



Understanding Modding Devotion, Practices and Motivations using Serious Leisure Perspective

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ABSTRACT

Modding actively contributes to videogame post-launch life cycles. Prior research has investigated the motivations of modders, but most studies have treated makers and users as the same group. This limits our understanding of how and why people may engage and progress in modding as a serious leisure activity. In a mixed-method study (N=483), we examined whether modding can be conceptualized as a Serious Leisure Activity. Using the SLIM (Serious Leisure Inventory Measure), closed-ended demographics items, and open-response questions, we investigated how modders perceive themselves, their common practices, and motivations using the theoretical lens of Serious Leisure and Devotion. We found that the key motivation for modders is the enjoyment of creating content. However, we also found that modders are diverse in their practices and motivations to mod. They mod different videogames and make various types of mods, and their motivation changes with their levels of devotion. Overall, this paper contributes to the growing body of knowledge around the motivations and practices of modders.

CCS CONCEPTS

• **Human-centered computing**; • **Social and professional topics** → **User characteristics**;

KEYWORDS

Modding, Videogames, Serious Leisure, Devotion, Modders, Custom Content Creation, Online Communities

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1 INTRODUCTION

Modding is the act of custom content creation for videogames [71]. Modding has been practiced since the early 1990s [40], and engagement in modding continues to grow. Sites like NexusMods allow millions of users to host and download videogame modifications [66] and industry partners like Bethesda support modders by offering Software Development Kits (SDKs) [8]. These may encourage people to engage in modding activities and make it more accessible to the average gamer. Given the popularity of modding, previous research has investigated motivations around modding. Primary motivators for modding videogames have been identified as fun and enjoyment [36, 41, 44, 54], social interaction [23, 31, 54, 71, 78], desire to play the modded videogame [55, 67, 71], aspirations for a career in videogame development [55], and creativity [31, 55, 71, 78]. While these studies identified different types of motivations of modders, they do not account for how modders engage in their practices differently. The research outlined in this paper differentiates modder practices based on levels of devotion to the hobby, and investigates the extent to which motivations vary as a result.

Devotion is a strong attachment to an activity, where the devotee experiences a sense of pride or achievement in their engagement with the activity [72, 75]. Prior work has established that individuals engage with their leisure activities in a multitude of ways with differing levels of devotion [35, 72] which is found to be strongly linked to wellbeing [32]. Leveraging the concept of devotion, as demonstrated through level of experience and time spent modding, in this paper we aim to establish the motivations of modders using a Serious Leisure Perspective [75]. Serious Leisure is a theory that has been used to understand hobbyist practices [75] and it allows researchers to have a comprehensive understanding of hobbyists' commitment to their pursuits using a range of factors including their levels of perseverance [62], search for a leisure career, and identification with the chosen pursuit [57]. Modding has been described as a serious and devoted hobby [78], and by examining modders with different forms of devotion we can gain new insights into the characteristics, attributes and motivational differences of modders based on their level of involvement and experience. Understanding these nuances may help uncover the relationship between different social-emotional outcomes of modding and encourage developers to tailor their tools allowing for a range of modding practices. Thus, the overall goal of this study is to discern distinct

differences between modding groups, their practices and devotion by answering the following research question:

RQ1: How do modders with different forms of devotion to modding differ in their modding practices?

RQ2: What are the motivations of modders with different forms of devotion to modding?

We conducted a mixed-methods online survey with 483 participants to answer these research questions. The survey included the Serious Leisure Inventory Measure (SLIM) [30, 75], questions on demographics, modding practices (e.g., years and weekly hours of modding) and motivations. The results of the SLIM were analysed using a Principle Component Analysis to establish different components in the context of modding. These components were then used to examine what the motivations of modders with different forms of devotion to their Serious Leisure practices may look like [73, 75]. We then applied a purposeful sampling method [48, 53] to further understand how modders' motivations and practices might change with further devotion to modding [35, 75].

2 BACKGROUND

2.1 Defining Modders, Modding, and Mod Types

Modders are defined as hobbyist [41, 63], crafters [45], prosumers (i.e., consumers who contribute to the production of the products and/or services they consume) [2], and players of the videogame they modify [65]. Modding can be defined as the practice of creating new content for videogames through modifying the game itself [55, 65, 70]. Modding has been found to benefit the modders and the game companies, perceived as way for customer value co-creation [9]. Modding has also been categorised as 'playbour', a form of digital labor, where both playing and labour activities combine [12, 46, 51]. Many game companies promote the creation of mods with Software-Development Kits (SDKs) to help promote the value created from modding communities [65]. The modifications or mods created can range from minor aesthetic changes, such as characters' hair colour, to Total Conversion Mods which can transform a game into a completely new experience through enhanced gameplay [20, 78].

Modding practices and communities vary across different videogames. For example, the Sims 4 [49], a life simulation videogame where players can create and control characters, is known for cosmetic mods, enabling character and building customization [38]. Some modding communities focus on music mods to improve aural immersion for the players [26]. In a role-playing game like Skyrim [7], modders tend to focus on environmental and immersion-based mods, improving visuals and realism. Others create gameplay mods like extra character slots for the character's pets [20], game fixes [77] or user interface improvements [10].

2.2 Modding Motivations

Modders are motivated by their love of games and their desire to enhance their gameplay experiences [36, 55, 71]. They derive enjoyment from modding. However, there has been limited research on whether the enjoyment primarily comes from the creation or use of mods. Previous literature often treats mod creators and mod users as indistinguishable, blurring the lines between creation and usage in their analysis [36]. Nevertheless, existing research highlights that

modders tend to engage in playful experimentation while modding [70], finding personal gratification in the process [31]. Modders are typically passionate about the game they mod [36], and sometimes they mod to further enhance their interest in playing a specific videogame [55]. The enjoyment of modding has also been mapped along a continuum of self-based motivations (e.g., skill development) to game-centric motivations (e.g., bug fixing) [78].

Some modders are motivated to engage in modding activities by social factors. Prior studies have found that people engage in various social interactions in online communities and feel a sense of belonging to their community [23, 31, 54, 55]. For example, modders may cooperate on modding projects [71], contribute to discussions [31], give and receive feedback on the mods they created [23, 54, 78], and learn to create mods in online communities through the means of collaboration and mentoring [64].

In addition to social factors, skill development and learning are also identified as motivations to create mods. [54, 83]. Some modders because they want to improve their programming or art skills [31]. Modders are also motivated by their personal achievements, either by getting something to work and understanding how it works, being able to discover hidden aspects of the game, or as a personal learning achievement [31, 71]. Some modders described their motivation for modding as an artistic or creative pursuit through developing cosmetic mods and add-ons [23, 55, 71].

Most studies that focus on the motivations of modders examine a single game title and not in the wider modding community [2, 23, 36, 44, 55, 56, 67, 71]. While these studies allow us to understand modding communities of a specific game, they do not identify the similarities across different modding communities. As highlighted earlier, prior studies also tended to combine mod users and creators as a homogeneous group [1, 50, 67]. While most mod creators are mod users, not all mod users are mod creators [78]. This approach may prevent a deep understanding of the creation and crafting aspects of modding motivations. There is evidence that the act of crafting an experience and construction is a key motivation to modding [31]. For instance, while character customisation is a form of creation and may improve users' sense of autonomy and enjoyment [19, 81], it is a different process from designing the hair, creating the clothing for videogame characters and sharing these with others.

In addition, prior research has focused on how modders become developers [71], their role in co-creation and being prosumers [2] and how modders interact with the games developers for commercial and monetary interests [82]. Prior research has also shown that when modding becomes an act of 'playbour', the overall experience is negative, with most modders losing their enjoyment of the craft [2, 12, 46, 51]. However, more recent research has found that modders may be relying less on economic measures of productivity and more on a sense of personal progression, competency and contribution to collective play practices [16]. The blurry distinction between play and labour for many enthusiasts sustains engagement, with the experience of playful development invigorating those hobbyists who craft using technology [25]. These findings may explain why modders are generally not particularly interested in financial return [54].

2.3 Serious Leisure

The Serious Leisure Perspective (SLP), developed by Robert Stebbins, analyses the continued pursuit of a core activity which individuals find highly engaging, interesting and fulfilling [75]. The SLP aims to explain the reasons why individuals engage in their hobbies, and how these hobbies evolve from casual leisure pursuits to serious leisure pursuits. The SLP has been applied successfully to understand various leisure activities, from extreme sports [27] and chess competitions [29] to competitive videogaming called esports [68]. SLP research has been also applied to examine different forms of digital crafting [11] and helped extend our understanding of different subcultures, such as Steampunk [79]. The SLP has also been used to understand modding practices of women modders, filling the gap on the lack of representation of women in modding research [78].

The SLP is divided into three forms of involvement: Casual Leisure, Serious Pursuits, and Project Based Leisure [75]. Casual Leisure is described as a short-lived and pleasurable activity (e.g., watching TV, socialising) requiring minimal to no training that brings immediate intrinsic rewards to the individual. Serious pursuits can be defined as both serious leisure activities and devotee work [75]. In the context of videogames, the difference between Serious Pursuits and Casual Leisure might be best illustrated as the difference between using mods and creating mods. While playing a modified videogame may evolve into a serious pursuit, the act of just playing games is a Casual Leisure activity. Modders display the key characteristics of engaging in a Serious Pursuit [31, 36] while still enjoying playing videogames. Project-Based Leisure, defined by a shorter life-span based around a project or cause, may be relevant when there are individuals working on group mods [2, 55, 76]. Given the evidence suggesting that modders work multiple projects, modding is more clearly aligned as a Serious Pursuit because engagement generally extends beyond one specific project.

Participation in Serious Leisure is discussed as a continuum or spectrum from Casual to Serious Leisure (CL-SL) [75]. In this continuum, "Neophytes" or Novices are considered dabblers who may slowly transition from the indulgent dabbling to a more serious pursuit. People may progress across stages from Novice to Participant Devotee and Moderate Devotee, where their practices can be categorised as Serious Leisure. Core Devotees and Devotee Workers are positioned at the serious end of the continuum. In the context of modding, these categories may describe people who pursue a career in games development through modding [41], finding donation schemes to help support modding full time [24] or transitioning their modding project into a company or a game [76].

The CL-SL continuum outlines what is known as a leisure career in the SLP. The use of the term 'career' within Serious Leisure refers to the stepping stones in a hobbyist's practices [75]. Many individuals who are devoted to a hobby, craft or practice will evolve over time in that hobby or practice through key moments, learning experiences, stepping stones and time spent devoted to this hobby [35, 69, 75].

2.3.1 Characteristics of Serious Leisure in the Context of Modding.

The Serious Leisure Framework has six distinguishing factors: the need to persevere, finding a leisure career, significant personal effort, durable benefits, self-gratification, unique ethos and identification

with chosen pursuit. In previous research, the features of Serious Leisure have not been fully applied to modding. As described in the SLP, similar to how people sometimes battle fatigue and even extreme weather conditions to pursue their hobbies [73], modders sometimes engage in modding despite the challenges [23] such as attempting to update outdated and broken games [47, 84] and sometimes persevering through legal issues, such as getting cease and desist letters to do with ownership [58].

SLP describes how hobbyists progress through the stages of development and move through turning points and contingencies when finding a leisure career. Previous research found that modders' motivations can change as a result of industry involvement, monetisation, and game changes which affect the modding community [24, 42]. While there is a lack of research on how modders' devotion change over time, there is some evidence of such progress in modders' cult-like engagement in titles like Skyrim [7].

Durable benefits in SLP covers categories of self-actualization, self-enrichment, feelings of accomplishment and the lasting final product. These were found to be some of the key motivations for modders [54, 83]. Self-Gratification as a motivation has been widely documented in modding practices as enjoyment of modding [70]. Unique Ethos relates to community aspects of modding including publishing mods [78], social interaction with community [23, 31, 54], and, in some cases, working on group modding projects [55]. Identification with pursuits is the feeling of attachment to the activity and personal identification with it, qualities which are seen when individuals are devoted to an activity [72]. Overall, the SLP allows us to better understand how devotion to modding is shaped by their motivations and experiences modding.

3 RESEARCH DESIGN

As part of a larger study to understand modders' experiences and devotion to their practice, we used an online survey to collect data from modding communities by posting a call for participation on over 120 modding forums and sites including The Sims Resources [38], Nexus Mods [66], and Subreddits [59]. Modders who were 18 years and older were invited to participate in the survey. The study sampling method aimed to engage a wide range of individuals from different modding communities to gain a broad perspective on modding practices.

We collected data on participants' demographics information (i.e., age, gender, employment status including their studies and careers) and modding expertise (e.g., how long they have been modding) to understand who modders are, what they do in their modding practice and how they are motivated in their modding practices. Using 'select all that apply' with an open-response option, we asked modders to report the types of mods they made (see below for the full list of the categories) and the games they modded (e.g., Skyrim, Sims). The closed response choices for the types of mods were based on prior research on mod types, online communities and a previous study that catalogued different mod types [78]. In an open-response question we asked participants' reasons for modding. We also asked for an example mod that they might like to share with the research team. Finally, participants were asked to complete the Serious Leisure Inventory Measure (see details below).

A single 12-month Humble Bundle [37] subscription was raffled among the modders who entered their email addresses at the end of the survey. The original dataset consisted of 641 participants who responded the survey. The final dataset included 483 participants who completed the survey.

3.1 Data Cleaning

The original dataset, taken from SurveyMonkey, had a total of 641 participants. As a part of data cleaning, 156 were removed.

As our age limit for participants was 18 and above, 26 participants were removed as they were under the age of 18. Our target sample was those who created mods. Thus, a further 125 respondents were removed as they were not making mods based on the question "What is the degree of involvement in modding?". Seven Participants were removed for abusive language, threats or joke answers. This left us with our participant number of 483.

3.2 Serious Leisure Inventory Measure (SLIM)

The SLIM includes 54 items in 18 components based on the original six distinguishing features of the Serious Leisure Framework [29, 30, 73, 75]. These features were translated into the 18 components of SLIM: Perseverance, Effort, Career Progress, Career Contingencies, Personal Enrichment, Self-Actualization, Self-Express Abilities, Self-Express Individual, Self-Image, Self-Gratification-Satisfaction, Self-Gratification-Enjoyment, Re-creation, Financial Return, Group Attraction, Group Maintenance, Group Accomplishments, Unique Ethos, and Identity. The SLIM uses a 9-point Likert-type scale (1 = Completely disagree; 9 = Completely agree).

3.3 Defining Devotion to Modding

Previous research has grouped modders by the videogame they play [36, 56, 71] or the mod they make [55] to analyse modding practices. However, each videogame and each mod for that game is different, which presents challenges in building a more complete understanding of diversity in modding communities. In this paper, we propose a new way of categorising modders and hobbyists based on their involvement and devotion.

To create devotion categories, we initially categorised hobbyists based on their level of experience using the 7-point Likert scale experience rating question "How experienced are you at modding?" as follows:

- Novice Devotee (n=34)
 - 'Not at all experienced', 'Minimal experience', 'Little to no experience'
- Participant Devotee (n=159)
 - 'Some to little experience', 'Some experience'
- Moderate Devotee (n=104)
 - 'A lot of experience'
- Core Devotee (n=27)
 - 'Extremely experienced'

Of 483 participants, 324 answered the experience rating question, and further analysis was undertaken on the data from these participants to further validate our devotee categories. We conducted a series of Spearman correlations between the modding experience of these participants and their responses to questions that identified their modding habits, including hours per week modding,

years of modding, number of mods created, and number of mods published (see the Supplementary Materials). We found significant positive correlations between our categories of devotion and the total number of mods created, $rs(324) = 0.474$, $p < 0.001$; number of mods published, $rs(324) = 0.454$, $p < 0.001$; hours per week spent on modding, $rs(324) = 0.402$, $p < 0.001$, and years spent modding, $rs(324) = 0.379$, $p < 0.001$. As a result, we are able to operationalize the devotee categories as above for our analysis to identify the differences across levels of devotion.

3.4 Demographics

The average age of participants was 28.46 (SD=9.39). Novice Devotees constituted the youngest group who were predominantly aged between 18-24 years (n=34, Mean=23.91, SD=4.85). Participant Devotees were aged between 18-34 (n=159, Mean=27.86, SD=8.64). Moderate Devotees were between 25-34 years of age (n=104, Mean=29.77, SD=10.44), and Core Devotees were between 25-34 (n=27, Mean=32.63, SD=11.26).

Most participants self-identified as men (n=256) and 57 participants self-identified as women and 11 reported that they "did not want to respond" or identified as "other".

3.4.1 Modding.

The most common site used to share and discuss modding was NexusMods across all devotee types (27.41%) followed by Steam-Workshop (21.10%) and Reddit (16.28%).

Overall, most modders create gameplay mods (n=208) followed by cosmetic (n=104), environmental (n=103), add-on (n=83) and joke/humour (n=39) mods. Analysis of the types of mods created by modders in different devotion categories shows that while gameplay mods rank the highest in popularity across all devotion categories, those with higher devotion (i.e., moderate and core) have stronger preferences for environmental modding and those with lower devotion levels (i.e., novice and participant) preferred cosmetic modding activities. Only moderate and core devotees recorded creating total conversion mods (see Table 1).

Devotees reported creating mods for 125 unique games, with some creating mods for multiple games. A large portion of modders tended to mod Skyrim (n=93, 14.79%) followed by Fallout 4 (n=49, 7.79%), Stardew Valley (n=25, 3.97%), Fallout: New Vegas (n=25, 3.97%) and XCOM 2 (n=24, 3.82%).

3.5 SLIM Results

3.5.1 Principal Component Analysis. The SLIM instrument (with 54 items) has only been used once in the context of modding [78]. To ascertain that the scale has the same 18 component loadings when used in the context of modding, we ran a Principal Component Analysis (PCA) with varimax rotation to assess how the 54 items clustered. The suitability of PCA was assessed prior to analysis using the entire sample (N = 483) due to the sample size restrictions for the analysis. Inspection of the correlation matrix showed that all variables had at least one correlation coefficient greater than 0.3. The overall Kaiser-Meyer-Olkin (KMO) measure was 0.267 with individual KMO measures all greater than 0.7, classifications of 'middling' to 'meritorious' according to Kaiser [43]. Bartlett's Test of Sphericity was statistically significant ($p < .0005$), indicating that the data was likely factorizable.

Table 1: Mod types by Devotees. Each participant could choose more than one type of mod.

	Novice (n=34)	Participant (n=159)	Moderate (n=104)	Core (n=27)
1	Gameplay (n=16, 47.1%)	Gameplay (n=103, 64.8%)	Gameplay (n=68, 65.4%)	Gameplay (n=21, 77.8%)
2	Cosmetic (n=12, 35.3%)	Cosmetic (n=52, 32.7%)	Environmental (n=40, 38.5%)	Environmental (n=10, 37%)
3	Add-on (n=6, 17.6%)	Environmental (n=50, 31.4%)	Cosmetic (n=34, 32.7%)	Add-on (n=9, 33.3%)
4	Joke/Humour (n=5, 14.7%)	Add-on (n=39, 24.5%)	Add-on (n=29, 27.9%)	Total Conversion (n=8, 29.6%)
5	Environmental (n=3, 8.8%)	Joke/Humour (n=19, 11.9%)	Total Conversion (n=13, 12.5%)	Cosmetic (n=6, 22.2%)

PCA revealed five components that had eigenvalues greater than one and which explained 26.9%, 13.4%, 11.6%, 8.1% and 4.2% of the total variance, respectively. Visual inspection of the scree plot indicated that ten components should be retained [13]. A ten-component solution met the interpretability criterion. As such, ten components were retained.

The ten-component solution explained 59.9% of the total variance. A varimax orthogonal rotation was employed to aid interpretability. The rotated solution exhibited a simple structure [80]. The interpretation of the data was consistent with the Serious Leisure attributes the instrument was designed to measure with strong loadings of Group related items on Component 1, Progress and Perseverance items on Component 2, Recreation and Self items on Component 3, Personal Enrichment and Self-Image items on Component 4, Self-Gratification-Enjoyment items on Component 5, Self-Expression Individual items on component 6, Career Contingencies items on Component 7, Ability items on Component 8, Financial Return items on Component 9 and Effort items on Component 10.

In order to ensure reliability of the new components, Cronbach's alpha was calculated for each component (see the Supplementary Materials for details).

3.5.2 Kruskal-Wallis H test. We ran a series of Kruskal-Wallis H Tests to compare modding motivations across the levels of devotion on the components of the SLIM. This test was chosen because it does not require the groups to be normally distributed and is more stable to outliers [4]. We followed statistically significant differences with pairwise comparisons using Dunn's (1964) procedure with a Bonferroni correction for multiple comparisons [21]. All Kruskal-Wallis tests showed that modding devotion impacted all 10 components (see the Supplementary Materials for details on the Kruskal-Wallis results).

Component 1: Group and Unique Ethos. The Group and Unique Ethos component includes Unique Ethos, Group Maintenance, Attraction and Accomplishment from the SLIM and refers to how modders identify within the community and whether this is an important motivator for them.

Significant differences were found between the Novice and the Participant Devotees ($p=0.012$), Novice and Moderate Devotees ($p<0.001$), and Novice and Core workers ($p<0.001$). Novice participants had the lowest ratings on the items in this component. There

were also significant differences between Participant Devotees and the Moderate Devotees ($p=0.039$), and Participant Devotees and Core Devotees ($p=0.004$). We found no statistically significant differences between the Core and Moderate Devotees ($p=0.554$) on their Group and Unique Ethos as a motivation to participate in modding.

Component 2: Persistence and Progress. Persistence and Progress refers to improving skills, overcoming obstacles and progression. Similar to Career contingencies (see below), this doesn't refer to specific instances of change, but rather continued learning and resolution in the process of involvement in the leisure activity.

Significant differences were found between the Novice and the Participant Devotees ($p<0.001$), Novice and Moderate Devotees ($p<0.001$), and Novice and Core Devotees ($p<0.001$). There were also significant differences between Participant Devotees and the Moderate Devotees ($p=0.039$), and Participant Devotees and Core Devotees ($p=0.002$). We found no statistically significant differences between the Core and Moderate Devotees ($p=1$) on their persistence and progress as modders. The higher the level of devotion, the higher the ratings were in this component.

Component 3: Invigoration and Renewal. The Invigoration and Renewal component measures sense of contentment and self-esteem through modding. Significant differences were found between the Novice and the Participant Devotees ($p=0.016$), Novice and Moderate Devotees ($p<0.001$), and Novice and Core Devotees ($p<0.001$). There was no significant differences between Participant and the Moderate Devotees ($p=0.065$), and Participant and Core Devotees ($p=0.142$). We found no statistically significant differences between the Core and Moderate Devotees ($p=1$) on their sense of Invigoration and Renewal.

Component 4: Personal Fulfilment. The Personal Fulfilment component measures elements from Enrichment and Self-Image of the original SLIM. Significant differences were found between the Novice and the Participant Devotees ($p=0.001$), Novice and Moderate Devotees ($p<0.001$), and Novice and Core Devotees ($p=0.002$). There was no significant differences between other groups ($p=1$).

Component 5: Enjoyment. Enjoyment remained the same as the original SLIM Self-Gratification-Enjoyment component and relates to the fun a participant feels as a result of engaging in a Serious Leisure activity. Significant differences were found between

Novice and Moderate Devotees ($p=0.001$), Novice and Core Devotees ($p<0.001$), and Participant and the Core Devotees ($p=0.004$). There were no statistically significant differences between other groups on their reported level of enjoyment ($p>0.001$).

Component 6: Self-Expression. Self-expression was an original SLIM component, including items to identify to what extent the individual modders can express their identity through modding practices. Statistically significant differences were found between the Novice and Participant Devotees ($p=0.003$), Novice and Moderate Devotees ($p<0.001$) and Novice and Core Devotees ($p=0.001$). The other pairwise comparisons showed no statistically significant difference.

Component 7: Career Contingencies. The Career Contingencies component also remained the same as the original SLIM component. In the SLIM this indicates different moments in time that have shaped people's experiences in modding and improved it. Statistically significant differences were found between the Novice and Participant Devotees ($p=0.017$), Novice and Moderate Devotees ($p<0.001$) and Novice and Core Devotees ($p<0.001$). The remaining pairwise comparisons showed no statistically significant differences.

Component 8: Personal Ability. The Personal Abilities component measures how someone ranks their own knowledge and skills and their capability in applying these abilities and demonstrate them through modding. All pairwise comparisons showed statistically significant differences ($p<0.0001$), except between the Core and Moderate Devotees ($p=0.088$).

Component 9: Financial Return. The Financial Return component remained the same as the original SLIM component. It garnered the lowest ratings overall with the majority of modders disagreeing that they receive monetary benefits for modding, which map onto the financial expectation findings from playbour literature [46]. Statistically significant differences were found between the Novice and Core Devotees ($p=0.002$), Participant Devotees and Moderate Devotees ($p=0.019$), and Participant Devotees and Core Devotees ($p<0.001$). The other pairwise comparisons showed no statistically significant difference.

Component 10: Effort. The Effort component included two survey items from the original SLIM component of Effort. Statistically significant differences were found between the Novice and Participant Devotees ($p=0.004$), Novice and Moderate Devotees ($p<0.000$) and Novice and Core Devotees ($p<0.000$). There was also significance between Participant and Moderate Devotees ($p=0.017$), and Participant and Core Devotees ($p=0.012$). Moderate and Core Devotees showed no statistical difference ($p= 1.00$).

Summary of the Findings from Kruskal-Wallis H Tests. Novice devotees are quite different from everyone else in their thinking of modding as a Serious Leisure activity. Novice devotees typically reported significantly lower levels of each of the principal component, with the exception of enjoyment and financial return. In terms of enjoyment, Novice Devotees reported similar levels of enjoyment as Participant Devotees. They also reported low levels of financial return motivation, which were similar to those reported by Participant and Moderate devotees. However, on some other

components the Participant Devotees seem to have similar views of modding practices as a Serious Leisure activity to Moderate and Core Devotees, compared to Novice Devotees. Their sense of enjoyment is also not significantly different to that of Moderate devotees, indicating potential progression through enjoyment. Participant Devotees' views in terms of Group and Unique Ethos, Persistence and Progress, Personal Abilities and Effort appear different to that of Moderate and Core Devotees. Moderate devotees expressed significant differences in their views from Novice Devotees except for Financial Return. They reported significantly different views from Participants in terms of Group and Unique ethos, Persistence and Progress, Personal Abilities, Financial Return and Effort. Moderate Devotees and Core Devotee views aligned on all components of serious leisure.

3.6 Purposeful Sampling of Modders

Having established the differences across SLIM components for different devotee groups using statistical methods, we will provide detailed descriptions of typical participants in each group to further identify the nuanced differences across devotee groups using purposeful sampling [48]. In order to this, we assume that homogeneity has already been established within each group by their devotion to modding practices [53]. Typical case purposeful sampling was implemented to highlight commonalities for each devotee group by finding the interquartile range and median of the metrics originally used to distinguish the devotees (i.e., hours per week modding, years modding and the number of mods created). Pseudonyms have been used in our reporting of the typical cases below.

3.6.1 Novice Devotees.

Novice devotees were identified as modders with minimal experience who had spent few hours devoted to modding and produced small number of mods (see page 3.3). In our sample, the average Novice Devotee was 24 years old, with the oldest being 31 years of age. On average, this group devoted 4.5 hours to modding each week, they had 3.8 years of experience and produced around 9 mods (see the Supplementary Materials for more details). Many of the mods created were completed for personal reasons and were/are yet to be published. On average, this group had only one mod accessible online. We identified 13 modders within the interquartile range across the three metrics (i.e., hours per week modding, years modding and number of mods made). Further selection was made based on how close each modder was to each of these three metrics. In total, three modders matched the criteria to represent the typical novice devotee.

Melissa is a 23 years old woman from Germany who spends three hours per week on modding and has only been modding for a year. She started making mods for Sims 4 and now also makes Cosmetic Mods for Stardew Valley and Sims 4. Her reason for focusing on cosmetic modding is that she feels there are limited cosmetic options in both games, and she wants more options. When it comes to modding as a Serious Leisure activity, Melissa finds that turning points and stages of development in her modding have been key motivators, as well as the effort she puts into her modding practices. Interestingly, despite her focus on cosmetic mods, she

isn't motivated by self-expression when it comes to her modding practices.

Grant is a 22 years old man from Sweden currently studying Sustainable Development. He has a preference for making small tweaks through Gameplay Mods, devoting an hour a week to this activity. The only game he has ever made mods for is Total War: Warhammer 2. However, he has used mods for games like Minecraft, Total War:Warhammer 2, Rimworld and Stellaris. His favourite mod out of the seven he has made is a climate tweak which he made so that multiple races can occupy the same climate conditions. He is motivated to mod by his own enjoyment of the process.

Steven is a 21 years old man from Belgium who studies IT. He focuses on making total conversion and add-on mods for Farming Simulator 17. He spends four hours per week devoted to making these modifications. The first game he ever created mods for was Minecraft, and has been modding for two years. His reason for modding is because he likes to learn new things. He doesn't like the idea of asking money for mods, or ever paying for a mod. This is reflected by his lower motivation scores in the SLIM Financial Return component. Steven's modding motivations include the effort he puts into his modding practices, seeing his own progress, and leisure career contingencies.

3.6.2 Participant Devotee. Participant devotees were identified as people who have engaged in modding for a longer period of time than novice modders. They typically spend about nine hours per week in modding, and while slightly older ($M=27.86$, $SD=8.61$), are still relatively new to the practice. They have made more mods than novice devotees, and it is in this category where we saw devotion start to spread to different games and mod types (see Supplementary Materials 1). In total, 39 modders were identified within the interquartile range across the three measures. One modder was an exact median on all measures, and another sitting on the median for two out of three metrics. These two modders were chosen to represent typical participant devotees.

Alex, a 34 years old man from the USA, has been modding for the past three years, and only makes mods for Factorio which is a management simulation based on the construction of a factory. With a full-time job and study load of Aerospace Engineering, he spends about six hours per week on making gameplay and add-on mods. He creates these mods to increase difficulty in Factorio for himself and "increase the feature set of vanilla games to make them more fun". He is highly demotivated by the idea of being paid for modding. He enjoys feeling competent by seeing his progress and persists through hurdles of modding. He uses modding as a form of self-expression.

Gene is an 18-year-old student from Sweden who is currently studying Computer Science. Having started making mods for Skyrim three years ago, he has expanded his modding endeavours to include The Witcher 3. His focus has been on environmental mods for both games because he likes to play at a high graphical fidelity. Gene spends about 10 hours per week devoted to modding. He has worked in a group modding project before. In terms of motivation, Alex feels neutral about modding for financial return. He is highly motivated by his own enjoyment of modding, career

contingencies, showing progress and seeing his own abilities at work, as well as the community aspects he engages with.

3.6.3 Moderate Devotee. Moderate devotees once again showed a higher level of devotion evidenced by dedicating about 13 hours per week to modding, and on average being involved in modding for eight years, with about 54 mods on average (see Supplementary Materials 1). Six modders were identified within the interquartile range on all metrics. One modder had a median value on two measures, and another participant had a median value on one out of three of the metrics. These two modders were chosen to represent typical moderate devotees.

Jenny, a 31-year-old woman from Germany, has been making mods for the past nine years and spends about 10 hours modding each week. She makes various types of mods including cosmetic, environmental, add-on and gameplay mods for Oblivion, and she makes mods because wants to use them herself. Of the 25 mods she has made, she has only published five. This is reflected in her responses to the SLIM. She seems to be highly motivated by enjoyment as well as progress and self-expression, with financial return being her lowest component score on the SLIM scale.

Christopher, a 32 years old man from France, makes mods for Morrowind, Oblivion and various GTA titles (GTA 3, GTA Vice City, GTA San Andreas). Having started in GTA 3, he has been modding for the last eight years and spends about 10 hours on modding per week. He has made various types of mods including gameplay, cosmetic, quests, sexual mods, and joke and humour mods. He mods because of his preferred play style, and to improve his gaming experience. His most downloaded mod is a mod for Morrowind which changes gameplay for those who uses magic in the game for better restoration of magicka. He is highly motivated by sense of self and expressing himself through modding. He is also highly motivated by sense of competence evidenced by his high ratings on persistence in modding, and moments that defined his modding and progress.

3.6.4 Core Devotees. Core devotees on average spend around 30 hours per week modding and have been modding for around 10 years. Core devotees also tend to be involved in more complex mod creation (see Supplementary Materials 5). Nine core devotees were identified within the interquartile range but only one matched one of the median values. The other reported is the closest match to all the of the median values.

Chelsea is one of the mature modders. At 54 years old, working as a cat breeder and a web developer, she has been modding for eight years. Having started modding with Oblivion, she has continued to mod for all the Elders Scrolls games. She has made a total of 14 mods, but published only five mods online. Her focus has been on Quest based and Gameplay mods, and a favourite mod she has made is an update to level up in Oblivion quest lines. She reports dedicating over 21 hours per week to her modding. Contrary to most of the modders surveyed, Chelsea was highly motivated by financial return while ranking components invigoration and renewal, personal fulfilment and self-expression lower.

Dave is a 24-year-old modder from Canada who currently does not appear to be working or studying. He is devoted to modding

games like Metal Gear Solid V: The Phantom Pain. He started modding when he was 13 years old in Halo: Combat Evolved. His favourite mod is a model importer and exporter from Fox Engine (Engine used to make Metal Gear Solid V) to Unity. He mods because he likes to "...reverse-engineer file formats..." and enjoy seeing what the community can do/make with his mods. In the SLIM, he identified as being highly motivated by persistence and progress, enjoyment and personal ability components.

In summary, the purposeful sampling exemplifies the differences across four types of modders. Novice Devotees, with minimal experience and limited hours dedicated to modding, contrast starkly with Core Devotees, who spend an average of 30 hours per week on modding with around a decade of experience. The diverse interests of modders are evident across the groups, with a range from cosmetic and environmental mods to comprehensive gameplay alterations for various games. Despite their differing levels and areas of focus, modders are commonly driven by a passion for self-expression, the enjoyment of the modding process, and a desire to enhance their skills and learning. The financial aspect of modding plays a varying role, being a significant motivator for some while others express a distinct lack of interest in monetary compensation for their modding endeavors. These examples show the diverse landscape of modding, underscoring the myriad ways in which individuals engage with and contribute to the gaming community through their unique modding practices.

4 DISCUSSION

The aims of this study were threefold: 1) operationalize devotion to modding, 2) examine how modders' motivations may differ based on their forms of devotion, and 3) identify how they may vary in their modding practices. Originally based off of Hartel's and Stebbin's research into devotion in Serious Leisure [33, 75], we operationalized devotion by participants' experience ratings, time spent modding and mods created. We categorized modders based on their involvement into four levels of devotion (Novice, Participant, Moderate, and Core devotee). Using the Serious Leisure Perspective as a lens, we examined different forms of devotion to modding, modder practices and what motivates modders within their devotion. Through devotion and Serious Leisure we aimed to identify potential differences across four devotee groups using the SLIM [30, 75]. We used Principal Component Analysis to ascertain that the SLIM scale had the same component loadings in the context of modding. After establishing a 10-component measure using our sample, we then ran a series of Kruskal-Wallis H tests to compare modding motivations across four devotion groups to answer our second research question (What are the motivations of modders with different form of devotion to modding?) Finally, using a purposeful sampling, we provided example cases of representative modders from each four devotion level to underline unique characteristics of modders within each group.

Through this systematic process, we were able to identify what modders within different categories of devotion may look like and how their interest in modding may contribute to the craft of modding. Thus, Serious Leisure allowed for a deeper understanding of the modding practices and modders motivations, expanding on

participatory culture perspectives that are supported through relatively low entry barriers, and adding to our knowledge of how variations in motivation, and associated individual and social behaviours, influence contributions to modding [39, 52].

4.1 Modding Practices of Devotees

Building on Hartel's original scale and Stebbin's research into devotion [34, 35, 75], our findings show evidence that modding behaviour can be conceptualised through categories of devotion that are operationalized based on experience levels and modding habits. Analysis of modding practices across devotee groups found that those who reported greater levels of experience spent more time modding, had been engaged in modding for a longer period of time, created more mods and published more mods. For example, we found Novice Devotees spend the least time modding per week (around 4.5 hours) among the four devotee groups whereas Core Devotees spend the most time (around 30 hours). This pattern was evidenced in our purposeful sampling. Novice devotee Melissa spends three hours on average per week modding and has been modding for about one year in contrast to core devotee, Chelsea, who dedicates over 20 hours per week to modding, has been modding for eight years and is motivated by financial return.

Our research demonstrates that across all modding categories, gameplay mods are the most popular. These type of mods aim to change the way people play a videogame such as adding new character abilities. The results also show a change in proportion of activity that involves gameplay modding increases with the level of devotion (i.e. 47.1 percent for novice devotees increasing to 77.8 percent for core devotees). Interest in cosmetic mods appeared to be relatively stable at between 32-35 percent for all groups. Novice devotees were less interested in environmental mods than the other groups. Core devotees tended to have a higher interest in more technical and complex modding pursuits including environmental, add-on and total conversion mods. Across the devotee groups, Moderate and Core Devotees seem to be engaging in total Conversion mods more than their Novice and Participant Devotee counterparts. Creating a total conversion mod is similar to creating an entirely new gaming experience for players and typically requires significant amount of knowledge, skills, and time dedication. Those with more self-reported experience levels, and presumably more confidence in their modding ability, appear more willing to engage in these larger and more complex modding activities.

Research findings demonstrate the breadth of titles being modified by modders, as does our purposeful sampling. Results show strong interest in Bethesda titles such as the Elders Scrolls and Fallout series and this may be due to the support provided by the company which allows ready access to modding practices [8]. In our purposeful sample group, titles being modded included Stardew Valley, particularly popular amongst women modders [78], Total War: Warhammer 2 [18], Farming Simulator 17 [28], Factorio [85], and The Witcher 3 [14].

Most modders stated that they started modding because they were interested in a particular videogame or series of videogames. In some instances, participants engaged in modding videogames with similar mechanics to those they were interested in or enjoyed. This pattern is demonstrated by participant devotee, Alex, who

plays Factorio and has been modding the game for personal satisfaction for three years. While some modders continue to mod the same game, the results show that across all categories devotees reported switching between different games or series of games. For example, a novice devotee, Melissa moved from Sims 4 to Stardew Valley. Similarly, some changes in modding interests was evident for Participant Devotees. For example, Gene reported moving from modding for Skyrim to Witcher 3. Christopher, one of the Moderate Devotees, shows similar change from modding Elders Scrolls titles [5–7] to the GTA series [22, 60, 61], both open-world focused genres.

In the purposeful sampling, we also found evidence of a positive relationship between the types of mods created and the level of devotion. While the Novice and Participant devotees like Steven and Gene stated focusing on one to two different mod types, those we identified as Moderate and Core devotees, like Christopher and Dave, averaged more than two types of mods. It seems that there is a relationship between the levels of devotion, interest, time spent in modding, the number of mod types created and the number of videogames modded. In summary, the findings from our mixed methods study show evidence that modding practices and devotion are related. Devotion, initially conceptualised based on the reported experience level of modders, not only reflects the number of hours and years of experience of a modder, it reveals an emerging dedication that builds on interests in particular videogames and videogame mechanics. Greater devotion results in more complex and intense modding behaviours, as well as a deeper and more varied connection with modding activities.

4.2 Serious Leisure Motivations of Devotees

We examined the key serious leisure motivations of modders across devotion categories using the SLIM. Novices showed statistically significant lower motivation levels compared to other devotees in most components with the exceptions of enjoyment and financial return (see Supplementary Materials 4). This finding demonstrates their motivation to engage in modding was largely differentiated from that of all other modders and indicates that an intensification of modding practice to move beyond novice engagement requires substantial shifts in levels of personal fulfilment, feelings of efficacy, and connection with community and purpose. This finding aligns with previous Serious Leisure research that demonstrates less devoted participants of golfing activities placing emphasis on balancing golf with other hobbies and not actively looking for friendship through their Serious Leisure activity [69]. Reported lower levels of motivation for each component by novice devotees is likely due to their relative inexperience compared to other groups. For example, novice devotees may not have enough experience to feel competent in their abilities, to be able to express themselves as effectively as they would like, or to identify communities or groups to join. In general, participant devotees reported higher levels of motivation across all components, indicating that experience level is linked to motivation in varied ways.

Moderate and Core devotees expressed higher levels of motivation across all ten components of the SLIM, demonstrating that engagement is driven by those components associated with positive psychological components such as enjoyment, fulfilment,

self-expression and invigoration, as well as those associated with tackling challenges (e.g., effort, persistence, and ability) and collaborative contributions. Moderate and Core devotees are similar in their motivations, as evidenced by the non-significant differences in their ratings across the ten SLIM components. This finding indicates that once modders reach a threshold level of experience, motivations become consistent and stretch across the areas of personal, collaborative, and challenge-oriented fulfilment. However, the similarities between these two groups may also be explained by the small number of Core devotees represented in this study, and that with a greater number of modders we might see more significant differences.

Our results found that all modders were highly motivated by enjoyment as a self-gratification. Overall, the findings from both the SLIM and purposeful sampling analyses indicate that enjoyment is a key factor in choosing modding as a leisure activity. This supports the findings from prior modding research stating that enjoyment is an important factor to engage in modding [31, 36, 65, 70, 78]. There were significant increases in the enjoyment of more experienced groups compared with less experienced devotees. For example, there was a significant difference between reported enjoyment levels of Novice devotees compared with Moderate devotees. In alignment with flow theory [74], an increase in enjoyment may occur when the skill and experience of an individual increases, and the relative inexperience of novices may be reflected in these findings. There were significant differences for the SLIM components of Group and Unique Ethos, Persistence and Progress, Personal Ability and Effort across all devotee groups, except when comparing Moderate and Core devotees. Novice and Participant devotees seemed to be less motivated by community aspects of modding compared to Moderate and Core devotees, and this result indicates that more experienced and devoted modders value interactions with and feedback from the modding community, as well as helping the community and gaining reputation. Moderate and Core devotees appear motivated to improve their skills and overcome obstacles and appreciate the influence that modding has in shaping their creative practice.

Participant, Moderate and Core devotees rated their Personal Fulfilment, Self Expression, and Invigoration and Renewal components similarly, while Novices rated these lower than the other devotee groups. It is likely that after reaching a certain level of devotion and intensity in modding, identity aspect becomes more central. Modders with higher levels of devotion are invigorated by engaging in self-expression through the creative practice. Being able to express their identity through mods they create and share becomes the key motivator for modders like Alex, Gene, Jenny and Chelsea.

Financial Return was overall the lowest ranked SLIM component across all devotees, a result which supports the prior Serious Leisure research [29, 75] and studies that have found that this factor can be detrimental to enjoyment of modding [2, 46]. The only significant differences were between novice and core devotees, participant and moderate devotees, and participant and core devotees. While they still reported not expecting a major financial return from modding in their open-response answers, moderate and core devotees like Chelsea tended to rank financial return higher than the other groups, implying that these groups understand the potential of modding as an occupational devotion. Modding as an activity may

be linked to a desire to find a job in videogame industry [54, 55]. Participants' attitudes towards financial return aligns with previous research on the commodification of modders [82], playbour [46] and co-creation [2], which highlight the potential for adverse implications of financial return for hobbyist activity. Striking an appropriate balance between creative practice and labour is important [3, 12, 15, 29], particularly as it appears that modders may be less reliant on economic motivators and place more value on a sense of personal progression, competency and contribution to collective play practices [16].

An analysis of the results of the neighbouring devotee categories, that is comparing Novice to Participant devotees, Participant to Moderate devotees, and moderate to Core devotees, yielded interesting findings. As mentioned, enjoyment appeared to be a universal motivator and was rated highly across all devotee categories. Our analysis shows no significant differences across any of the neighbouring categories. While reported enjoyment does increase with devotion level, increases are not significantly different until the level of devotion changes substantially. This result implies a gradual change as devotion increases. The analysis also highlighted that those motivations that align with personal attributes such as personal fulfilment, invigoration and renewal and self-expression, while significantly different when comparing novice and participant devotees, did not yield significant results across participant and moderate devotees, or for moderate and core devotees. It may be that enjoyment draws modders in to this serious leisure activity and those who become slightly more experienced are able to achieve and maintain a positive sense of fulfilment and creative expression that keeps them invigorated and engaged in modding practices. In addition, these two neighbouring groups have similar levels of motivation when it comes to feelings of being able to shape and influence their modding practices (as defined by the career contingencies component). Significant differences are observed across the motivational components of persistence and progress, personal abilities, and effort when comparing novice and participant devotees, participant and moderate devotees, and moderate and core devotees.

This step-wise change in skill-oriented motivational influences across these three neighbouring category demonstrates the impact that perceived ability has on intensifying engagement in a hobbyist activity. It appears that the first step in strengthening engagement in modding is the provision of an environment that allows enjoyment to evolve into self-expression and a sense of fulfilment and meaningful involvement. The second step in this intensification process involves modders developing a strong sense of competence through an environment that rewards persistence and effort. Research suggests that activities that provide devotees with challenge, potential to develop skills, and control may facilitate flow [74], which may be experienced in modding.

In summary, our findings show evidence that there is a positive relationship between the increased levels of devotion and the motivation in modding and community building. Enjoyment is the important starting point, with modders more likely to become devoted to modding when they experience personal fulfilment and accomplishment, have opportunities for self-expression and feel the influence of modding activity (i.e., career contingencies). Feelings

of competence and skill, along with revelling the ability to overcome challenges and the drive to collaborate in community-based endeavours, are important motivators for more devoted modders. As a community, it is important to acknowledge and make space for those individual modders who are primarily motivated by enjoyment. These modders are embracing the 'easy' fun enable through simple gameplay, cosmetic and add-on modding. Equally, the community needs to be inclusive of those who are looking to experience modding solely as an avenue for self-expression and personal fulfilment. These are the modders who are looking for 'creative' fun and appreciate accessible and expressive modding environments that allow them to engage in gameplay, cosmetic and environmental modding. And finally, the community needs to acknowledge and appreciate moderate and core devotees. These are the community connectors and the visible public face of modding, those who publish and engage in discourse and commentary. These are the modders who are embracing the 'hard' fun of modding, tackling total conversion modding projects, and are open to opportunities to be challenged and contribute in new and interesting ways. By acknowledging that there is not one category of modder, we can start to think about what existing modding environments and communities offer and how they might be better designed for easy, creative and hard fun modding experiences.

5 LIMITATIONS

This study has limitations. While we were able operationalize different categories of devotees based on multiple metrics and a Likert scale experience question, these are all subjective and are not based on objective data. In addition, this was a single cross-sectional survey study which asked participants to reflect back to their practices from the start of their modding journey. We acknowledge that it is not possible to refer to longitudinal changes and behaviors from a single survey study which limits our understanding of how one's devotion to the activity may evolve or devolve over time. Thus, we cannot make causal claims on the relation between the levels of devotion, practices and motivations. It is correlational. There is a need for longitudinal studies to have a better understanding of how devotion to modding may change over time across the metrics we identified and others that are yet to be discovered. While this study gathered data from a large number of modders, our sample included few Novice and Core Devotees compared to Participant and Moderate ones. It is likely that there are fewer Core Devotees compared to others which may reflect the actual numbers. However, we estimate there are more Novice Devotees than what is represented in our sample. Due to the methods that we employed to recruit participants (i.e., posting on online modding forums) we might not have reached those groups of modders. Future studies may aim to expand their recruitment strategies to reach broader range of modders.

6 CONCLUSION

This paper contributes to the growing body of knowledge around the motivations and practices of modders by examining modders across different forms of devotion to modding. RQ1 focused on understanding modding practices. Within our participant sample, we found modders like Jenny, who were interested in modding a

single videogame or a series of videogames, others, like Gene, who invested in specific game genres or types of mods, and those like Christopher, who modded a variety of games, genres and mod types. Our findings showed that level of devotion to modding influences modding practices and reflects varied motivational drivers. Results demonstrate that novice modders often develop mods for their own use, focusing on simple mod types. Those with greater devotion tend to create a wider variety of mods, with increasing complexity. Those more devoted to modding were more likely to become engaged in a modding community, collaborating on projects and publishing their work. Our research demonstrates that modding communities comprise many modders who work alone, potentially in parallel, to produce outcomes for their own benefit and satisfaction. From the outside, modding may look like a public enterprise, but for many it is a personal and private hobby. Environments that are accepting of novice modding activity that emerges from an interest in a particular game or game mechanic is important for the growth of modding communities. These should be spaces that encourage private exploration and experimentation in safe and welcoming ways, and that provide mechanisms for creative expression and skill development through practice-based engagement. Conversely, these communities thrive on the collaborative and complex enterprises, public contributions and active discourses that engage more devoted modders. For some, like Dave, who enjoys seeing what the community does with his mods, an initial interest or intention to create mods appears to have become a life-long leisure career. Mechanisms that support the activities of more devoted modders are equally important within modding communities.

Expanding on previous research we applied a Serious Leisure Perspective to address RQ2 to understand the motivations of those with different forms of devotion to modding. We investigated modder motivations quantitatively using statistical analyses and qualitatively in purposeful sampling. Regardless of their level of devotion, a common motivation for all modders was the sense of enjoyment they receive from engaging in their craft. It appears that enjoyment is the motivational driver that promotes modding activity for those who have progressed from playing a game to creating a mod for that game or game series. Self-expression and a sense of identity are motivators that emerge for participant devotees. Increased experience levels appear to allow modders to produce satisfying and invigorating external expressions that align with their internal experiences (i.e., the game-based experiences that they value and feel strongly about). For moderate and core devotees, who look very similar in terms of motivation, drivers become more challenge and skill oriented. At the same time, group orientation motivation emerges as a significant differentiator. Our results show that any modding community might include those looking for easy fun, those motivated by creative fun, those seeking the challenge of hard fun, and those invested in community fun. Sustaining modding contributions across this spectrum is important for those industry and community enterprises looking to promote and grow modding activity.

Interesting, there is limited evidence to suggest that financial reward is a significant motivator for many modders, which points to the importance of intrinsic rather than extrinsic motivation for this community. Even those, like Dave, who are publishing their mods to see what the community does with them, appear motivated

by a sense of personal achievement, rather than external validation or financial reward. This finding aligns with previous research that has investigated the intersection of hobbyist activity and labour [3, 12, 15, 29].

Understanding what motivates modders to begin and continue modding as well as the types of mods they create through their devotion may enable game developers and larger modding communities to provide greater support for modders and their activities. As echoed in other modding research, there is a need to further understand modders as a community and how best to represent them within the larger gaming ecosystem [2, 54, 82]. Our approach utilises an established theory, the Serious Leisure Framework, to provide further insight into this community and help conceptualise modding as a Serious Leisure activity. Our findings demonstrate that modding communities are not homogeneous in terms of modding practices or motivations. While it is obvious that any hobbyist community will include those with varying experience levels, our research has revealed the variety of practices and motivations that result from these differences. Any modding community will include those who are strongly linked through collaborative activity and shared purpose, those who are loosely linked through a passion for self-expression, and those who dabble because they find it fun to do so. The exploration of modding devotion through a Serious Leisure framework has provided us with new insights into who modders are and how they are connected to their craft.

Future research may investigate the application of Serious Leisure and devotion to modding further to shed light to further potential differences between moderate and Core devotees. The extent to which industry involvement may support or hinder those moderate and Core devotees who are interested in investing in modding as an occupational devotion is another area for exploration. Investigating how modders transition from one level of devotion to another is a rich area of study, particularly with respect to how community and industry partners might support this transition. How gameplay influences modding and modding influences gameplay is also a question that warrants further investigation, particularly in light of our findings which demonstrate the strong influence that particular videogames and game mechanics have on modder practices. How videogame communities intersect with modder communities is also of interest from this perspective. From theoretical perspective, there is a need to investigate modding practices through different lenses, such as Gaming Capital as a way to understand people's interaction with games, information about games, the game industry and other players [17] and participatory culture [39]. This research may provide insights beyond those found through the application of a Serious Leisure perspective [75]. Finally, recognising the diversity of modders is important, and there is a need to investigate how individual differences such as sexuality, gender and racial identity may influence engagements in modding as a hobby.

REFERENCES

- [1] Chee Siang Ang, Panayiotis Zaphiris, and Stephanie Wilson. 2010. Computer Games and Sociocultural Play: An Activity Theoretical Perspective. *Games and Culture* 5, 4 (2010), 354–380. <https://doi.org/10.1177/1555412009360411>
- [2] John Banks and Sal Humphreys. 2008. The Labour of User Co-Creators: Emergent Social Network Markets? *Convergence* 14, 4 (2008), 401–418. <https://doi.org/10.1177/1354856508094660>

- [3] Carla Barbieri and Sandra Sotomayor. 2013. Surf Travel Behavior and Destination Preferences: An Application of the Serious Leisure Inventory and Measure. *Tourism Management* 35 (April 2013), 111–121. <https://doi.org/10.1016/j.tourman.2012.06.005>
- [4] Alan S Bellack and Michel Hersen. 1998. *Comprehensive clinical psychology*. Pergamon Amsterdam, New York.
- [5] Bethesda Game Studios. 2002. *The Elder Scrolls III: Morrowind*. Bethesda Softworks.
- [6] Bethesda Game Studios. 2006. *The Elder Scrolls IV: Oblivion*. Bethesda Softworks.
- [7] Bethesda Game Studios. 2011. *The Elder Scrolls V: Skyrim*. Bethesda Softworks.
- [8] Bethesda Softworks. 2021. *Creation Kit*. <https://www.creationkit.com/>.
- [9] Katarzyna Bilińska-Reformat, Anna Dewalska-Opitek, and Magdalena Hofman-Kohlmeier. 2020. To mod or not to mod—an empirical study on game modding as customer value co-creation. *Sustainability (Switzerland)* 12, 21 (2020), 1–16. <https://doi.org/10.3390/su12219014>
- [10] Blizzard Entertainment. 2004. *World of Warcraft (WOW)*. Blizzard Entertainment.
- [11] Jo Bryce and Jason Rutter. 2003. The Gendering of Computer Gaming: Experience and Space. *Leisure Cultures Investigations in Sport Media and Technology* 79 (2003), 3–22. <https://doi.org/10.1080/0261436032000048966>
- [12] Ergin Bulut. 2013. Seeing and Playing as Labor: Toward a Visual Materialist Pedagogy of Video Games Through Walter Benjamin. *Review of Education, Pedagogy, and Cultural Studies* 35 (11 2013), 408–425. Issue 5. <https://doi.org/10.1080/10714413.2013.842864>
- [13] R. B. Cattell. 2010. Multivariate Behavioral Translator disclaimer The Scree Test For The Number Of Factors. *Multivariate behavioral research* 1, 2 (2010), 2010. <https://doi.org/10.1207/s15327906mbr0102>
- [14] CD Projekt Red. 2015. *The Witcher 3: Wild Hunt*. CD Projekt.
- [15] Aleena Chia. 2020. Productive leisure in post-Fordist fandom. *Journal of Fandom Studies, The* 8, 1 (2020), 47–63. https://doi.org/10.1386/jfs_00009_1
- [16] Aleena Chia. 2021. 2. Self-Making and Game Making in the Future of Work. *Game Production Studies* (2021), 47.
- [17] Mia Consalvo. 2007. *Cheating: Gaining Advantage in Videogames*. MIT Press. https://is.muni.cz/el/1421/podzim2014/IM082/um/Consalvo_Cheating_Gaining_Advantage_in_Videogames.pdf
- [18] Creative Assembly. 2017. *Total War: Warhammer II*. Sega.
- [19] Robert Cuthbert, Selen Türkay, and Ross Brown. 2019. The effects of customisation on player experiences and motivation in a virtual reality game. In *Proceedings of the 31st Australian Conference on Human-Computer-Interaction*. 221–232.
- [20] Dheuster. 2010. *Extra Dog Slot*. <https://www.nexusmods.com/dragonage/mods/664>
- [21] Alexis Dinno. 2015. Nonparametric pairwise multiple comparisons in independent groups using Dunn’s test. *The Stata Journal* 15, 1 (2015), 292–300.
- [22] DMA Design. 2001. *Grand Theft Auto III*. Rockstar Games.
- [23] Eric Ellis. 2014. *Productive Play: Exploring Participant Motivations of a Modding Community Surrounding a Massively Multiplayer Online Game*. Ph. D. Dissertation. Pepperdine University.
- [24] FlashShifter. 2019. *FlashShifter Stardew Valley Expanded*. Patreon. <https://www.patreon.com/StardewValleyExpanded>.
- [25] Maxwell Foxman. 2018. *Playing with Virtual Reality: Early Adopters of Commercial Immersive Technology*. <https://doi.org/10.7916/D8M05NH3>
- [26] Joana Freitas. 2021. Kill the Orchestra: On Music, Mods, and Immersion in The Elder Scrolls on the Nexus Mods Platform. *Journal of Sound and Music in Games* 2, 2 (2021), 22–41.
- [27] Don Getz and Tommy D. Andersson. 2010. The Event-Tourist Career Trajectory: A Study of High-Involvement Amateur Distance Runners. *Scandinavian Journal of Hospitality and Tourism* 10, 4 (2010), 468–491. <https://doi.org/10.1080/15022250.2010.524981>
- [28] Giants Software. 11 No25 October 2016vember 2011. *Farming Simulator 17*. Astragon, Focus Home Interactive.
- [29] James Gould, Dwayne Moore, Nancy J. Karlin, Diane B. Gaede, Joseph Walker, and Andy R. Dotterweich. 2011. Measuring Serious Leisure in Chess: Model Confirmation and Method Bias. *Leisure Sciences* 33, 4 (2011), 332–340. <https://doi.org/10.1080/01490400.2011.583165>
- [30] James Gould, DeWayne Moore, Francis McGuire, and Robert A. Stebbins. 2008. The Development of a Serious Leisure Inventory and Measure. *Journal of Leisure Research* 40, 1 (2008), 47–68. <https://doi.org/10.1080/00222216.2008.11950132>
- [31] Eleonora Hackman and Ulfrik Björkqvist. 2014. *Modders of Skyrim: Motivations and Modifications*. Ph. D. Dissertation.
- [32] Kirstin Hallmann, Laura Bogner, Kathrin Sander, and Konrad Reuß. 2022. Sport for a Livelihood and Well-being: From Leisure Activity to Occupational Devotion. *International Journal of the Sociology of Leisure* 5, 1 (2022), 55–77.
- [33] Jenna Hartel. 2009. Leisure and Hobby Information and Its Users. *Encyclopedia of Library and Information Sciences, Third Edition* (2009), 3263–3274. <https://doi.org/10.1081/E-ELIS3-120043076>
- [34] Jenna Hartel. 2014. An interdisciplinary platform for information behavior research in the liberal arts hobby. *Journal of Documentation* 70 (9 2014), 945–962. Issue 5. <https://doi.org/10.1108/JD-08-2013-0110>
- [35] Jenna Hartel, Andrew M. Cox, and Brian L. Griffin. 2016. Information Activity in Serious Leisure. *Information Research* 21, 4 (2016).
- [36] Eero Hirvonen. 2017. *Improving the Game With User Generated Content : An Overview of Skyrim Mod Users*. Ph. D. Dissertation. University of Jyväskylä.
- [37] Humble Bundle Inc. 2021. *Humble Bundle*.
- [38] IBIBIH. 2016. *TSR- The Simsresources*. <https://www.thesimsresource.com>.
- [39] Henry Jenkins. 2013. *Textual Poachers* (20th anniv ed.). Vol. 1. Routledge, New York, New York, USA. 1–2 pages. <https://doi.org/10.1017/CBO9781107415324.004> arXiv:arXiv:1011.1669v3
- [40] Andrew Johnson, Preston Nevins, and Rob Romanchuk. 2013. *Castle Smurfenstein*. <https://www.evl.uic.edu/aej/smurf.html>
- [41] Kristine Jørgensen, Ulf Sandqvist, and Olli Sotamaa. 2017. From Hobbyists to Entrepreneurs. *Convergence* 23, 5 (2017), 457–476. <https://doi.org/10.1177/1354856515617853>
- [42] Daniel James Joseph. 2018. *The Discourse of Digital Dispossession : Paid Modifications and Community Crisis on Steam*. *Games and Culture* (2018), 1–18. <https://doi.org/10.1177/1555412018756488>
- [43] Henry F. Kaiser. 1974. An index of factorial simplicity. *Psychometrika* 39, 1 (01 Mar 1974), 31–36. <https://doi.org/10.1007/BF02291575>
- [44] Keunyeong Kim, Michael G. Schmierbach, Saraswathi Bellur, Mun Young Chung, Julia Daisy Fraustino, Frank Dardis, and Lee Ahern. 2015. Is It a Sense of Autonomy, Control, or Attachment? Exploring the Effects of in-Game Customization on Game Enjoyment. *Computers in Human Behavior* 48 (2015), 695–705. <https://doi.org/10.1016/j.chb.2015.02.011>
- [45] Yong Ming Kow and Bonnie A Nardi. 2010. Who Owns Mods? *First Monday* 15, 5 (2010).
- [46] Julian Kücklich. 2005. Precarious playbour: Modders and the digital games industry. *fibreculture* 5, 1 (2005), 1–5.
- [47] Cass Marshall and Polygon. January 6 2021. *Cyberpunk 2077 Modders Are Fixing up the Game*. <https://www.polygon.com/2021/1/6/22215667/cyberpunk-2077-mod-scene-third-person-view-minimap-change-v-appearance>.
- [48] Sandra Mathison. 2013. Purposeful Sampling. *Encyclopedia of Evaluation* (2013). <https://doi.org/10.4135/9781412950558.n453>
- [49] Maxis. 2013. *The Sims 4*. Game [PC].
- [50] Kyle Andrew Moody. 2014. *Modders: Changing the game through user-generated content and online communities*. The University of Iowa.
- [51] B Nieborg, David and Shenja van der Graaf. 2008. The Mod Industries The Industrial Logic of Non Market. *European Journal of Culatural Studies* 11, 2 (2008), 177–195. <https://doi.org/1367549407088331>
- [52] David B Nieborg. 2005. Am I Mod or Not? - An Analysis of First Person Shooter Modification Culture. *Creative Gamers Seminar Exploring Participatory Culture in Gaming* (2005), 16.
- [53] Lawrence A. Palinkas, Sarah M. Horwitz, Carla A. Green, Jennifer P. Wisdom, Naihua Duan, and Kimberly Hoagwood. 2015. Purposeful Sampling for Qualitative Data Collection and Analysis in Mixed Method Implementation Research. *Administration and Policy in Mental Health and Mental Health Services Research* 42, 5 (2015), 533–544. <https://doi.org/10.1007/s10488-013-0528-y>
- [54] Nathaniel Poor. 2014. *Computer Game Modders’ Motivations and Sense of Community: A Mixed-Methods Approach*. *New Media and Society* 16, 8 (2014), 1249–1267. <https://doi.org/10.1177/1461444813504266>
- [55] Hector Postigo. 2007. Of Mods and Modders Chasing Down the Value of Fan-Based Digital Game Modifications Introduction: Fan-Programmers in Context. *Games and Culture* 2, 4 (2007), 300–313. <https://doi.org/10.1177/1555412007307955>
- [56] Patrick Prax. 2016. *Co-Creative Game Design as Participatory Alternative Media*. Ph. D. Dissertation. <https://doi.org/10.1017/CBO9781107415324.004>
- [57] L. Price. 2017. *Serious Leisure in the Digital World: Exploring the Information Behaviour of Fan Communities*. November (2017). <https://doi.org/10.1177/0165551516658821>
- [58] Project Vaulderie and Atrblizzard. 2014. *Goodnight, Sweet Prince*. <http://www.projectvaulderie.com/archive/goodnight-sweet-prince/>.
- [59] Reddit. 2021. *Reddit*. <https://www.reddit.com/>.
- [60] Rockstar North. 2002. *Grand Theft Auto: Vice City*. Rockstar Games.
- [61] Rockstar North. 2004. *Grand Theft Auto: San Andreas*. Rockstar Games.
- [62] Melissa J. Rogerson and Martin Gibbs. 2018. Finding Time for Tabletop: Board Game Play and Parenting. *Games and Culture* 13, 3 (2018), 280–300. <https://doi.org/10.1177/1555412016656324>
- [63] Melissa J Rogerson, Martin Gibbs, and Wally Smith. 2019. Understanding the Travel Motivations of Game Hobbyists. *Proceedings of DiGRAA 2019: What’s Next?* 2019 (2019).
- [64] Dongwan Ryu and Jiwon Jeong. 2019. Two Faces of Today’s Learners: Multiple Identity Formation. *Journal of Educational Computing Research* 57, 6 (2019), 1351–1375.
- [65] Walt Scacchi. 2011. Modding as an Open Source Approach to Extending Computer Game Systems. *International Journal of Open Source Software and Processes* 3, 3 (2011), 36–47. <https://doi.org/10.4018/joss.2011070103>
- [66] Robin Scott. 2018. *Nexus Mods*. <https://www.nexusmods.com/>.

- [67] By Sean Cory Targett Regina. 2011. A Study of User Created Interfaces in Video Games. *The University of Regina(Canada)* (2011).
- [68] Yuri Seo. 2016. Professionalized consumption and identity transformations in the field of eSports. *Journal of Business Research* 69, 1 (2016), 264–272.
- [69] Kim L. Siegenthaler and Irma O'Dell. 2003. Older Golfers: Serious Leisure and Successful Aging. *World Leisure Journal* 45 (1 2003), 45–52. Issue 1. <https://doi.org/10.1080/04419057.2003.9674304>
- [70] Olli Sotamaa. 2009. *The Player ' s Game*. Ph.D. Dissertation. University of Tampere.
- [71] Olli Sotamaa. 2010. When the Game Is Not Enough: Motivations and Practices among Computer Game Modding Culture. *Games and Culture* 5, 3 (2010), 239–255. <https://doi.org/10.1177/1555412009359765>
- [72] Robert Stebbins. 2014. *Careers in serious leisure: From dabbler to devotee in search of fulfillment*. Springer.
- [73] Robert A. Stebbins. 2008. Right Leisure: Serious, Casual, or Project-Based? *NeuroRehabilitation* 23, 4 (2008), 335–341.
- [74] Robert A Stebbins. 2010. Flow in serious leisure: Nature and prevalence. *Leisure Studies Association Newsletter* 87 (2010), 21–23.
- [75] Robert A. Stebbins. 2015. Play in Art and Entertainment. , 65-87 pages. https://doi.org/10.1057/9781137513038_5
- [76] SureAI. 2018. Enderal. <https://enderal.com/>.
- [77] Tahira. 2015. War Table - No Waiting. <https://www.nexusmods.com/dragonageinquisition/mods/479>.
- [78] Nicoletta Tancred, Selen Turkey, Nicole Vickery, Peta Wyeth, and Anna McCoombe. 2020. Understanding Women Modders Using the Serious Leisure Perspective. In *Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems* (Honolulu, HI, USA) (CHI '20). Association for Computing Machinery, New York, NY, USA, 1–13. <https://doi.org/10.1145/3313831.3376351>
- [79] Joshua G. Tanenbaum, Amanda M. Williams, Audrey Desjardins, and Karen Tanenbaum. 2013. Democratizing Technology: Pleasure, Utility and Expressiveness in DIY and Maker Practice. *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (2013), 2603–2612. <https://doi.org/10.1145/2470654.2481360>
- [80] L L Thurstone. 1947. *Multiple-factor analysis; a development and expansion of The Vectors of Mind*. University of Chicago Press, Chicago, IL, US. xix, 535–xix, 535 pages.
- [81] Selen Turkey and Sonam Adinolf. 2010. Enjoyment of customization in multi user online games: A survey study with World of Warcraft and City of Heroes/Villains players. In *EdMedia+ Innovate Learning*. Association for the Advancement of Computing in Education (AACE), 592–601.
- [82] Shenja Van der Graaf. 2018. *ComMODify: User Creativity at the Intersection of Commerce and Community*. Springer. <https://doi.org/10.1007/978-3-319-61500-4>
- [83] Richard L. Webb. 2009. *The Online Game Modding Community: A Connectivist Instructional Design for Online Learning*. Ph.D. Dissertation. Capella University.
- [84] Wesp5 and ModDB. 2018. VTMB Unofficial Patch. <https://www.moddb.com/mods/vtmb-unofficial-patch>.
- [85] Wube Software. 2020. Factorio. Wube Software.