Understanding Women Modders using the Serious Leisure Perspective

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ABSTRACT
Modding, the act of custom creation in videogames, is a large enterprise comprising millions of people. Despite the large number of individuals creating mods, our understanding of who modders are and their motivation for modding is limited. This is especially true for minority groups, including women. In prior research with modding communities, women modders were consistently underrepresented. Using a mixed-method survey (N = 68) that incorporates the Serious Leisure Framework, this study begins to unravel women’s participation in modding activities. We begin to identify who women modders are, examine what motivates them to mod, and investigate their modding practices. Results show that women modders value the creation of multiple mod types, including cosmetic, environmental and gameplay modification. They are primarily motivated by self-gratification and enjoyment. These findings create new insights into how women interact with gaming environments, as well as identifying those aspects of the experience that motivate women’s engagement in modding.

Author Keywords
Modders;Modding; Women Modding; Game Modifications; Custom Content; Video Games; Serious Leisure

CCS Concepts
•Human-centered computing → User studies; Human computer interaction (HCI); Participatory design;  
•Software and its engineering → Interactive games;

INTRODUCTION
Modding is described as the action of creating custom content for videogames [73, 75]. It engages millions of people across multiple modding sites around the world. Investment into mod creation by players in videogames has been shown to improve the shelf-life of games [48]. Modding practices demonstrate the strength of individual and community interests in creating and maintaining mod content [18, 74]. Modding can be considered as Serious Leisure, since it typically involves the systematic pursuit of an amateur, hobbyist, or volunteer activity [61]. Studies found that modders find fulfilment in improving or gaining skills as a part of continuing hobbyist or amateur endeavours [49, 59]. Modding is closely related to crafting practices. It is a substantial activity that participants value, and find important and engaging [61].

Previous studies examined motivations of modders and modding practices, investigating modding as a creative endeavour and/or artistic expression [49, 59], as a social experience [59, 47, 15, 22], as a means of gaining ownership [1], and as a mechanism for fixing game flaws [22, 26]. The other common modding motivations are enjoyment of the modding process and increased enjoyment with the modified game [2, 26, 49, 47, 59]. Despite the popularity of and the increasing industry investment in modding, and current research on modding practices, very little is known about different populations of modders. This is especially true for minority groups, including women. Women in modding are either underrepresented or not represented at all in the extant modding research [27, 34, 43, 47, 49, 50, 51, 54, 58, 59]. Often gender demographics are not explicitly mentioned [49] and when they are mentioned there is a large focus on men [59, 47]. As a result, we know very little about what drives women to mod and what their modding practices look like.

To address these research gaps, as part of a larger study on modder behaviors and motivations, this paper investigates the modding motivations and behaviours of women through the lens of the Serious Leisure Framework [61, 20]. In this paper,
we use responses from women participants in an online survey to answer the following research questions (RQ):

RQ1: Who are women modders?
RQ2: What motivates women modders to mod?
RQ3: What do women modders’ modding practices look like? (e.g., What games are they more likely to mod? What types of mods do they create?)

The contributions from our study are threefold. Firstly, we discovered a level of diversity in the women modding population that some may find surprising. The span of age-groups, experience levels, countries, and games being modded is notable. There is no typical women modder. Secondly, unlike previous studies that included mainly men [59, 47, 49], we found that women tend to mod for their personal enjoyment and rarely mod for financial or social reasons. While some women engage in modding as amateurs, embracing professional practices and establishing a public profile, many others are dedicated hobbyists. Modding for these makers and tinkerers provides an avenue for self-expression and personal fulfillment. Many embrace the acquisition of knowledge for its own sake. Finally, women modders create various types of mods including cosmetic, environmental and gameplay mods. This finding debunks any potential public perception that women modder equals cosmetic modder. Women who mod are not one dimensional, but rather are important contributors across a range of modding practices and communities.

BACKGROUND
Modding and Modders
Modding in today’s gaming culture is very different from what it was in its early conception. Today, multiple modding sites available to both players and modders (e.g., ModDB [13], Nexus Mods [53], Steam Workshop [72]). The release of popular games like Skyrim [62] have changed modding for everyone, with Skyrim mods being extremely popular [17, 26] and the most modded game on Nexus Mods since its release [53]. Some modders rely on donation schemes from the popular site Patreon [12] to fund their modding practices. There are also companies which focus solely on modding games [64] and a large portion of the community mod because they love it and not for financial gains [47]. Previous studies have also discussed the potential impacts of mod creation on game legislation, modders, developers and players [73, 27, 34, 35, 49, 58] with animosity towards developers in recent years when trying to engage modders as part of the development cycle [6].

Modders have been described as amateur hobbyists participating in the craft of modding [57, 58], as non-commercial parties who develop modifications and add-ons for games (26) and as co-creators in a participatory activity [27]. Scacchi defines modders as “players of the games they construct” [54] and relates them to free/open software developers [55]. From this it can be interpreted that modders are diverse and their interest may vary, but they share two characteristics: they love the games they mod and they want to change how the game is played.

The research surrounding modders appears to present a relatively comprehensive representation of the modding community. However, the participants involved in these studies were either all men [59], 95.5% men [47] or gender was not specified [49]. When there was a larger number of women involved in a study [26] there was little investigation into the differences between women and men modders. Hirvonen’s [26] thesis study had 14.6% women participants but it did not examine women’s motivations exclusively or comparatively with the men participants. As a result, modding discussions skewed significantly towards understanding men’s modding motivations while women’s modding motivations are typically ignored.

Modder Motivations
Modders in general are motivated by wanting to play the game and have fun [2, 59, 22, 26]. There are also social, creative and personal motivations towards engaging in modding practices [27, 34, 43, 47, 49, 50, 51, 54, 58, 59]. Previous studies identified social aspects of modding such as socialization, collaboration and social forces as one of the main motivations for modding [47, 49, 59]. The social aspects of modding are defined as having a sense of community via engaging in forums [49, 47], wanting to socialise with others, and working on the same modding project [49, 59]. Another common motivation is the desire to fix and improve gameplay or the usability of the game. As seen with the Vampire: The Masquerade - Bloodlines (VTMB) patch mods work on by user Wesp5 for the past 14+ years [74], many modders want to fix their perceived issues with the game content [22, 26, 59]. This motivation also relates to the replay value and continued enjoyment of the game [59, 22, 26, 2]. Research also suggests that some modders mod for creativity, artistic expression or to investigate how mods work [49, 59]. This suggests that the key overarching motivation for many modders is the desire to make the game "their own" [49].

Since the release of many of these modding studies mentioned above, modding communities have changed. With access to multiple sites [72, 53, 29, 13] and the implementation of paid modding schemes [7] the modding communities have evolved. Recent studies have shown that interest in modding as an avenue to a career in the games industry has decreased [47] compared to previous research which noted it as a key motivation [49]. Several studies on modding also included mod users in the data collection, as well as users who made game changes that are not typically associated with modding, such as using cheat codes [26, 56]. The motivation findings in these studies may be skewed by the inclusion of these user groups as their motivations are likely different to modders.

Women Modders and Their Motivations
Women have modded games since the early 1990s, where they created women avatars for games that lacked representation. However, there is little empirical research that investigates women modders [21]. The existing research focuses on the positive influences that modding can have on young women [24, 25, 76]. Particularly getting them interested in Information Technology (IT) and game industry careers [25, 76].
Hayes [24] conducted a workshop case study on using modding to get young women interested in IT careers. The study followed a young girl from the workshop and described her developing a mastery through the creation of cosmetic mods in the Sims [38], a willingness to persist and developing a passion for creating digital art through modding. This passion for modding seemed to shift the young girl’s focus from pursuing art and fashion design to learning computer skills and wanting to pursue an IT centred career.

Even though it is understood that women take a predominantly active role in modding and playing the Sims series [38, 39, 40, 41], there has been little investigation into why they gravitate towards this style of game, who they are and how their modding may differ from their counterparts, men modders. [25, 30, 56, 59]. While studies on the Sims series [38, 39, 40, 41] acknowledge that there may be potential differences, no data is presented to back this up [56]. Even outside of the Sims series [38, 39, 40, 41] these questions remain unanswered as modding research typically only briefly mentions women in modding [47], leaves them out entirely [57, 50, 49] or the women that are included in these studies are not specifically investigated [26, 22]. Therefore, there is a significant gap in the existing research regarding women modders and how they fit into modding communities.

**Serious Leisure Framework and Modding**

The Serious Leisure Framework [61] is used to investigate countless hobbies, from baking to extreme sports, in order to identify the key reasons why individuals engage in these activities. Within the Serious Leisure perspective there are three different forms of leisure identified by Stebbins [61]:

**Serious Leisure:** A commitment to an amateur, hobbyist, or volunteer activity where an individual can improve and express their skills, knowledge and experience of the activity. As the activity is sufficiently substantial, interesting and fulfilling the commitment is long-term.

**Casual Leisure:** An intrinsically rewarding activity that requires little training to enjoy. Whilst pleasurable the activity is relatively short lived.

**Project-Based Leisure:** A creative undertaking that is fairly complicated, infrequent, short lived and completed during an individual’s free time.

Modding practices are closely related to hobby and crafting practices. While previous modding research focused on participatory culture [32, 50, 59], many modding studies describe it as a hobby practice [57, 58, 26, 43, 49]. Hobbies are considered a Serious Leisure activity, where an individual voluntarily partakes in an activity in their free time [23]. While this definition is not focused on modding research, it closely relates to the modding practices identified in previous studies (e.g., [54]). Serious Leisure fits within modding practices, as the systematic pursuit of a hobbyist’s core activity to them is highly interesting, engaging and fulfilling [54, 57, 58, 26, 43, 49]. The use of the word Serious is meant to embody a sense of sincerity and importance in the hobby activities.

This paper applies the Serious Leisure lens [61] to understand modding. Within the Serious Leisure Framework, both Casual and Project-Base Leisure are described by Stebbins [61] as being short lived. Modding, even if it is short-lived in one game, can continue on in another game or game series. Previous research also considered modding to be a more serious and long-lived pursuit [58, 26]. Currently, the Serious Leisure Framework does not appear to be used in Human-Computer Interaction or games research except a study about chess participation [19]. 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. All factors can differ in importance depending on the activity undertaken, for example, in chess, perseverance tends to outweigh the idea of group motivations [19].

**METHODS**

**Participants and Data Collection**

As part of a larger study, we used an online survey to collect data from modding communities by posting a call for participation on over 120 modding forums and sites such as The Sims Resources [29], Nexus Mods [53], subReddits [52] and several niche sites, such as ModDB [13]. Modders of 18 years or older were invited to participate in the survey. A single 12 month Humble Bundle [28] subscription was raffled among the participants who entered their email addresses at the end of the survey.

The final dataset included responses from 483 people who answered all the questions in the survey. The majority of the participants identified as men (n = 393). Table 2 summarizes the characteristics of the women sample in the final dataset (n = 68). 14% of our participants were women which is similar to Hirvonen’s [26] study which contained the highest level of women participants from the previous research.

**Data Collection Instruments**

We collected data on participants’ demographics information (e.g., age, gender, employment status) and modding expertise (e.g., how long they have been modding). Using ‘select all that apply’ with an open-response option, we asked participants to report the types of mods they made (see below for the categories) and the games they modded (e.g., Skyrim, Sims). In an open-response question, we asked their reasons for modding. We also asked for an example mod that they might like to share.

The closed response questions for the types of mods were based on prior work within mod types and online communities. [54, 56, 53]. These are:

- **Cosmetic Mods:** Referring to hairstyles, skins, outfits, etc., much like in character customization interfaces [3].
- **Environmental Mods:** Referring to re-texture mods [44] and immersion mods [37], anything that makes the game environment enhanced or different.
- **Total Conversion Mods:** Referring to when a whole new game, or play experience is made through mod creation [64].
• Add-on Mods: Referring to the Heads Up Display and User Interface mods which are more popular in online games like World of Warcraft (WOW) [16, 68].
• Gameplay Mods: Referring to any mods that change the gameplay in any way, this includes new character classes [10], new abilities [46] and new ways to play the game [42].
• Sex/Sexual mods: Referring to mods that come from LoverssLab [5].
• Joke and Humour Mods: Referring to mods which are not meant to be taken seriously, for example, changing all the dragons in Skyrim [62], into Thomas the Tank Engine [67].
• Patches and Bug Mods: Referring to the unofficial fixes to bugs and broken content in games, like what Wesp 5 does for VTMB [18, 74].

**Serious Leisure Inventory Measure (SLIM):** The Serious Leisure Inventory Measure includes 54 items in 18 components based on the elements from the Serious Leisure Framework [61]. The components are based on the original six distinguishing features of the Serious Leisure Framework. These are:

1. The need to persevere, as in confronting fears like losing or not achieving goals but continuing anyway.
2. Finding a leisure career, which is shaped around turning points and stage of involvement.
3. Career refers to turning points and stages of development within the leisure activity. Career in Serious Leisure is not to be confused with actual career but rather putting in significant personal effort and using skills acquired through knowledge, training, experience and/or skill.
4. Durable benefits, which is split into 8 subcategories (self-actualization, self-enrichment, self-expression, regeneration or renewal of self, feelings of accomplishment, enhancement of self-image, social interaction and sense of belonging) related to self. A part of durable benefits is also having a physical output from the Serious Leisure activity.
5. Unique Ethos or spirit of community refers to most Serious Leisure activities having shared attitudes, perceptions and practices amongst the hobbyists.
6. Being able to identify with your chosen pursuit. Meaning it can become an identifier due to a strong attachment to the hobby.

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, Recreation, Financial Return, Group Attraction, Group Maintenance, Group Accomplishments, Unique Ethos, and Identity (see Appendix 1 in the supplementary materials for all the components).

The SLIM uses a 9-point Likert-type scale (9 = Completely Agree, 8 = Mostly Agree, 7 = Moderately Agree, 6 = Slightly Agree, 5 = Neither Agree nor Disagree, 4 = Slightly Disagree, 3 = Moderately Disagree, 2 = Mostly Disagree, 1 = Completely Disagree).

**Preliminary Component Analysis of the SLIM Data**
The SLIM instrument (with 54 items) has not previously been used within the context of measuring modder motivations. Multiple studies have shown that instruments need to be tested for reliability when used in a new context, including games [36, 71, 69]. Therefore, we needed 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 'mi' to 'meritorious' according to Kaiser [33]. Bartlett's Test of Sphericity was statistically significant (p < .0005), indicating that the data was likely factorizable.

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 [11]. 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 [66]. 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 on Component 2, Recreation and Self items on Component 3, Personal Enrichment and Self-Image on Component 4, Self-Gratification-Enjoyment on Component 5, Self-Expression Individual on component 6, Career Contingencies on Component 7, Ability on Component 8, Financial Return on Component 9 and Effort on Component 10.

In order to ensure reliability of the new components, Cronbach’s alpha was calculated for each component. Each component showed a high level of consistency with all the data (see Table 1).

**Qualitative Data Analysis**
A thematic data analysis was conducted by three researchers, and comprised of several stages [31]. Responses to the open-response question regarding motivations for modding were manually transcribed onto sticky notes, as a process of developing familiarity with the data and coding. These notes were arranged based on similar subject-matter, developing themes. After the initial grouping, the themes were further refined. The results of this thematic analysis were given descriptions and are presented in the results below.
Participants who were students tended to be 26 years old or younger (n = 13). Some participants preferred not to answer this question (8.8%). Among unemployed participants eleven were students. Refer to Table 2 (above) for more regarding participant demographics.

We had participants from four continents: North America, Australia, Europe and Asia. Most participants stated their country of origin as the United States of America (USA)(n = 35, 53.24%). The rest are from a wide range of countries including Germany (n = 7), the United Kingdom (n = 4), Finland (n = 4) and Australia (n = 3).

**Experience in Modding**

Participants reported that they have been modding on average for 4.46 years (SD = 5.21). On a 7-point Likert scale, ranging from 1 = not at all experienced to 7 = extremely experienced, participants rated their experience on average as 4.96 (SD = 1.31) which corresponds to some experience. Only a few rated themselves as being extremely experienced (n = 5).

When we asked the approximate number of mods they had published, participants’ answers ranged from 0 (n = 9) to more than 100 (n = 10). The median number of mods they had published was 14 and the average was 36.86 (SD = 63.33). While there are super modders who rated themselves as a lot or extremely experienced, the majority of the participants published less than 50 mods. Refer to 2 for more details on participants’ modding experiences.

**Games Modded and Mod Types**

Overall, the majority of women tended to mod for role-playing games like Skyrim [62] (n = 16), while the rest modded for Stardew Valley [4] (n = 14), Fallout 4 [63] (n = 4) and the Dragon Age series [8, 9], including Origins (n = 7) and Inquisition (n = 6), as well as simulation games like the Sims 4 [41]. Many participants (n = 32) reported modding other games like VTMB [18] and WoW [16].

| Mod Types          |       |
|--------------------|-------|
| Cosmetic           | 31    |
| Environmental      | 29    |
| Gameplay           | 26    |
| Add-Ons            | 9     |
| Joke and Humour    | 4     |
| Total Conversion   | 3     |
| Sex/Sexual         | 2     |
| Bug Fixes          | 2     |

Table 3. Popular Mod Types of Women Modders

When it comes to the types of mods women modders create there appears to be a high number of participants creating cosmetics mods (see Table 3). Some reported making other mods alongside cosmetic mods, as multiple answers could be given. For example, two participants discussed creating dialogue and story mods, which encompass cosmetic and gameplay mods. Other participants also reported making quest mods (Gameplay Mods), level design mods (Gameplay, Cosmetic and Environmental) and changing the characters to look like Japanese Role-Playing Game characters (Cosmetic).
SLIM Analysis
We report the analysis based on the updated 10 components and outline them below (see Table 4 for descriptive statistics and the number of participants who answered the items in the corresponding components).

Group and Unique Ethos
The Group and Unique Ethos component includes items from Group Maintenance, Unique Ethos, Group Attraction, Group Accomplishments, and two items from the Identity component (i.e., “Others that know me understand that modding is a part of who I am.” and “Others recognize that I identify with modding and modders.”) The average score for this component was 5.34 (SD = 2.06) which indicates that on average participants have a neutral stance towards being part of a group as their modding motivation.

Persistence and Progress
The Persistence and Progress component includes items from the Perseverance, Career Progress and Effort components of the original scale. These items relate to improving skills, overcoming obstacles and progressing when making mods. Persistence and Progress was one of the higher rated components (M = 7.51; SD = 1.27) with most people agreeing that through modding they were overcoming obstacles and improving in their practice. Overall it appears that woman modders feel they are improving their skills, managing obstacles and rising to the challenges that they face.

Invigoration and Renewal
The Invigoration and Renewal component includes items from the Recreation, Self-Gratification-Satisfaction and Self-Actualization components of the original scale. This component measures participants’ sense of gratification and self-actualization through modding. The average score for this component was 6.17 (SD = 1.93) which indicates that women modders find modding to be slightly self-gratifying and self-actualizing.

Personal Fulfilment
The Personal Fulfilment component includes items from Personal Enrichment and Self-Image from the original SLIM. Items include “I have been enriched by modding” and “Modding has enhanced my self image”. The average rating for this component was 6.24 (SD = 2.20) which indicates that participants view modding as personal enrichment to some extent.

Enjoyment
Enjoyment remained the same as the original SLIM Self-Gratification-Enjoyment component. It garnered the most positive responses overall with the majority of women modders agreeing that modding is enjoyable and fun to them. The average rating was 8.08 (SD = 1.36). This supports prior modding research which found that most individuals mod for personal enjoyment [50, 47, 57].

Self Expression
Self-Expression was another component that remained the same as the original SLIM component. This component includes items that aim to measure the extent that individuals can express their identity through modding practices (e.g., “Modding allows me to express who I am”). The average rating was 6.72 (SD = 2.21) which indicates that they believe that modding allows them to express their identity to some extent.

Career Contingencies
The Career Contingencies component also remained the same as the original SLIM component. The use of the term ‘career’ within Serious Leisure refers to the stepping stones in a hobbyist’s practices [61]. When it comes to the items for Career Contingencies they call to specific instances which have defined the participant’s modding experiences (e.g., “There are defining moments within modding that have significantly shaped my involvement in it.”). The average score for this component was 6.15 (SD = 1.94) which indicates that participants could, to some extent, recall specific moments that defined their involvement in modding practices.

Personal Abilities
The Personal Abilities component includes items from the Identity, Self-Actualisation and Self-Expression components of the original scale. These items relate to participant’s modding knowledge and their ability to demonstrate their modding skills and abilities. The average score for this component was 6.36 (SD = 1.79) which indicates that participants show their personal abilities to some extent through modding.

Financial Return
The Financial Return component remained the same as the original SLIM component. It garnered the lowest ratings overall with the majority of women modders disagreeing that they receive monetary benefits for modding. The average rating was 2.37 (SD = 2.31). This supports a previous study that found modders are not motivated by monetary gain when it comes to modding [47] and contradicts assumptions that many modders want jobs in the games industry [50].

Effort
The Effort component included two items from the original SLIM component. One of the items from the original component grouped with the Group and Unique Ethos component (“Others recognize that I identify with modding and modders.”) On average, participants rated their effort in modding as 6.95 (SD = 2.03) which indicates that they put considerable effort into their modding practices.

Qualitative Findings
We asked modders to describe their reasons for modding in an open-ended survey question. The qualitative data analysis was undertaken through thematic analysis using three cycles of review and refinement of codes. The open-response question was not specifically related to the SLIM questionnaire. The categories emerged from the data inductively rather than deductively using SLIM. Analysis of their responses demonstrated that participants described their reasons for modding as focusing on self or the game, or both (see Figure 1). Self-oriented motivations revolved around enjoyment of, and interest in modding, personal satisfaction, community engagement, level of skill, and learning. While Game-oriented motivations centred around creating gameplay, character and aesthetic mods that added variety or fixed game content.
| Factor                        | n  | M    | SD  |
|-------------------------------|----|------|-----|
| Group and Unique Ethos        | 51 | 5.34 | 2.06|
| Persistence and Progress      | 52 | 7.51 | 1.27|
| Invigoration and Renewal      | 51 | 6.17 | 1.93|
| Personal Fulfilment           | 51 | 6.24 | 2.20|
| Enjoyment                     | 49 | 8.08 | 1.36|
| Self Expression               | 52 | 6.72 | 2.21|
| Career Contingencies          | 51 | 6.15 | 1.94|
| Personal Abilities            | 51 | 6.36 | 1.79|
| Financial Return              | 50 | 2.37 | 2.31|
| Effort                        | 52 | 6.95 | 2.03|

Table 4. Updated SLIM Components and corresponding descriptive statistics

Modding for the intrinsic enjoyment of modding was one of the self-oriented motivations described by participants:

- On creating Cosmetic, Environmental and Gameplay mods: "These types of mods are what I have the most interest in." Participant 55 (Age 34, USA)

- Community engagement: "I enjoy creating new content for the community to use." Participant 19 (Age 23, USA)

As highlighted by Participant 19 (above), for some participants personal enjoyment and satisfaction may also have stemmed from engaging with the community. Example responses from the participants who discussed different aspects of community engagement included:

- Releasing games: "I am quite proud of my work so I love sharing them in the form of mods." Participant 7 (Age 20, Australia)

- Soliciting support for modding activities: "... I make a request to find someone who can [implement a particular mod component]." Participant 32 (Age 26, Australia)

- Helping others: "I started combining cosmetic (SIC) edits for my own use, and help others do so." Participant 49 (Age 31, USA);

- Taking suggestions from others: "I started making Expanded Access to access parts of maps with collectables, and expanded with suggestions from others." Participant 49 (Age 31, USA)

Deriving satisfaction from modding was a motivation for some modders, such as Participant 26 (below):

- "Once I started getting the hang of it, it became a form of voyeurism for me." Participant 26 (Age 25, Poland)

Several participants described their motivation for a specific type of modding in relation to skill or learning. Lack of knowledge or skill in what might be considered a more technical element of game development (i.e. programming) was seen as a motivation for primarily creating cosmetic-based mods:

- "I’m too stupid and incompetent to make anything more complicated." Participant 67 (Age 60, USA); "Because I do not know deeper level programming codes to make structural change type mods..." Participant 32 (Age 26, Australia)

While other participants described their motivation for making mods as practice of their development skills:

- "As I’m already a programmer, those require the least effort to make." Participant 48 (Age 31, Netherlands)

For some participants, their modding practices were driven by a curiosity for how a game works or a desire to develop their skills and learn:

- How a game works: "Seeing the scripting habits and different workflow of different developers, their little personal touches; I find it amusing." Participant 26 (Age 25, Poland);

- Learning new skills: "I also like learning and trying new things, which lets me branch into a lot of areas in modding." Participant 37 (Age 28, USA)

![Figure 1. Qualitative Thematic Analysis](image)

During the thematic analysis, we identified three key types of mods that women participants were motivated to create: gameplay, character and aesthetic. Further consideration was given to these participant motivations, and we identified that participants were generally motivated to create these mods for one of three reasons - for personal fun, to add variety to their gameplay experience, or to fix the game itself. We believe that personal fun has a general alignment to the self-oriented motivations described above, but the participants within this theme also specifically described game-oriented elements which places at the centre of the diagram. While the variety and fixing themes align solely with motivations to improve the game and gameplay experience, motivations for creating mods for personal fun centred around customising gameplay to modders’ preferred play style (gameplay), enjoying the process of creating characters (characters), and enjoying visually impressive games (aesthetics); such as in the experiences described below:

- Gameplay: "I like to play over-powered. The ghost horse cannot die, and the poison arrows kill with one hit." Participant 69 (Age 61, USA);
Rich Examples of Women's Modding Practices

This section describes the modding practices of three women - Sarah, Kelly and Ava (pseudonyms) - who completed the survey. It includes information from their open-ended responses as well as selections they made to the closed response questions. These descriptions also provide a detailed analysis of their responses to the SLIM questions. These participants were chosen due to their unique perspectives on modding. We selected these participants who offered rich and detailed responses to the SLIM questions. These descriptions also provide a detailed analysis of their responses to the closed response questions. Through these detailed descriptions, three examples were chosen to demonstrate the diversity of modding experiences to reveal further insights.

**Sarah** is a 61 year old from the USA. She both uses and makes Skyrim mods. She spends approximately 1 hour per week modding and sees herself as having some to little experience in the area. She has been modding for about 4 years and her first mod was a Skyrim mod. Since she started modding, Sarah has created approximately 12 mods and released 3 on the Steam Workshop. She appreciates this platform as a "place to showcase my work", but feels that game studios should "not be trying to create new revenue streams" from casual modders. Sarah creates gameplay mods. Her most successful mod is not the one she is most proud of. She created mods because she likes to play over-powered - "the ghost horse cannot die". For her, modding is "a labor of love" and she "would not pay for or expect to be paid for mods or modding".

In considering modding as Serious Leisure, Sarah finds the activity highly enjoyable, and it provides a deep sense of invigoration and renewal. She strongly identifies with modding as a form of self-expression and personal fulfillment; engaging in modding has added richness to her life. While she does not feel recognised as a person "devoted" to modding, she agrees that modding is an avenue for displaying her personal abilities. Sarah has been strongly influenced by certain mods, and enjoys interacting with modding enthusiasts. However, she has never engaged in group-based modding and does not seek a sense of accomplishment through interacting with modding groups. Sarah has not received any financial compensation for her modding activities and this is something that she is completely disinterested in.

**Kelly** is a 26 year old from Australia who creates and plays Stardew Valley and Sims mods, and her focus at the moment is on Stardew Valley, which she loves. She spends approximately 10 hours per week creating mods and describes herself as someone with a lot of experience. She has been creating mods for about a year now, and her first mod was for The Sims. Kelly has uploaded her creations to Nexus Mods, and engages with Reddit forums and the Discord Stardew Valley Group. Kelly describes herself as someone that "doesn't have the deeper level programming codes to make structural change type mods" so she primarily creates cosmetic and environmental mods. She has created approximately 20 mods and published one. While she has never been paid and assumes the she will "never be financially compensated for anything", she does not "particularly enjoy the idea of everyone freely benefiting" from her skills. She explains that "it's a large part of the reason why I've only shared one of my creations in public and keep the rest to myself".

Kelly strongly identifies with most qualities of the Serious Leisure Framework, particularly Effort, Persistence and Progress, Invigoration and Renewal, Personal Fulfilment, Enjoyment, Self-expression, Personal Abilities, and Career Contingencies. While Kelly does prefer to associate with others that are devoted to modding, she does not have a strong sense of group and unique ethos. She does not value financial return.

**Ava** is a 54 year old from Canada who is an extremely experienced modder. She has been modding for 8 years and currently spends approximately 21 hours per week engaged in modding activity. Ava has created approximately 9 mods and published 5 of these. She has created mods for Fallout 3, Fallout 4, Skyrim, Morrowind, Oblivion and Dragon Age: Origins and she is currently working on Skyrim, Morrowind and Oblivion mods. She is very proud of her Oblivion mods and one of these has been her most successful. She contributes to the Nexus Mods site and the Assimilation Lab forum. Ava's
reason for creating her most successful Oblivion mod is that it "revamps the levelling system to a style I prefer to play". She primarily works on gameplay and quest mods. She "adds more content" to games if she feels that "is something it needs". Ava has worked on group modding projects.

In considering modding as Serious Leisure, Ava strongly identifies with modding as an avenue for demonstrating her skills and abilities. She also finds it highly enjoyable. Ava receives financial return for her modding efforts and approvals of the Nexus Mod sites donation scheme. She does not view modding as an avenue for Personal Fulfilment, Self-Expression, Invigoration and Renewal, Career Contingencies or Effort. She does however, value her modding persistence, progress and improvement over the years. While she enjoys interacting with other enthusiasts, shares some of the same ideals, and felt a part of her modding group’s accomplishments, Ava does not strongly relate to a unique modding ethos.

DISCUSSION
Overall, the women modding community is diverse. There is variation in the mods they make, the games they mod, their reasons for modding and how they engage in modding communities. In short, there is no typical type of women modder. Our SLIM findings suggest that the majority of women modders find modding fun. While they put a considerable level of effort into their modding practices they are rarely motivated by financial gain. The SLIM findings relating to group modding were relatively neutral but some participants stated in an open-response question that they enjoy sharing mods and helping others. The qualitative findings also showed that women modder motivations are typically self-oriented, game-oriented, or both. This section expands on these findings and is structured around the research questions.

Women Modders
We first aimed to find out more about women modders (RQ1). Our findings identified several qualities of women in modding. Our participants spanned over four continents and participated from many countries. They appear to come from diverse backgrounds and ages with some of our modders older than 61 and others in their 20s. A lot of the participants reported being unemployed, with only some of the unemployed participants being students. This suggests that some of our participants may consider modding as a Serious Leisure activity during their unemployment. While this study did not focus on the role of modding as a hobby during unemployment, future studies may examine its role on women modders’ well-being (e.g., [60]). Our findings shed light on women modders as prior research on modders had minimal to no information on demographics [49] and those that contained women modders did not provide details about their background [47, 26].

Women’s Modding Motivations
Motivations for modding (RQ2) were explored using the SLIM and qualitative data. The results of the SLIM suggests women modders tend to be motivated strongly by the enjoyment of modding based on the Self-Gratification-Enjoyment component (see Table 4). This is supported by the qualitative thematic analysis findings (see Figure 1). These findings suggest that the majority of women modders are motivated by personal enjoyment which supports and extends upon prior research [50, 51, 57, 47]. We also found that social aspect were not a primary motivation for women. However, our qualitative and SLIM findings suggest that there are some exceptions, such as an enjoyment of community engagement. For example, even though Kelly, Sarah and Ava did not relate strongly to the social aspects of modding, they still enjoyed interacting with other modders. However, they showed less interest in other social aspects, such as group-based modding, where only Ava reported engaged in this practice. When asked whether they had worked on a group modding project only 32.4% of participants said that they had. The majority of the women modders either had not worked on a group modding project (50%) or did not answer the question (17.6%). Conversely, previous research focusing on men found this to be a main motivator [49, 47]. However, this is not surprising as previous research also showed that, when compared to men, women are less interested in the social aspects of playing videogames (e.g., [30]). It is possible that the norms and expectations of a majority (i.e. men) could exert pressure on women modders thus influencing their social aspect motivations, however, this would require further investigation.

Our qualitative findings suggest nuances to women modders’ personal fun and enjoyment of modding. Some participants derived personal fun from customising gameplay to their preferred play-style (game-play) while others enjoyed the process of creating characters (characters) and some enjoyed creating visually impressive games (aesthetics). For example, for Sarah, fun in modding is creating overpowered characters. While Ava found changing levelling systems in gameplay mods and creating quest mods fun. Similarly, previous research found that replaying the game in their own way was a key motivation for men modders [59]. This suggests that play-style is an important motivator for both men and women modders. We also found that some women created mods to improve their own person fun and customised gameplay and therefore, they chose not to publish some or all of their mods. This corroborates previous research that discusses players’ desire for ownership of their game experience through modding [59, 2, 70].

Participants showed high levels of Persistence and Progress which indicates they go through stages of development and persistence in modding. This confirms Hayes’ [25] case study findings which found passion in modding where women modders exhibit persistence and grit to work through problems. We see modders like Ava value the persistence and progress through the years she has been modding through her technical skills. Kelly is also a good example of this as she is highly motivated and persistent and puts effort into her modding even though she believes that she lacks the required technical skills. This suggests that through persistence and effort she was still able to value her modding. This contradicts previous findings with men, where motivations like “hacking” [59] and existing technical skills were reasons why men get into modding. Skills and learning are reflected in previous research regarding the effectiveness of teaching young women IT skills through modding and learning modding skills [24, 17, 47].
Participants think that others recognize their effort in modding. For example, Kelly believes that modding is an avenue to display her personal abilities and she scored high in Effort component of the SLIM. The effort put into modding as a motivation towards the creation of new mods has not been explored in previous modding research. While we see items of the SLIM like Invigoration and Renewal, Personal Fulfilment, Career Contingencies and Personal Abilities as positive motivating factors, and strong for certain participants, it does not appear to be the driving forces for the majority of women modders. While some modders (n = 10), like Ava, received compensation for their modding, the majority identified a lack of interest in being paid for their mods as shown by the Financial Return component in the SLIM. This lack of interest, which is shared by Kelly and Sarah, supports and extends prior research by [47].

Modding Practices of Women
Modding practices are as diverse as modders themselves (RQ3). The majority of our participants had published 14 mods, with some participants having published over 100 mods. There is also variation in the number of mods that women modders have created and those that they actually published. The majority of participants have been modding for less than 5 years, spend less than 5 hours a week modding and think that they have some modding experience. Though there were participants who have been modding for over 11 years, spend more than 21 hours a week modding and consider themselves to be extremely experienced. This all suggests that women modders have a variety of modding experience, skill and community engagement. This is also apparent in our examples.

Sarah has been modding for 4 years and currently spends an hour a week modding. In this time she has created 12 mods and only published 3, however, she considers herself to be an inexperienced modder. On the other hand, Kelly has been modding for around a year and spends 10 hours a week modding. In that time she has created 20 mods but has only published one but she considers herself to be a modder with a lot of experience. This suggests that women modders consider modding as both Casual and Serious Leisure depending on their personal commitment, effort and modding motivations [61].

While we do see a large portion of women modders engaging in the creation of cosmetic mods, they also create other types of mods such as environmental and gameplay mods. Given that previous research found evidence that cosmetic mods are very popular (e.g., "clothing" and "clothing:women" were previously the most downloaded Skyrim mods [14]) and players enjoy cosmetic customisation [70], our finding both support and extend upon previous research [24, 25, 56]. However, the interest in environmental and gameplay mod creation are a novel finding with some women modders have significant interest in creating these types of mods, as exemplified with cases of Sarah and Ava who created gameplay mods, and Kelly who created environmental mods.

We also found the games that women choose to mod are fairly diverse. Previous research has often focused on a specific game or game series, especially the Sims series [24, 25]. While some of our participants also created mods for Sims 4, they also modded for a variety of games such as Skyrim, Stardew Valley, Fallout 4 and the Dragon Age series. In the past mainly the Sims series were used to engage women in the STEM and IT fields [24]. However, we found Skyrim and Stardew Valley are more popular games to mod among women. Our findings also suggest that women modders mod for multiple games, sometimes working on more than one game at once. For example, Ava has modded for at least six games and is currently working on mods for three of those games simultaneously.

LIMITATIONS AND FUTURE RESEARCH
While this research included both qualitative and quantitative methods, the data is subjective which may have influenced our results relating to how participant’s perceive themselves. Future research into this area could consider employing objective methods, such as observations and analytics. Our study recruited participants through online forums which means that our participants may already engage with the community which could have influenced our findings surrounding community engagement. Future research may look into other ways of recruitment to gain an in-depth understanding of women modder’s community engagement.

While this paper provides an insight into women modders and their motivations, a more in-depth understanding of their practices and evolving motivations using interviews and other qualitative methods could be beneficial. Future research could also focus on the similarities and differences in men and women’s modding motivations and practices. Our study did not focus on other minority groups. Future research could also work with other demographics and smaller modding groups, such as the LGBTQIA+ community and people of colour, who are underrepresented in modding research even though they are represented in modding communities [45, 65] and games [8, 9, 4]. Working with these demographics and groups would further our understanding of who modders are, why they mod and what they mod.

CONCLUSION
We believe that this paper establishes a foundation for future research focusing on underrepresented groups and their motivations in modding spaces. We found significant diversity in the women modding population. The span of age-groups, experience levels, countries, and games being modded is notable. There is no typical women modder. We found that women modders are invested hobbyists who tend to mod for their personal enjoyment and rarely mod for financial or social reasons. While some engage in modding as amateurs, embracing professional practices and establishing a public profile, many others are hobbyists. Modding for these makers and tinkerers provides an avenue for self-expression and personal fulfilment. Many embrace the acquisition of knowledge for its own sake. Finally, women modders create various types of mods including cosmetic, environmental and gameplay mods. This finding debunks any potential public perception that women modder equals cosmetic modder. Women modders are not one dimensional, but rather are important contributors across a range of modding practices and communities.
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