulcahy et al., 2019) with cognitive, emotional, and behavioral dimensions. Cognitive engagement includes the focusing of attention or engrossment within the gamified object (Suh, Wagner, & Liu, 2018). Emotional engagement involves feelings of positivity and enjoyment when engaging with a gamified object (Berger et al., 2018; Harwood & Garry, 2015). Behavioral engagement occurs when a user expends energy, effort, and time during an interaction (Hollebeek et al., 2014), such as towards a gamified object. Therefore, consistent with recent research (Mulcahy et al., 2019), customer engagement will be conceptualized within this study within three dimensions – cognitive, emotional, and behavioral engagement, and like flow will be measured as a multidimensional and hierarchical construct.

### 2.4. Value-in-behavior

The third construct used for the current study is value-in-behavior, an alternative view to theorizing and conceptualizing value which has recently emerged in the literature to measure the benefits consumers perceive when performing pro-social behaviors (Gordon et al., 2018).

The inclusion of value-in-behavior is supported by the gamification literature, for instance Huotari and Hamari (2017) define gamification as a value creating interaction. Gordon et al. (2018) propose that value-in-behavior consists of five dimensions, functional, economic, emotional, social and ecological value. In a sustainability setting, functional value refers to whether energy efficient behavior is easily embedded and controlled within daily routines (Gordon et al., 2018). Economic value considers the cost-benefit of engaging within a behavior (Gordon et al., 2018). Emotional value is intrinsically motivated and refers to engaging within a behavior to attain an emotional experience (Gordon et al., 2018). Social value refers to the perceived influence the behavior has upon others and potential status implications (Gordon et al., 2018). Lastly, ecological value is identified when perceiving the positive environmental effect of undertaking the behavior (Gordon et al., 2018).

While other constructs of value creation have been empirically tested and validated, such as the value-in-use derived from interacting with the gamified object (Molinillo, Japutra, & Liébana-Cabanillas, 2020; Mulcahy, Russell-Bennett et al., 2020), value-in-behavior is yet to be applied within gamification due to the construct's recent conceptualization. In addition, value-in-behavior is yet to be validated hierarchically as a second-order construct. This is despite evidence from studies adopting a value-in-use perspective that the hierarchical measurement of the creation and experience of value is theoretically and empirically practical (Tanouri et al., 2019). Therefore, like flow and customer engagement, which have been conceptualized as hierarchical and multidimensional constructs, value-in-behavior will also be conceptualized in this manner. This extends the recent work of Gordon et al. (2018) who conceptualize value-in-behavior as a single-order construct. Value within gamification is commonly conceptualized at a single-order level (Mulcahy, Russell-Bennett et al., 2020), therefore the use of hierarchical and multidimensional modelling within this study moves beyond extant literature to provide richer insights into value created via gamification. We therefore propose that the five first-order value dimensions will accumulate into an overall perception of value-in-behavior at a second-order level. Next, the sustainability and gamification outcomes are defined to finalize the conceptual development for the current study.

### 2.5. Behavioral intentions for sustainable behavior and continued gamified app use

In the current study, behavioral intentions to perform a sustainable behavior and continue to use the gamified app function as the dependent variables within the conceptual model. The inclusion of sustainability and gamification outcomes was appropriate for the following reasons. Gamification studies often only assess one behavioral outcome of gamification, for example, behavioral intention to continue using the gamified object (Hamari & Koivisto, 2015a; Harwood & Garry, 2015) or behavioral intention to engage within pro-social behavior (Mulcahy, Russell-Bennett et al., 2020; Mulcahy, Russell-Bennett, Zainuddin, & Kuhn, 2018; Rai & Beck, 2017). This is somewhat limiting for gamification for sustainability marketing, as continued use of the gamified app (gamification outcome) and performance of the sustainable behavior (sustainability outcome) are both desired. One notable study which undertakes a similar approach is Hamari and Koivisto (2015b) who assess both behavioral outcomes, however this study was conducted in relation to exercise and not sustainability behavior. A need therefore exists for further assessment of dual behavioral outcomes of gamification in relation to intentions to continue using the gamified object and to adopt energy efficient behavior.

## 3. Conceptual model and hypothesis development

The affect-as-information theory (Albarracín & Kumkale, 2003; Bosmans & Baumgartner, 2005; Schwarz & Clore, 1983) underpins the conceptual model's network of relationships presented in Fig. 1, suggesting that the feelings (e.g. flow and customer engagement) regarding a gamified app provide a source of information about sustainable behavior (value-in-behavior and behavioral intentions to perform sustainable behavior). The following sections outline the hypotheses tested in the current study, supported by previous literature and affect-as-information theory.

### 3.1. Flow relationships (H1-H2)

H1 proposes that flow will have a significant direct influence upon customer engagement. It could be suggested that as a consumer becomes more involved and engrossed within a gamified app (i.e. flow state), they are subsequently more likely to become focused (cognitive engagement), enjoy using the app (emotional engagement), and use the app over competing alternatives (behavioral engagement). This is supported by gamification research which demonstrates concepts related to those of flow affecting engagement (Hamari et al., 2016), and flow impacting dimensions of customer engagement (Berger et al., 2018). For instance, Hamari et al. (2016), found that the flow related dimensions of challenge and skill significantly influenced engagement and immersion. Whereas, Harwood and Garry's (2015) qualitative gamification study specifically suggests that flow generates greater levels of customer engagement emotions. Harwood and Garry's (2015) findings are echoed and extended by Berger et al. (2018) and Vitkauskaitė and Gatautis (2018) who demonstrate links between flow and cognitive and emotional engagement. Gatti et al.'s (2019) study also found that participants playing a sustainability simulation game experience performative flow and develop emotional engagement. It therefore appears

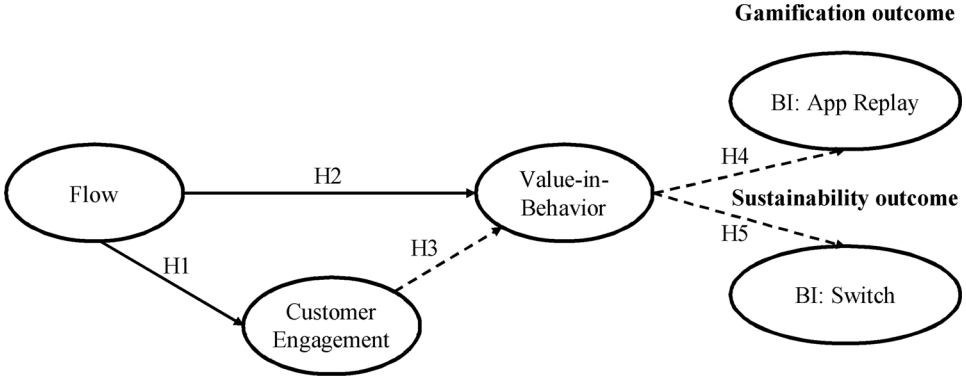


**Fig. 1.** Conceptual Model of Flow, Customer Engagement and Value-in-Behavior.
Note: Dotted lines indicate indirect effects, BI = behavioral intention.
All constructs and interrelationships shown at higher order to aid interpretation.

that there is considerable prior empirical evidence to suggest a link between flow and customer engagement could exist.

Additional support for the influence of flow on customer engagement can also be drawn from affect-as-information theory (Schwarz & Clore, 1983). As flow is a mental state in which consumers feel arousal, intense involvement and enjoyment, it is likely that this will transfer positively to customer engagement. Drawing from the tenets of affect-as-information theory, this is most likely to occur from affective arousal, whereby the intensifying nature of flow will lead to positive reactions and judgmental evaluations (Bosmans & Baumgartner, 2005). Thus, as flow intensifies it could be theorized that individuals' reactions and judgements of their engagement also positively increase. In summary, based upon evidence drawn from the prior literature and theorizing from affect-as-information theory, we hypothesize:

**H1**. Flow will have a direct positive association with customer engagement.

Next, we propose that flow will have a direct influence upon value-in behavior (H2). We suggest that as the consumer becomes fully involved (i.e. in a state of flow) within the gamified app, the strength of flow will likely influence the value perceived towards the encouraged sustainable behavior. Interaction and immersion, key elements underpinning flow, have shown to positively influence value creation in social media environments (Carlson, de Vries, Rahman, & Taylor, 2017; Hamilton, Kaltcheva, & Rohm, 2016). For example, Hamilton et al., (2016) study demonstrates that immersion (an aspect of flow) in social media has a significant relationship with customer value. Other studies have shown more specific links between flow and dimensions of value such as Jiao, Gao, and Yang (2015), who show that flow can influence social and content value. More closely related to the current area of study, Mulcahy, Zainuddin et al., 2020 gamification study demonstrates a significant relationship between the flow related concept of involvement and value. Studies have also shown aspects of flow, such as positive affect (enjoyment) to influence hedonic value with gamified or game experiences (Chang, 2013; Högberg, Ramberg et al., 2019; Johnson & Wiles, 2003).

We also again draw support for our hypothesized relationships from affect-as-information theory (Schwarz & Clore, 1983). Another key aspect of affect-as-information theory is that affective reactions provide an embodied source of information and the 'value' of an objective (Clore & Storbeck, 2006), which within the current study is the value in performing a sustainable behavior. Thus, transferring this theorizing to the current study, it could be suggested that as flow intensifies, that this will enhance the perceptions of value-in-behavior. Collectively drawing this theoretical justification and the review of evidence from prior studies, we therefore suggest:

**H2**. Flow will have a direct positive association with value-in-behavior.

### 3.2. Mediating role of customer engagement (H3)

In H3, we propose the first mediated relationship in the conceptual model, whereby flow will have an indirect influence on value-in-behavior via customer engagement. The mediating role of customer engagement has been validated across several settings including online brand communities (Islam & Rahman, 2017) and smart technology (Mulcahy et al., 2019), and we extend this thinking into gamification. Mulcahy et al. (2019) for example indicate that the impact of consumers' technology readiness on intentions to adopt smart technology is mediated by customer engagement. Rather et al.'s (2019) study also suggests that customer engagement can mediate relationships.

For customer engagement to successfully mediate the relationship between flow and value-in-behavior, customer engagement must also possess a significant direct influence upon value-in-behavior. As such, H3 subsumes the direct influence of customer engagement on value-in-behavior. As a consumer becomes cognitively, emotionally, and behaviorally engaged within a gamified app, this is likely to enhance the perceived value of the sustainable behavior. The broader services marketing literature provides evidence that customer engagement will enhance value-in-behavior with studies such as Jaakkola and Alexander (2014) demonstrating customer engagement to increase value creation. The gamification literature also provides support for the expected relationship between customer engagement and value-in-behavior. For instance, findings by Leclercq, Poncin, and Hammedi (2017) evidence that value created within gamification relates to customer engagement. In additional support for the customer engagement and value-in-behavior relationship, Leclercq et al., (2018) study demonstrates that the inclusion of game mechanics enhances customer engagement and subsequently value creation.

We also draw support for the mediating role of customer engagement for the flow and value-in-behavior relationship from the affective reaction aspect of affect-as-information theory (Schwarz & Clore, 1983). If the individual's affective reaction to the gamified app (e.g. flow) leads to improved reactions (customer engagement) as suggested in H1, further extending on affect-as-information theory it could be argued that these processes lead to enhanced persuasion of the gamified app and reflective processing of information by the user relating to the value of sustainable behavior (Albarracín & Kumkale, 2003). More simply, the reaction to the gamified app, flow, leads to positive judgements of the interactions with the app (customer engagement) culminating in positive evaluations about the information provided about sustainable behavior (value-in-behavior). From the review of prior studies suggesting a mediating role of customer engagement and our theorizing based upon affect-as-information theory, we suggest the following:

**H3**. Customer engagement will have a mediating role on the flow and value-in-behavior relationship.

### 3.3. Mediating role of value-in-behavior (H4-H5)

Drawing from the customer value-loyalty framework (Brodie, Whittome, & Brush, 2009), and the quality-value-loyalty chain (Parasuraman & Grewal, 2000), we suggest that the influence of customer engagement on behavioral intentions, which is often used as a proxy for loyalty, will be mediated by customer value. This is because in these frameworks, and those which draw from them, suggest customer value mediates loyalty relationships. For example, Brodie et al., (2009) study found that service brands' impact on loyalty was mediated by customer loyalty. Indeed, multiple studies in a range of different settings and different relationships such as 'coolness' and attitude to a product (Im, Bhat, & Lee, 2015) and service quality and brand equity (He & Li, 2010), have found customer value to play a mediating role.

For value to be a successful mediator between customer engagement and behavioral intentions, value should possess a significant direct influence upon behavioral intentions. As such, H4 and H5 subsumes the direct influence of value-in-behavior on both behavioral intention outcomes. In regard to the proposed positive direct association between value-in-behavior and behavioral intentions to replay a gamified app, value has been demonstrated to be a predictor of loyalty within the broader marketing literature (Parasuraman & Grewal, 2000), supporting the suggested relationship between value-in-behavior and behavioral intentions. For instance, Ozturk, Nusair, Okumus, and Hua (2016) propose that value is positively related to continued use of mobile hotel booking services. In more related settings to the current study, research on gaming has shown value to positively influence play continuance intentions (e.g. Molinillo et al., 2020; Rezaei & Ghodsi, 2014). Gamification studies also provide evidence for a link between value and use continuance intentions. For instance, Högberg, Ramberg et al., 2019 study shows hedonic value being related to continued intention to engage with gamified experiences. In further support, Sigala (2015) demonstrates that experiential value can be generated within a gamified

tourism platform, positively influencing behavioral outcomes such as continued user interaction and engagement.

In regard to the proposed positive direct association between value-in-behavior and behavioral intentions to perform an energy efficient behavior, various studies outside (Gordon et al., 2018; Zainuddin & Gordon, 2020) and inside (Mulcahy, Zainuddin et al., 2020; Tanouri et al., 2019) of gamification demonstrate that value can be created to influence non-commercial behaviors. In light of such findings, we suggest value-in-behavior influences behavioral intentions to performing a sustainable behavior. For example, Gordon et al., (2018) study suggests that value-in-behavior can predict self-reported energy efficient behavior. From a gamification perspective, studies display strong support for value-in-behavior to influence behavioral intentions to perform energy efficient behavior. Mulcahy, Zainuddin et al., 2020) study evidences that transformative value can influence behavioral intentions to perform well-being behavior. Further, Tanouri et al., (2019) study of transformative gamification services for wellbeing evidences that value can influence brand loyalty towards well-being behaviors.

Drawing on affect-as-information theory, consumers are likely to transfer their positive engagement with the gamified app to perceptions of value in a sustainable behavior, which in turn enhances both intentions to continue using the gamified app (in line with customer engagement) and likelihood to perform the sustainable behavior (in line with value-in-behavior). Consistent with this theorizing and prior empirical studies' suggestion of value as a mediating variable, we propose the following:

**H4**. Value-in-behavior will mediate the relationship between customer engagement and behavioral intentions to replay a gamified app.

**H5**. Value-in-behavior will mediate the relationship between customer engagement and behavioral intentions to perform an energy efficient behavior.

## 4. Method

This study comprises of both subjective data (i.e. survey) and objective data (duration of gameplay recorded) collected from a field study. A sample of 387 participants was sourced via social media online recruitment. Participants were required to complete screening questions to ensure they were aged 18 years or above, lived in Australia, and had access to a smartphone or mobile tablet device. The sample was largely female (78.6 %), aged between 18–39 years (96.4 %), were employed full-time (36.4 %) and lived with two other people (25.8 %). This is consistent with prior gamification studies, which have shown similar skews for gender and age (for example, Hamari & Koivisto, 2015a; Mulcahy, Russell-Bennett et al., 2020). Within a pre-gameplay Qualtrics survey, participants completed screening questions and registered to participate within the study. After this survey, participants were emailed directions to download and play the gamified app, "Reduce Your Juice", on their personal smartphone or mobile tablet device. After the one-week gameplay period, participants completed a post-gameplay survey. Using a cross-sectional research design is consistent with prior gamification literature (Hamari & Koivisto, 2015a, 2015b; Hamari, 2013; Mulcahy et al., 2018).

### 4.1. Gamified app

"Reduce Your Juice" contains various mini-games which each target different sustainable behaviors (e.g. turning off electricity switches or using the clothesline rather than the clothes dryer). Participants had access to only one mini-game within this study, which was called "Power Raid". The objective of this game is to turn off electricity switches, and the behavior is gamified as the user earns points, badges, and trophies for turning off switches and completing achievements (refer to Fig. 2 for screenshots of gameplay). If the user fails to turn off the switch before it reaches the red line, the 'juice' bar fills incrementally. The game ends when the 'juice' bar is filled due to numerous switches not being turned off in time.

### 4.2. Instrument development

All items used within the post-gameplay survey were adapted from previously validated scales. Flow is conceptualized as a hierarchical and multidimensional construct and was measured via the 36 item DFS-2 scale from Jackson and Eklund (2002) on a five-point scale. This study aims to build upon the modelling of the nine flow dimensions proposed by Hamari and Koivisto (2014), who modelled flow as a second-order construct and proposed that the flow dimensions can be divided into two categories within gamification – dimensions which are conditions and outcomes of flow experience. We extend on the work of Hamari and Koivisto (2014), whose findings and suggestions point out that the second order dimensions of conditions and outcomes are highly correlated, evidence pertaining that they cumulate into overall flow. Further, we address Hamari and Koivisto's (2014) call for finding further evidence pertaining to the relationships between the components of flow by understanding how they may extend into a higher order approach which could give greater theoretical parsimony and utility as evidenced in prior gamification and marketing studies which have used hierarchical approaches (see Mulcahy et al., 2019; Tanouri et al., 2019).

Customer engagement is conceptualized as a hierarchical and multidimensional construct and was measured using a 24-item, five-point Likert scale. Cognitive (11 items, made up of the sub-dimensions of conscious attention and absorption) and emotional engagement (10 items, made up of the sub-dimensions of dedication and enthusiasm) was measured using a validated scale developed by Abbasi, Ting, Hlavacs, Costa, and Veloso (2019). Three items measuring behavioral engagement were derived from the CBE scale developed by Hollebeek et al. (2014) as the scale more accurately assessed how participants engaged with the gamified app. Value-in-behavior is conceptualized as a hierarchical and multidimensional construct and was measured using a collection of validated value dimension scales assessing 21 items, with each item being measured on a five-point scale. Both behavioral intention scales used two items adapted from the literature (Cronin, Brady, & Hult, 2000).

### 4.3. Common method bias

The current study mitigated the impact of common method bias on the results prior to the implementation of the survey in the following ways. First, as suggested by Podsakoff, MacKenzie, Lee, and Podsakoff (2003), a different range of responding options in addition to and question randomization was used throughout the survey to minimize bias. Second, after the completion of the survey, a Harman's single-factor test found that bias did not have a major impact, as the percentage of explained variance explained was 33.2 %, well below the recommended threshold (< 50 %). Thus, common method bias did not considerably impact the results of the study.

### 4.4. Controls

To enhance the study's rigor, several variables were used as covariates in the analysis to control for confounding factors, including participant income, reported bill size, gender, attitudes towards energy use, and total gameplay duration (Bayuk & Altobello, 2019; Eisingerich et al., 2019; Mulcahy, Russell-Bennett et al., 2020; Rai & Beck, 2017). The decision to control for these covariate variables was based upon the findings of prior literature, which suggest these have important impacts on sustainability behavior. Gameplay duration was a unique inclusion as it was collected from the data analytics of the gamified app used by participants. This is a strength of the study as it also provides insights into whether increases in usage impact the key constructs within the study but also mitigates its impact on the relationships and providing an

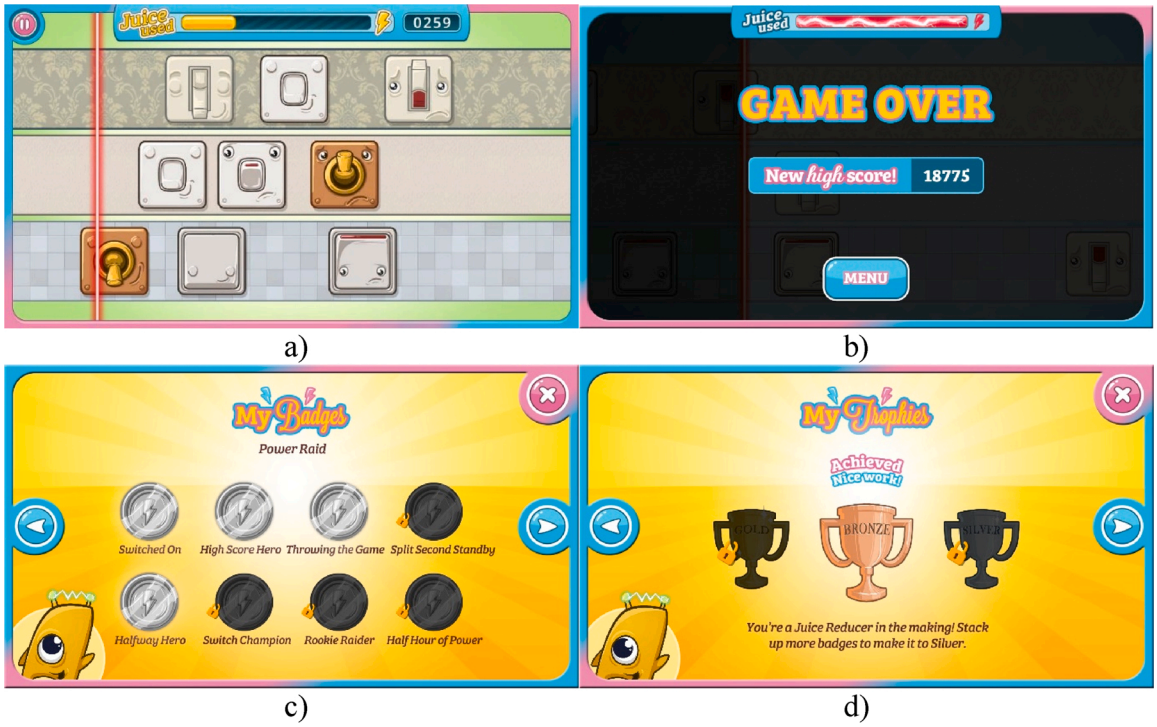


**Fig. 2.** a) Power Raid gameplay, b) game over screen, c) badges, d) trophies. Images used with permission from CitySmart.

alternative explanation for the results observed. To control for all the aforementioned variables we regressed them onto the main constructs of the model – flow, customer engagement, value-in-behavior, and both behavioral intention outcomes.

## 5. Results

### 5.1. Measurement validation

Data analysis was conducted by using PLS-SEM in SmartPLS3 (Ringle, Wende, & Becker, 2015), which was conducted using 2000 bootstrapping samples. Bootstrapping is used to assess the significance of path coefficients (Hair, Ringle, & Sarstedt, 2011), and is an approach consistent with existing gamification literature (Baptista and Oliveira, 2017; Suh et al., 2018). The use of 2000 bootstrapping samples also exceeds previous studies in gamification (Baptista and Oliveira, 2017). Using PLS-SEM to analyze the data of the 387 participants is appropriate as the study's sample size exceeds that of other gamification studies using PLS-SEM (Baptista and Oliveira, 2017; Hamari & Koivisto, 2015a; Hassan, Dias, & Hamari, 2019; Suh et al., 2018). Prior to hypothesis testing, reliability and validity assessments were firstly undertaken.

As shown in Table 2, the scales demonstrate high levels of reliability and validity at the third order (refer to the supplementary material for detailed reliability and validity assessments at the first and second order). As recommended in the literature, the composite reliability scores were all above the recommended level of 0.70. Convergent validity within the main constructs was achieved as all constructs possess AVE scores exceeding 0.5 and have significant loadings ($p < .000$), exceeding the designated 0.5 threshold at both single, second, and third orders. Discriminant validity (Table 3) was also confirmed with AVE scores higher than their respective squared correlation coefficient (Fornell & Larcker, 1981). A VIF analysis was also undertaken to ensure multicollinearity was not an issue impacting the data analysis and interpretation of the results. The VIF analysis produced a maximum value of 1.62, below the threshold of 5 recommended by Hair et al. (2011), indicating that multicollinearity did not considerably impact the study.

## 6. Hypothesis testing

The results show flow to have a significant positive association with customer engagement ($\beta = .62$, $p < .01$), supporting H1. Flow had a direct ($\beta = .20$, $p < .01$), and whilst mediated by customer engagement, indirect ($\beta = .20$, $p < .01$) significant impact on value-in-behavior, indicating customer engagement only partially mediated this relationship, supporting H2 and H3. In testing H4 and H5, it was found that

**Table 2**
Construct reliability and validity.

| Construct | Loadings | CR | AVE |
|---|---|---|---|
| **Flow (TO)** | | 0.955 | 0.834 |
| ***Conditions (SO)*** | | 0.948 | 0.601 |
| Autotelic Experience (FO) | .888-.935 | 0.955 | 0.842 |
| Challenge/Skill Balance (FO) | .777-.906 | 0.912 | 0.720 |
| Clear Goals (FO) | .884-.922 | 0.943 | 0.805 |
| Sense of Control (FO) | .894-.933 | 0.942 | 0.801 |
| Unambiguous Feedback (FO) | .863-.923 | 0.945 | 0.810 |
| ***Outcomes (SO)*** | | 0.915 | 0.512 |
| Action-Awareness Merging (FO) | .824-.904 | 0.926 | 0.758 |
| Concentration on Task (FO) | .808-.920 | 0.928 | 0.762 |
| Loss of Self-Consciousness (FO) | .894-.920 | 0.951 | 0.829 |
| Time Transformation (FO) | .866-.914 | 0.944 | 0.809 |
| **Customer Engagement (TO)** | | 0.971 | 0.796 |
| ***Cognitive Engagement (SO)*** | | 0.949 | 0.859 |
| Conscious Attention (FO) | .797-.896 | 0.945 | 0.741 |
| Absorption (FO) | .810-.867 | 0.927 | 0.717 |
| ***Emotional Engagement (SO)*** | | 0.953 | 0.912 |
| Dedication (FO) | .821-.886 | 0.930 | 0.726 |
| Enthusiasm (FO) | .815-.894 | 0.935 | 0.742 |
| ***Behavioral Engagement (FO)*** | .916-.943 | 0.953 | 0.789 |
| **Value-in-Behavior (SO)** | | 0.947 | 0.588 |
| Ecological Value (FO) | .881-.890 | 0.879 | 0.784 |
| Economic Value (FO) | .820-.918 | 0.900 | 0.751 |
| Emotional Value (FO) | .781-.856 | 0.939 | 0.688 |
| Functional Value (FO) | .671-.863 | 0.916 | 0.646 |
| Social Value (FO) | .888-.920 | 0.935 | 0.827 |
| **Behavioral Intention (App Replay) (FO)** | .965-.971 | 0.967 | 0.937 |
| **Behavioral Intention (Switch) (FO)** | .865-.929 | 0.893 | 0.806 |

TO = Third order; SO = Second order; FO = First order.

**Table 3**
Convergent and discriminant validity.

| Construct | AVE | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| 1. Flow | 0.834 | | $r^2$: 0.419 | $r^2$: 0.214 | $r^2$: 0.310 | $r^2$: 0.054 |
| 2. Customer Engagement | 0.796 | r: 0.648 | | $r^2$: 0.283 | $r^2$: 0.654 | $r^2$: 0.101 |
| 3. Value-in-Behavior | 0.588 | r: 0.463 | r: 0.532 | | $r^2$: 0.148 | $r^2$: 0.247 |
| 4. Behavioral Intention (App Replay) | 0.937 | r: 0.557 | r: 0.809 | r: 0.386 | | $r^2$: 0.065 |
| 5. Behavioral Intention (Switch) | 0.806 | r: 0.233 | r: 0.318 | r: 0.497 | r: 0.255 | |

Correlation for all constructs significant at the 0.01 level (2-tailed). $r$ = original correlation score, $r^2$ = squared correlation score.

customer engagement had a significant direct effect on value-in-behavior ($\beta = .33$, $p < .01$). Furthermore, whilst mediated by value-in-behavior, customer engagement had a significant indirect effect on behavioral intention for app replay ($\beta = .12$, $p < .01$) and behavioral intention for sustainable energy behavior ($\beta = .13$, $p < .01$), supporting H4 and H5. This demonstrates that value-in-behavior only partially mediates the relationships between customer engagement and behavioral intentions. Interestingly, value-in-behavior possessed a comparable impact on behavioral intention for app replay ($\beta = .37$, $p < .01$) and behavioral intention for sustainable energy behavior ($\beta = .40$, $p < .01$). Refer to Table 4 and Fig. 3 for the results of the hypothesized relationships.

### 6.1. Post-hoc analysis

It could also be suggested that game duration functions as an outcome rather than a control variable [1]. As such, we examine this via post-hoc analysis, which involved removing game duration as a control variable and regressing it as an outcome of behavioral intention of app replay. The observed relationship between behavioral intention of app replay and game duration was significant ($\beta = .142$, $p < .01$), while the prior relationships between flow, customer engagement, and value-in-behavior remained significant and consistent with the hypothesized model.

Although not a hypothesized relationship, interesting insights for game designers could be derived from comparing the impact of conditional and outcome flow dimensions upon both customer engagement and value-in-behavior via a second post-hoc analysis. Conditions ($\beta = .296$, $p < .001$) and outcomes ($\beta = .365$, $p < .001$) both had a significant relationship with customer engagement and did not differ in strength ($t = .814$, $p = .416$). Conversely, conditions ($\beta = .160$, $p < .05$) had a significant relationship with value-in-behavior, whereas outcomes ($\beta = .054$, *ns*) had a non-significant relationship. Interestingly, customer engagement was found to not only partially mediate the conditions-value-in-behaviour relationship ($\beta = .103$, $p < .001$), but also fully mediate a significant relationship between outcomes and value-in-behavior ($\beta = 0.127$, $p < .001$). The indirect relationships did not differ in strength ($t = .542$, $p = .588$).

## 7. Discussion

The results of this study indicate that 1) flow enhances customer engagement with gamified systems; 2) value-in-behavior relating to sustainable energy behavior is facilitated by flow and customer engagement from gamified systems; and 3) behavioral intentions to use a gamified system and enact sustainable behavior are influenced by value-in-behavior relating to sustainable energy behavior. Next, these results are compared with the current literature.

This study examined the effect of flow on customer engagement as prior literature suggests that a relationship would exist (Berger et al., 2018; Harwood & Garry, 2015; Vitkauskaitė & Gatautis, 2018). Consistent with this literature and the prior theorizing (H1) in this study, flow was found to have a significant positive influence on customer engagement. This is an important finding for gamification research, which to date has only partially investigated the dimensions of flow and customer engagement (e.g. Harwood & Garry, 2015), which have been examined in their entirety in this study.

It can be argued therefore that flow captures the "gameful experience" of gamification, whereas customer engagement, whilst enhanced by flow, is more orientated towards a consumer's interaction with the gamified system itself. This is somewhat in line with definitions of gamification, whereby flow captures the use of game design elements or game-like experiences, which are used to enhance service experiences, as captured by customer engagement (Huotari & Hamari, 2017). Further, whilst not hypothesized, our post-hoc results indicate that flow outcomes and conditions separately had significant impacts on customer engagement (and value-in-behavior, when mediated by customer engagement) with the strengths being reasonably comparable in magnitude but not significantly different. This indicates that condition and outcome flow dimensions have a similarly important role in influencing customer engagement and that value exists in ensuring that both condition and outcome flow dimensions are catered for within gamification experiences. Through our demonstration that specific dimensions of flow experience can influence customer engagement, we provide further justification as to the value of conceptualizing flow as a multi-dimensional construct, moving beyond prior gamification studies (Wiebe, Lamb, Hardy, & Sharek, 2014).

Our results demonstrate that flow directly influences the creation of value-in-behavior (H2), and that flow has an indirect influence on value-in-behavior via customer engagement (H3). We move beyond prior literature which suggest that links exist between the positively affective nature of flow and hedonic value within gamified experiences (Chang, 2013; Högberg, Ramberg et al., 2019; Johnson & Wiles, 2003), as we demonstrate that flow aids the creation of value-in-behavior toward a sustainable behavior. This study therefore suggests that value-in-behavior is a viable alternative theorization to value creation within gamification as value can be created beyond the gamified object. The mediating role of customer engagement (H3) has been identified in various settings (Mulcahy et al., 2019; Islam & Rahman, 2017; Rather, Hollebeek, & Islam, 2019), and the findings of this study demonstrates that this mediating role also extends to gamification.

Customer engagement was found to facilitate the creation of value-in-behavior, as well as indirectly enhance behavioral intentions to continue using the gamified app (H4) and to perform a sustainable behavior (H5) when partially mediated by value-in-behavior. Demonstrating the importance and significance of customer engagement with gamified systems used for sustainability purposes extends the customer engagement literature which has been often primarily commercially orientated and focused within social media and online brand communities (Harwood & Garry, 2015; Hollebeek et al., 2014; Islam & Rahman, 2017; Kaur et al., 2020). Our results demonstrate that enhancing customer engagement is important for gamification used for sustainability marketing purposes as it helps transfer the experience of the gamified system to sustainability outcomes outside of the system, which in our study is value-in-behavior and behavioral intentions to perform sustainable behavior.

Research has identified that there is a severe lack of quantitative evidence as to the effectiveness of gamification as an approach for sustainability marketing (Johnson et al., 2017). Therefore, whilst customer engagement in gamification is known to influence related outcomes in commercial settings (Eisingerich et al., 2019; Insley & Nunan, 2014), it is still important to understand if customer engagement can also lead to

[1] We thank the reviewer for their helpful suggestion.

**Table 4**
Mediated effects.

| Hyp. | Mediating Variable | Independent Variable | Dependent variable | Direct Effect | Mediator to Dependent | Indirect Effect | Total effect | Mediation |
|---|---|---|---|---|---|---|---|---|
| H3 | Customer Engagement | Flow | Value-in-Behavior | 0.206** | 0.337** | 0.209** | 0.415** | Partial |
| H4 | Value-in-Behavior | Customer Engagement | BI: App Replay | N/A | 0.375** | 0.126** | Same as indirect effect | Partial |
| H5 | Value-in-Behavior | Customer Engagement | BI: Switch | N/A | 0.408** | 0.138** | Same as indirect effect | Partial |

** $p < .01$; *$p < .05$.

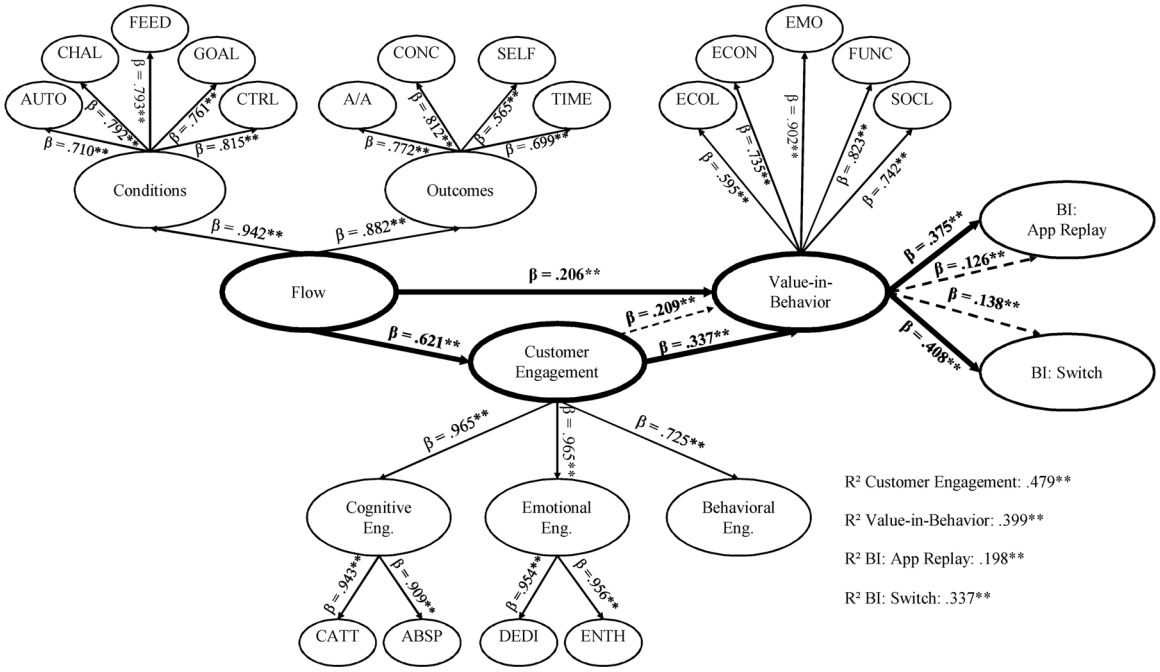


**Fig. 3.** Hierarchical Model of Flow, Customer Engagement, Value-in-Behavior with Behavioral Intention Outcomes.
Note: Dotted lines indicate indirect effects. Bolded loading values indicate hypothesized relationships.
** $p < .01$; * $p < .05$.
**Flow**: AUTO = Autotelic Experience; CHAL = Challenge/Skill Balance, FEED = Unambiguous Feedback; GOAL = Clear Goals; CTRL = Sense of Control; A/A = Action-Awareness Merging; CONC = Concentration on Task; SELF = Loss of Self-Consciousness; TIME = Time Transformation.
**Customer Engagement**: CATT = Conscious Attention; ABSP = Absorption; DEDI = Dedication; ENTH = Enthusiasm.
**Value-in-Behavior**: ECOL = Ecological Value; ECON = Economic Value; EMO = Emotional Value; FUNC = Functional Value; SOCL = Social Value.

sustainability marketing outcomes. Our results confirm that customer engagement enhanced via gamification can enhance value-in-behavior and behavioral intentions for sustainable behavior. This finding therefore helps begin to address the issues and gaps in knowledge cited in prior systematic reviews of gamification and sustainability (Johnson et al., 2017).

Surprisingly, the impact of value-in-behavior on behavioral intentions to perform a sustainable behavior was comparable to its impact on behavioral intentions to continue to use the gamified app. This is an interesting finding, as it demonstrates that the value realized by consumers toward a sustainable behavior not only reinforces its performance but also extends to motivating consumers to continue using a gamified system. This is an important extension of prior gamification studies which have often focused primarily on the value of using a gamified system (Mulcahy, Russell-Bennett et al., 2020) rather than an object or behavior outside of the system, such as sustainability behaviors.

### 7.1. Theoretical implications

As noted in the gamification literature (e.g. Hamari, 2013; Hassan et al., 2019), gamification can be introduced into technological systems to enhance utilitarian goals through providing hedonic experiences, and we theorized the relationships consistently with this literature using affect-as-information theory as a basis to support and explain the relationships within our model. Further, we took a novel approach to theorizing and examining value in a gamification and sustainability setting. In taking these theoretical approaches, this research contributes to the literature in two ways.

First, this paper contributes by leveraging affect-as-information theory to understand how gamification experiences may transfer to improve perceptions of sustainable behaviors as empirically shown through the interrelationships between flow, customer engagement, and value-in-behavior. In line with affect-as-information theory (Schwarz & Clore, 1983), we evidence how gamification experiences (flow and customer engagement), which often create heightened levels of hedonism, influence the judgement and salience of sustainability behaviors

(value-in-behavior), an object outside the gamified system. Our theorizing and model therefore provide guidance to future gamification scholars to consider the inclusion of concepts which evaluate the gamification experience and how these extend to impact the evaluation of objects or behaviors outside the system. To enhance or support such model development and testing, theorizing through emotionally-orientated theories such as affect-as-information theory, used in the current study, and emotional attachment theory and affective events theory, used in other gamification studies (Hassan et al., 2019), may help stimulate future scholarship and understanding.

The second contribution of this paper concerns the perspective of how value is created in gamification and sustainability marketing outside of a gamified system. The value creation literature has concentrated on two perspectives, value-in-exchange and value-in-use, and there have been calls for new and novel perspectives to value in emerging settings (see Zainuddin & Gordon, 2020). This research addresses such calls by introducing and empirically testing a new perspective to value, value-in-behavior (Gordon et al., 2018), created toward gamification experiences encouraging sustainability behaviors. We propose that value-in-behavior is a potentially useful perspective for scholars investigating the use of gamification for pro-social behaviors such as sustainability as it considers consumers' perceptions of value that is, or is not, realized through the performance of pro-social behaviors such as sustainability (Zainuddin & Gordon, 2020). We propose that value-in-behavior is not a competing approach to value-in-use of gamified systems, but complementary, that is, further theoretical developments of gamification can consider the benefits perceived from using the system in combination with the benefits of performing the behavior encouraged outside of the system. Indeed, this perspective to value could be complemented with other commonly used perspectives such as value-in-use to understand how the value within the gamified system may translate to increasing value in performing a behavior outside of the system.

### 7.2. Practical contributions

This research also has important practical contributions. First, insights can be drawn from flow as to how gamified experiences should be designed to create greater customer engagement. As evidenced by the modelling of flow, to achieve greater levels of customer engagement, marketers and app designers using gamification should incorporate both conditional and outcome flow dimensions within their gamified platforms.

For example, the conditional dimension of challenge/skill balance is an integral element of flow experience – involving the stretching of one's skills within tasks which possess challenge at a level appropriate to the individual's capacities (Csikszentmihalyi, 1990). Gamified app designers could implement learning or gameplay challenges which use self-selectable difficulty or adapt to a user's skill-level – thereby encouraging conditions to create flow experiences.

Although conditional flow dimensions are critical in attaining flow experience (Hamari & Koivisto, 2014), our post-hoc analysis suggests that outcome dimensions, rather than conditional dimensions, possessed greater positive influence on customer engagement. However, as the result shows that condition and outcome dimensions are not significantly different in increasing customer engagement, we emphasize to marketers and gamified app designers that ensuring both conditional and outcome flow dimensions are encouraged via good gamification design is important to encourage customer engagement. For example, consider a scenario where there are no game mechanics which influence conditional flow dimensions. This would impede the user from entering flow and experiencing flow conditions which positively influence customer engagement, and in addition, the user would be unable to experience the outcome flow dimensions (i.e. the psychological experience of flow) which also positively influence customer engagement. As flow influences customer engagement, marketers and app designers using gamification should therefore ensure their gamified app encourages conditional and outcome dimensions of flow experience.

Through our results, we demonstrate the importance of encouraging flow experiences which influence a user's perceived value towards enacting sustainable behavior. This approach is evident within the "One Drop of Life" mobile app developed by Microsoft, which uses gamification elements such as points and challenge in a game designed to communicate the value of water conservation while guiding a single drop of water and bypassing challenging obstacles (Ponder, 2015). In accordance with affect-as-information theory, which suggests that affective experiences provide an embodied source of information about the value of an objective (Clore & Storbeck, 2006), marketers and gamified app designers should ensure that the gamification experience is conducive to establishing enjoyable flow experiences to more effectively persuade the user into realizing the value of the encouraged sustainable behavior.

Using value-in-behavior, gamified app designers can create experiences to encourage repeated intentions to perform the desired sustainable behavior and repeat game/app usage. Such an approach was demonstrated by the gamified mobile app "TapOff" to help Cape Town residents save water during their ongoing water scarcity crisis. "TapOff" allows users to calculate their household water usage and compare it to recommended consumption levels. In addition, users can post their consumption figures on suburb leaderboards to gamify consumption via competition (AUX Studio, 2019), which requires repeated interaction with the app to update consumption levels and the enaction of water conservation behavior to maintain competitiveness. "TapOff" demonstrates that gamification can be used to establish value-in-behavior towards undertaking sustainable behavior (e.g. to avert a community crisis), which encourages both repeated app interactions and the adoption of sustainable behavior.

Lastly, our findings emphasize that gamified app designers should acknowledge the influential role which customer engagement possesses when transitioning enjoyable flow experiences generated by the app into realized value towards the encouraged behavior. Gamified apps should therefore be designed with specific engagement dimensions in mind. For example, gamified apps should utilize streamlined controls to mitigate unnecessary cognitive load and utilize challenge to enhance cognitive engagement. Gamified apps should also encourage cognitive attentiveness by communicating knowledge in an interesting and non-complex manner which does not impede cognitive processing. Emotional engagement should be established within gamified apps by ensuring that the interaction is a positive emotional experience. For example, the gamified app might contain content perceived to be exciting, associating the app with feelings of enjoyment.

### 7.3. Limitations and future research directions

Whilst the current study had notable strengths such as the implementation of a field study and the incorporation of app usage through analytic data as a control variable, which begin to address some of the noted limitations in the current literature (Beck et al., 2019; Johnson et al., 2017; Morganti et al., 2017), there are still some limitations and opportunities for future research, which we now acknowledge. The current study focuses on one sustainable behavior (turning off electricity switches) and a convenience sample with most participants being 18–35 years. Whilst focusing on one behavior and a younger market segment is consistent with most gamification research, caution should be drawn when extending the generalizability of these findings to other sustainability contexts which have previously been investigated, such as water conservation (Koroleva & Novak, 2020) and eco-driving (Günther et al., 2020), and other market segments such as tourists (Negruşa et al., 2015) or employees (Oppong-Tawiah et al., 2020). Future research could seek to investigate whether relationships may differ based on the type of sustainable behavior or market segment using the gamified app, as the presence of such moderators were not considered within the current study. For instance, future research could seek to investigate whether demographic characteristics such as age and gender moderate

relationships relating to the gamification experience, such as flow and customer engagement. In addition, psychographic characteristics relating to sustainability such as environmental concern, prior sustainability knowledge, and consumer skepticism of sustainability claims could also be investigated as moderators for relationships which include the sustainability variables of value-in-behavior and intentions to perform sustainable behavior.

Another limitation of the current study is the limited observation of the impact of gamification. We agree with the sentiments of Johnson et al. (2017) that future studies should seek to employ longitudinal designs to observe the impact of gamification over time. Furthermore, future research is encouraged to isolate specific game design elements, such as challenge, trophies, badges, and leaderboards, and how they contribute to the enhancement of flow and customer engagement, potentially by using experimental designs and/or objective measurements such as app analytics as per other studies (Hamari, 2013; Mulcahy, Russell-Bennett et al., 2020).

## 8. Conclusion

This research contributes understanding to the effectiveness of gamification for sustainability marketing purposes. Taking into account the urgent need to address sustainability issues such as climate change (Höök & Tang, 2013), this study has shown how consumers' experience and engagement with a gamified system can transfer into improving sustainability outcomes, namely, the value consumers perceive in performing sustainability actions and their intentions to perform sustainability behavior. As sustainability marketers are faced with finding new and innovative ways to encourage consumers to change or maintain sustainable behavior, these findings have important implications for practitioners and provide evidence as to how gamified systems can be used to achieve such desired outcomes.

## CRediT authorship contribution statement

**Lucas Whittaker:** Conceptualization, Formal analysis, Investigation, Methodology, Writing - original draft, Writing - review & editing, Visualization. **Rory Mulcahy:** Conceptualization, Formal analysis, Methodology, Writing - original draft, Writing - review & editing, Supervision. **Rebekah Russell-Bennett:** Conceptualization, Methodology, Project administration, Supervision, Writing - original draft.

## Declaration of Competing Interest

None.

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## Appendix A. Supplementary data

Supplementary material related to this article can be found, in the online version, at doi:https://doi.org/10.1016/j.ijinfomgt.2020.102305.

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