"Jumping Out from the Pressure of Work and into the Game": Curating Immersive Digital Game Experiences for Post-Work Recovery

JONATHAN MELLA, UCL Interaction Centre, University College London, London, United Kingdom of Great Britain and Northern Ireland
IOANNA IACOVIDES, Department of Computer Science, University of York, York, United Kingdom of Great Britain and Northern Ireland
ANNA COX, UCL Interaction Centre, University College London, London, United Kingdom of Great Britain and Northern Ireland

Extant research demonstrates that playing digital games after work can have a psychologically restorative effect. This article focuses on understanding how players can maximise this effect by strategically leveraging the immersive potential of digital games. For one week, eleven participants played games after work with the aim of developing strategies to support their post-work recovery. A follow-up laddering interview identified various "immersion optimisation" strategies that fulfilled components of successful recovery, such as mental disengagement from work and relaxation. These strategies predominantly focused on cognitive involvement and challenge, neglecting other dimensions of immersion. Based on these findings, we contribute an initial framework of immersion optimisation strategies which can be used to enhance the recovery potential of digital games. We also suggest exploring potential boundary conditions of the immersion optimisation phenomenon and offer methodological reflections on the use of the laddering methodology in this study.

CCS Concepts: • **Human-centered computing → Empirical studies in HCI**;

Additional Key Words and Phrases: Post-work recovery, digital games, immersion, player experience

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1 Introduction

Understanding the impact of digital games upon players' wellbeing is an ongoing topic of interest to games researchers [6, 70]. Though there exists evidence that gaming can have a deleterious impact on players [7], there is also a growing body of evidence that playing games can benefit

Authors' Contact Information: Jonathan Mella, UCL Interaction Centre, University College London, London, United Kingdom of Great Britain and Northern Ireland; e-mail: jon.mella.21@ucl.ac.uk; Ioanna Iacovides, Department of Computer Science, University of York, York, United Kingdom of Great Britain and Northern Ireland; e-mail: jo.iacovides@york.ac.uk; Anna Cox, UCL Interaction Centre, University College London, London, United Kingdom of Great Britain and Northern Ireland; e-mail: anna.cox@ucl.ac.uk.

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wellbeing [28]. For example, playing games can help players cope with stress [36, 44] and difficult life events [13, 30], regulate their emotions [44, 50] and fulfil their basic psychological needs [49]. Another way in which games can benefit psychological wellbeing is by restoring depleted internal resources such as energy and mood (e.g., [9, 46, 64, 65]). The restorative potential of games makes them well-suited for recuperating mental resources that have been taxed during a working day [45]. Indeed, extant research demonstrates that digital games can support this process of 'post-work recovery', which is vital to avoid the deleterious effects of chronic work stress, such as an increased risk of Type II diabetes [32], coronary heart disease [15] and depression [8]. However, there is surprisingly little guidance for players on how to maximise the recovery potential of their post-work gaming episodes. This article aims to address this gap, by exploring some of the strategies that players use to curate immersive gaming experiences which address their post-work recovery needs.

Workers are constantly engaged in a repeating cycle of work and rest, of which post-work recovery forms a key element [71]. A typical workday makes psychological and physical demands on workers [5] which leads to strain reactions that can be physiological, behavioural and subjective in nature [39]. In order to reverse these strain reactions, workers can engage in activities during the 'rest' period of the cycle that fulfil the four qualities of a successful recovery, known as recovery experiences [56]. Firstly, workers benefit from experiencing *psychological detachment*, whereby they mentally disengage from the demands of work. Secondly, workers will ideally achieve *relaxation*: a state of low activation and positive affect. Thirdly, recovery activities should provide workers with opportunities for *mastery*, which refers to an experience of learning and development that is unrelated to work. Finally, a successful recovery can involve a sense of *control* wherein workers feel a sense of autonomy and freedom during their post-work activities. The presence (or lack thereof) of these recovery experiences influences recovery outcomes, i.e., one's physiological and psychological state after a recovery activity [57]. For example, high levels of recovery experiences are associated with greater energy levels, positive affect and work engagement [55].

Existing research demonstrates that some people play digital games for the purpose of recovery during their post-work leisure time [45]. A range of evidence suggests that playing games after work has a beneficial impact on recovery experiences and outcomes. For example, the frequency of digital gameplay is predictive of psychological detachment [17], relaxation, mastery and control [19]. Moreover, prior research has demonstrated that digital games are better at promoting recovery than mindfulness apps [18], watching videoclips [46] or being instructed to relax in the absence of any activity [68].

Building on these findings, researchers have sought to explore the mechanisms underlying the relationship between gaming and recovery. One candidate mechanism is the player experience of immersion: the experience of engagement that occurs during a gaming episode [11, 12]. Immersion has been conceptualised as a multidimensional construct, consisting of five inter-related components: *cognitive involvement*, *emotional involvement*, *real-world dissociation*, *challenge* and *control* [31]. Using a mixed-methods survey approach, Mella and colleagues [41] found evidence that these immersion dimensions play a role when gaming for recovery. For example, cognitive involvement during a gaming episode was a positive predictor of psychological detachment, which was attributed by the authors to a deeper involvement with a game reducing the occurrence of work-related thoughts. Moreover, qualitative data from this study indicated that the immersive experience of challenge influenced whether a recovery episode promoted mastery or relaxation. High levels of challenge provided a foundation for learning and development (allowing for mastery) whereas low challenge experiences reduced the experience of stress and negative affect (which facilitated relaxation).

Though these findings suggest that the experience of immersion when gaming might influence the effectiveness of recovery, they do not demonstrate *how* players could go about leveraging this relationship. This is an important area of study as there is variability in the recovery potential of a given gaming episode. For instance, certain game genres (such as first-person shooters) appear to be predictive of recovery whereas others (such as fighting games) are not [19]. Moreover, recovery varies between participants in experimental studies, despite them playing an identical game [18, 46]. Given that not all gaming episodes are equal with respect to post-work recovery, there is scope to develop our understanding of how players can maximise the benefits of gaming in this wellbeing context.

Notably, Mella and colleagues [41] found evidence for what they termed 'immersion optimisation', whereby some (but not all) players strategically curated the immersive experiences required for their recovery needs. As an example, one participant worked through a mental checklist of easily manageable in-game tasks which gave them a sufficient sense of challenge that they were able to experience mastery. Such strategies provide a promising avenue for providing practical advice to players detailing how they can improve the recovery potential of their post-work gaming episodes. However, the number of strategies identified in this study was limited given that only a subset of participants reported engaging in immersion optimisation. Thus, this article aims to investigate this phenomenon in greater depth to further explore the suite of immersion optimisation strategies available to players.

It should be noted that prior research has identified game features which are able to elicit immersive experiences (e.g., [21, 23, 24, 29, 48]). However, some immersion-promoting features are difficult for players to manipulate for practical reasons, such as the fidelity of the gaming display [10] or the use of virtual reality equipment [43]. Without the ability to alter these game features to curate the required immersive experience, these game features are of limited use for optimisation strategies. Thus, there is scope to identify optimisation strategies which centre on as-of-yet unexplored immersion-facilitating features.

One way to understand the means by which immersion optimisation might occur is to conceptualise the process as a **means-end chain (MEC)**. The MEC model [27] was originally developed in the field of consumer psychology to explain purchasing behaviour. In an MEC, people's interactions with a given product are decomposed into three hierarchically ordered levels: attributes (product features), consequences (the effects of these features upon the person) and values (desired end states arising from consequences). For example, Mandolesi and colleagues [37] found that people are more likely to purchase meat when it has a pleasant appearance (attribute) because this signals that it will have a pleasant taste (consequence) which will bring about enjoyment when eating it (value). Outside of the field of consumer psychology, MEC theory has been applied within games research to explore the interactions between players and games. For example, Abeele and Zaman conducted interviews with young children focused on their gaming experiences and developed MECs in which the values of 'fun'[69] and 'liking to win' [14] were supported by a range of game features (attributes) and player experiences (consequences). Similarly, in a study of older adults playing virtual reality games [22], several key MECs were identified, such as variation in the game (attributes) supporting physical activity (consequence) which in turn facilitated a sense of health and independence (value).

MECs are also applicable to immersion optimisation for post-work recovery. Consider the previous example from Mella et al. [41] in which a player completed manageable in-game tasks to experience the level of challenge required to promote mastery. Conceptualising this as an MEC, the presence of manageable in-game tasks would serve as the attribute. This would be considered a 'concrete' attribute, in the sense that it reflects a specific property of the game, which exists independently from the player [69]. However, attributes can also be 'abstract', in the sense that they represent opinions and attitudes regarding the game that are internal to the player (e.g., finding a game cute; [69]). Seeking to extend upon previously identified examples of attributes in immersion optimisation MECs, the first research question that this study poses is as follows:

RQ1: *What attributes of digital games are used as the basis for immersion optimisation when gaming for the purpose of post-work recovery?*

The consequences of game-related MECs reflect player experiences arising from the attributes of a game [3]. Game consequences can be either functional (immediate experiences that arise directly from specific features found within a game, e.g., challenge and control) or psychosocial (those which are broadly affective in nature and are not tied to a specific game feature, e.g., cognitive involvement, emotional involvement and real-world dissociation; [3, 12, 31]). In the case of immersion optimisation, the consequences reflect the dimensions of immersion which are strategically curated for the purpose of recovery. For example, in the aforementioned optimisation strategy, the consequence of completing manageable in-game tasks was the calibration of challenge. Following on from RQ1, this study seeks to explore the dimensions of immersion which are leveraged in optimisation strategies for post-work recovery. As such, the second research question is:

RQ2: *What are the consequences, in terms of the player experience, when engaging in immersion optimisation for post-work recovery?*

The final level of an MEC consists of values, which refer to desired end states. In keeping with recommendations for applying the MEC model to studies of technology [4], prior research has decomposed values into two sub-levels. For example, in their study of the impact of technology upon sustained wellbeing, [67] distinguished between intrapersonal orientations (psychological variables which drive behaviour, e.g., relaxation) and wellbeing outcomes (aspects of users' psychological functioning, such as positive emotions, which arise from intrapersonal orientations). A similar distinction can be drawn for values related to post-work recovery. Recovery experiences, much like intrapersonal orientations, are thought to be the psychological variables that influence wellbeing outcomes, such as post-work energy and mood [55]. Hence, recovery experiences and outcomes represent values when conceptualising immersion optimisation as an MEC. For example, the value associated with the manageable in-game task strategy was the recovery experience of mastery arising from the sense of challenge. In this article, we aim to further explore which recovery experiences and outcomes are impacted by immersion optimisation. Hence, the third and final research question that this study seeks to answer is:

RQ3: *What values, in the form of recovery experiences and outcomes, are supported by immersion optimisation for post-work recovery?*

In sum, immersion optimisation for post-work recovery can be conceptualised as a MEC, where features of games (attributes) are manipulated to produce particular immersive experiences (consequences), which in turn influences recovery experiences and outcomes (values). This study aims to generate MECs detailing the different strategies players use when optimising immersion as well as the facets of immersion and recovery influenced by said strategies. To this end, we employ a laddering methodology [47]: an interview technique and data analysis approach designed for the elicitation of MECs. Using this methodology, we explore the use of immersion optimisation strategies amongst a sample of workers who used games to recover over a one-week period.

2 Method

2.1 Participants

Eleven participants were recruited for this study through Reddit (including subreddits for survey-sharing, e.g., r/SampleSize, and related to digital games, e.g., r/Steam) and mailing lists. This sample size was chosen to be similar to other technology-related laddering studies (e.g., [67]). Seven participants identified as male and four identified as female. Participants ranged in age from 19 to 41 years (M = 28.1, SD = 10.3). On average, participants estimated that they worked 39.2 hours per week (SD = 7.8). Participants worked in a range of fields, including technology, medicine, retail and education. To be eligible, the participants had to work at least five days during the one-week period that the study lasted. All participants were paid a £45 Amazon voucher for their participation.

2.2 Procedure

To register for the study, participants first read through the information sheet, signed a consent form and then provided some basic demographic information. They were then invited to an orientation meeting, lasting up to one hour via Microsoft Teams. Here, full instructions for their participation in the study were provided. Once they had completed the orientation meeting, the participants began the main study. Over the course of a week, participants played a digital game of their choice after work on their next five working days. If participants worked more than five days during this period, they were only expected to participate in the study on the first five working days. A one-week time period was selected on the basis of a pilot study that indicated this period generated sufficiently rich data for the laddering analysis.

Each post-work gaming session had to last a minimum of 5 minutes. The length of the gaming episode was chosen on the basis that 5-10 minute play sessions are commonplace, particularly amongst smartphone and tablet gamers [58, 59]. Thus, we hoped to include a wider range of digital game players in this study by allowing sessions of this length. All participants had to play at least three different games during the study (on the same or different devices) so that a ranking elicitation technique [47] could be used. This laddering interview technique is designed to support participants with identifying salient product attributes which can be used as the basis for constructing MECs. This is achieved by asking interviewees to rank their preference for a set of products, in this case the digital games that they played. Interviewees provide justifications for these rankings to support the detection of significant product attributes.

For each of their five post-work gaming sessions, participants were tasked with trying to unwind from work as best as they could. They were instructed to develop their own strategies for using the games to unwind from work. Participants were intentionally given no further details on exactly what this unwinding process should entail (i.e., no information about recovery experiences or outcomes were shared). This ensured that participants could explore their own strategies without becoming unduly focused on any particular facet of recovery. We also deliberately instructed participants to develop strategies for using games to unwind from work, as opposed to studying only naturally occurring instances of immersion optimisation. This approach was taken to maximise the number of immersion optimisation MECs. Whilst a degree of ecological validity was lost by ‘forcing’ players to strategise, this was deemed an acceptable compromise given that this phenomenon naturally occurs amongst some digital game players without any researcher intervention [41].

For each post-work gaming session, participants completed an online diary entry in Qualtrics describing their experiences. In these entries, participants described the strategies that they adopted in the gaming session to help them unwind, explained how these strategies were helpful for this unwinding process and outlined any unexpected negative consequences of the strategies that they adopted. These diary entries were not directly subject to analysis but were used in the interviews as a probe to remind the participants of their experiences during the study. The decision was taken to include a diary due to the extended time period over which this study took place, in contrast with a traditional laddering study where the product interaction and interview typically takes place in a single session. Such an approach is similar to that adopted by Midha and colleagues [42] in their study of mental workload. Here, participants were asked to track their mental workload over the course of the week (equivalent to the diary keeping in this study), followed by interviews which were used to generate the primary data for the analyses.

Throughout the period of the study, participants received daily reminder notifications on their smartphones from a diary study app [52]. The first notification served as a reminder to play a game after the participant had finished work. The second notification was sent later and reminded participants to complete their diary entry. The timings of these notifications were unique to each participant, and this was arranged during the orientation meeting based on when the participants felt the notifications would be most useful given their work schedule. However, participants were not required to play their digital game or complete the diary entry at the time the notifications were sent. The notifications simply served as reminders and participants were free to complete these elements of the study at whatever time was most convenient for them.

Within 72 hours of their final diary entry, participants completed their interview with the first author, lasting approximately 1 hour over Microsoft Teams. Participants were sent an electronic copy of their diary prior to the interview, allowing them to refer to their entries throughout. To generate the attributes for the MECs, the ranking elicitation technique was used. Here, participants were asked to think about the strategies that they had used to unwind from work and to rank the games that they played during the study from most to least useful. For each game, participants justified their ranking by answering the question "*What was it about [the game] that made it your first/second/third/fourth fifth choice when thinking about how helpful it was for your strategies to unwind from work?*". For each of the attributes, the interviewer probed for consequences using the standard laddering interview probe: "*why is this important to you?*" [47]. Specifically, participants were asked "*Thinking of the strategies you used to unwind from work, why was [this attribute] important to this strategy?*" Where a consequence was generated, an identical "*why is this important to you?*" probe was used to explore the associated values. An additional prompt was used if participants experienced difficulties moving from (a) attributes to consequences or (b) consequences to values. Here, interviewees were asked to consider what they believed would have occurred had an attribute not been present in the game or if a consequence ceased to occur [69]. If participants were still unable to move to the next level of the MEC, that chain was abandoned by the interviewer and a new chain was attempted starting from another attribute mentioned by the participant. Once the participants had attempted to generate MECs for each of the games they played during the study, they were debriefed and the interview was terminated.

2.3 Summary of Diary Entries and Gaming Episodes

To ensure compliance with the study instructions, participants' diary entries were reviewed by the first author. All participants completed five entries on separate days within the study period, which was verified by checking the timestamps in Qualtrics. Moreover, across the diary entries, each participant reported playing at least three games. The mean length of the daily diary entries was 83.5 words ($SD = 58.2$). While a minimum length for the entries was not specified, the average word count suggests that participants invested a non-trivial amount of effort in maintaining their diaries. Though there was substantial variation between participants in the length of their entries, a review of the text suggested that all entries (even those shorter in length) articulated a specific strategy for post-work recovery. Participants played a range of games during the study period.

Table 1. Games Played by Each Participant during the Study Period, Ranked from Most to Least useful in Terms of their Contribution to their Recovery Strategies

Participant Code	Games Played
P01	1. Candy Crush 2. Cookie Run Kingdom 3. Board Kings
P02	1. Subway Surfers 2. Homescape 3. Candy Crush
P03	1. My Time at Portia 2. Academic School Simulator 3. Project Zomboid 4. Triviaverse 5. Overcooked
P04	1. Need for Speed 2. Subways Surfers 3. Chess Royale
P05	1. FIFA 2023 2. Online Poker 3. Call of Duty 4. Pro Evolution Soccer
P06	1. Planet Crafter 2. Stacklands 3. Dinkum 4. F1 Manager 5. iRacing
P07	1. Spider-Man: Remastered 2. Spades (iOS) 3. Super Street Fighter II Turbo
P08	1. Online Chess 2. Call of Duty 3. Grand Theft Auto V
P09	1. Super Meat Boy 2. Monster Hunter 3. New Star Soccer 4. Hearthstone 5. Mario Kart 8
P10	1. FIFA 2023 2. WWE 2K23 3. Subway Surfers
P11	1. Word Cross 2. Block Puzzle 3. Magic Tiles 4. Candy Crush

The full list of games can be found in Table 1, including the rankings made by the participants of their utility for their recovery strategies.

2.4 Data Analysis

The interviews were recorded and transcribed using Microsoft Teams. Analysis of the data took place in four stages, in keeping with the principles of the laddering methodology [47]. Firstly, a content analysis was conducted on the transcripts to identify attributes, consequences and values discussed by participants. Secondly, MECs were generated from these attributes, consequences and values. Thirdly, the MECs were aggregated into an Implication Matrix, which represents the direct and indirect connections between components of the MECs. Finally, the MECs were visualised in the form of a Hierarchical Value Map. The analysis was carried out by the first author. However, regular discussions were held with the remaining authors to ensure the validity and interpretability of the analysis conducted at each of the four stages.

2.4.1 Stage 1: Content Analysis. A content analysis was conducted on the interview data to generate codes for attributes, consequences and values. Any game features referred to by participants were coded as attributes. In keeping with the recommendations of [69], these codes were categorised as either concrete (e.g., levelled progression) or abstract (e.g., familiarity with the game). References to immersive player experiences were coded as consequences according to the five-dimension model [31]. Again, the consequence codes were placed into one of two categories [69]: either functional (challenge and control) or psychosocial (cognitive involvement, emotional involvement and real-world dissociation). Finally, recovery experiences and recovery outcomes were coded as values. In the case of recovery experiences, the codes reflected the four dimensions outlined by [56]: psychological detachment, relaxation, mastery and control. Recovery outcomes did not have a specific coding scheme but reflected any reference to a participant's physiological or psychological state following the recovery activity [57].

In total, 68 individual MEC components were identified through the content analysis (see Supplementary Materials). Elements at each of the six levels were derived from the interview data: concrete attributes (34), abstract attributes (12), functional consequences (4), psychosocial consequences (6), recovery experiences (7) and recovery outcomes (5). Note that increases and decreases (denoted with (+) and (-) respectively) in immersion and recovery experiences were coded separately. Hence, there are more instances of these codes than would be expected based on the relevant theoretical models. An inter-coder reliability analysis was carried out for this coding frame. A second researcher (who was not one of the authors but was familiar with the research topic and conducting laddering analyses) coded five of the interview transcripts using the 68-element framework. There was a strong rate of agreement ($K = .85$) and any disagreements were resolved via discussion between the coders.

2.4.2 Stage 2: Means-End Chains. MECs were created using the codes derived from the content analysis. The chains were created in LadderUX [2], a specialised laddering analysis software. To be considered an MEC, the participant had to describe an example of immersion optimisation which included at least one attribute, consequence and value. However, the MECs could also incorporate the multiple levels that existed for each of these three components. In other words, MECs could include a concrete and/or abstract attribute, a functional and/or psychosocial consequence and a recovery experience and/or recovery outcome. Across the 11 participants, 79 MECs were generated in total. The number of MECs generated by each participant ranged from 1 to 15 ($M = 7.18$, $SD = 3.71$).

2.4.3 Stage 3: Implication Matrix. LadderUX was also used to generate an implication matrix (see Supplementary Materials), which aggregates MECs such that the direct and indirect linkages between attributes, consequences and values can be observed. Direct linkages refer to instances where two elements exist adjacently to each other in a MEC. For example, consider an example of immersion optimisation observed in the current study in which players selected a lower difficulty mode (attribute) to reduce their sense of challenge (consequence) in order to experience relaxation (consequence). In this case, the lower difficulty setting and reduced challenge are directly linked. By contrast, indirect links refer to non-adjacent components of an MEC. For instance, in this example, the reduced difficulty mode and relaxation are indirectly linked.

2.4.4 Stage 4: Hierarchical Value Map (HVM). For the output of the laddering analysis, a **Hierarchical Value Map (HVM)** was produced. An HVM provides a visualisation of the MECs generated within a study, showing linkages between the attributes, consequences and values which have been identified. Generally, a cut-off level is set for an HVM, which specifies the minimum number of times a direct linkage must have occurred for it to be included in the visualisation. There is no consensus regarding the optimum method of determining the cut-off level [33]. However, we take the approach advocated by [67] who used a cut-off which maximises the interpretability of the HVM whilst retaining as many linkages as possible. In this article, this resulted in a cut-off value of two for the HVM. With respect to the consequences illustrated in the HVM, only those which met the cut-off for linkages with both an attribute and a value were included. This decision was taken because immersion optimisation strategies necessarily include each of the three levels of an MEC. Thus, illustrating how immersion connects to game features but not recovery (or vice versa) does not contribute to the overarching research question of this article.

3 Results

The HVM derived from the interview data can be observed in Figure 1. The accompanying analysis begins by reflecting separately on the attributes (**RQ1**), consequences (**RQ2**) and values (**RQ3**) represented within the map. Following this, three examples of frequently occurring MECs represented within the HVM are discussed in detail, to demonstrate how the three levels of the MECs integrate to produce successful immersion optimisation strategies (**RQ1-3**). Illustrative quotes are provided throughout the commentary and have been labelled with the participant code and the game the participant reported playing in their recovery episode.

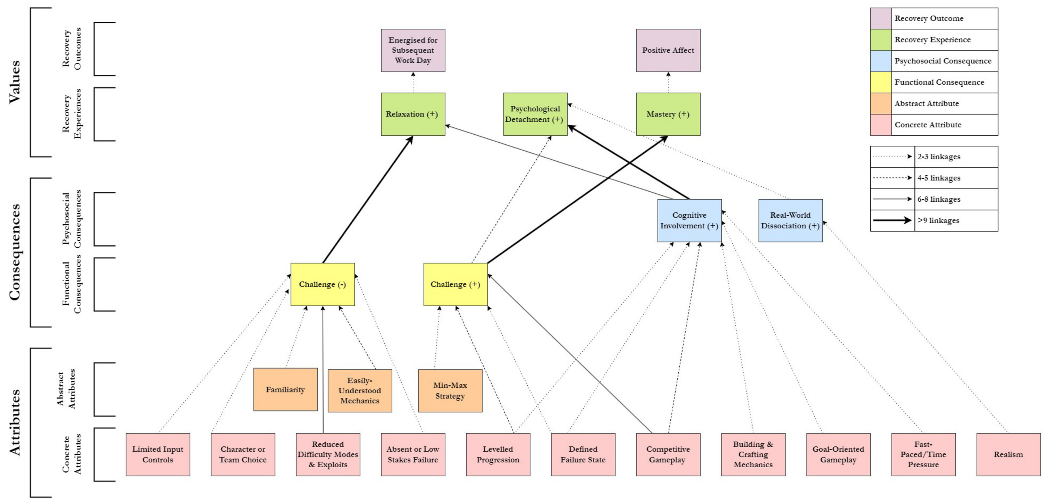

Fig. 1. HVM visualising immersion optimisation strategies.

3.1 What Attributes of Digital Games are used as the Basis for Immersion Optimisation when Gaming for the Purpose of Post-work Recovery? (RQ1)

As per Figure 1, a wide range of attributes were leveraged for participants' immersion optimisation strategies. Most of these attributes were concrete in nature (11), with comparably few abstract attributes (3) identified by participants as being part of their optimisation strategies. Notably, the two most commonplace attributes in the map were concrete: Reduced Difficulty Modes and Exploits ("*turn off the ability to die*" - P07, Spider-Man: Remastered) and Competitive Gameplay ("*it was a competition, so the one who gets knocked out first and sits out for the rest of the game*" - P04, Need For Speed). The former allowed participants to reduce the level of challenge experienced ("*nothing ever goes wrong*" - P09, New Star Soccer), while the latter allowed participants to curate an experience high in challenge ("*I always make it a challenge to beat their score*" - P11, Block Puzzle) and cognitive involvement ("*you have to put extra focus and concentration*" - P05, Call of Duty).

3.2 What are the Consequences, in Terms of the Player Experience, when Engaging in Immersion Optimisation for Post-work Recovery? (RQ2)

Cognitive involvement and challenge were the dimensions of immersion that were most central to the participants' optimisation strategies. For example, participants frequently used strategies which lowered their sense of challenge, typically in order to experience relaxation. This is exemplified by P01, who deliberately chose to play Candy Crush as their familiarity with the game reduced their experience of challenge ("*it just wasn't too hard, it wasn't making my brain that think about too much*") which in turn allowed them to relax ("*let my brain thaw out a bit and just try and calm down from like the craziness at work*"). Another common focus of participants' optimisation strategies was to increase cognitive involvement such that they could experience psychological detachment. As an example, P08 played Call of Duty due to its fast pace, which required them to "*just have to be on it, concentrating*" which prevented them from thinking about work ("*your mind has to be on the game and the game alone*"). Another common linkage was between elevated challenge and mastery. For instance, P06 outlined how they chose to play iRacing due to its competitive nature, which facilitated a sense of challenge ("*it's not like playing a game where you can mess up*") which in turn meant that "*you feel real good about yourself*". In total, cognitive involvement was linked with two recovery experiences (psychological detachment and relaxation), whilst challenge was linked with three (psychological detachment, mastery and, at low levels, relaxation).

Contrastingly, the remaining immersion dimensions played a relatively minor role in the participants' optimisation strategies. In fact, only real-world dissociation achieved the cut-off criteria for inclusion in the HVM. However, this immersive dimension was connected with a single recovery experience (psychological detachment), in contrast to cognitive involvement and challenge which were associated with multiple aspects of recovery.

3.3 What Values, in the Form of Recovery Experiences and Outcomes, are Supported by Immersion Optimisation for Post-work Recovery? (RQ3)

Three of the four recovery experiences (psychological detachment, relaxation and mastery) were represented in the HVM. Thus, it appears that immersion can be optimised towards these aspects of recovery (see the previous section for illustrative quotes exemplifying these relationships). By contrast, the recovery experience of control was not connected to any dimensions of immersion by the participants. Thus, there is no evidence from the laddering analysis that this recovery experience can be supported by immersion optimisation strategies.

With regards to recovery outcomes, two were represented within the HVM. The first of these was coded as positive affect ("*a very positive feeling*" – P09, Super Meat Boy), a broad positive feeling which was typically associated with mastery arising from a challenging gaming experience. The second recovery outcome observed in the HVM was feeling energised for the subsequent working day ("*get the energy that I need to work the following day*" – P02, Candy Crush). Unlike positive affect (which was a more general positive sensation), this was a specific affective response which typically arose when participants experienced relaxation (either because their player experience was low in challenge or high in cognitive involvement).

Some participants framed the impact of their optimisation strategies on post-work recovery in a global fashion. For example, they might have curated a relaxing immersive experience because they felt that this is a generally desirable quality of a recovery episode. However, participants also articulated occasions on which they devised optimisation strategies in response to a recovery need which arose on a specific day. Some commented on this process of matching immersive experiences to day-specific needs when discussing the overall experience of using digital games to unwind whilst taking part in the study. For example, P08 emphasised the importance of "*listening to yourself and your wants or needs or desires*" when curating player experiences for the purposes of recovery. Similarly, P09 stated that for "*different days, I want different things*" when justifying the differing immersive experiences that they had sought out during the post-work recovery episodes. Other participants were more explicit in describing exactly what recovery needs they optimised towards during the study. For example, P06 outlined that "*no matter how I feel after work I can adjust depending on my needs*". They gave the example of deliberately playing a low-challenge game on a particularly difficult working day ("*I [played] on Monday night because Mondays are tough at work*") to meet their need for relaxation. Hence, it appears that immersion optimisation strategies can be used both to globally benefit post-work recovery and to address day-specific recovery needs.

3.4 Recurring MECs (RQ1-3)

In this section, we outline three illustrative examples of specific immersion optimisation strategies that occurred frequently amongst our sample. That is not to say that these strategies are more valid in some way than others within the HVM; a laddering analysis provides no method for determining the strength or significance of the linkages within the MEC. Nonetheless, the higher frequency with which these strategies occurred could represent a greater degree of salience or accessibility that might make them more straightforward candidates for real-world players to adopt.

3.4.1 Mastery from Levelled Progression. One strategy which was used by multiple participants was to select games which incorporated levelled progression. This engendered a sense of challenge which translated into a mastery recovery experience. An example of this strategy was observed in P07's account of playing Super Meat Boy after work. When describing how this strategy benefited their recovery, they outlined the sense of challenge associated with tackling the game's levels: "*Ohh actually you know what I got through one level that was really difficult today and tomorrow I can come back and try another level that will be really difficult.*" P07 framed the mastery experience arising from this challenging gaming experience as a fulfilment of a need to accomplish something tangible after work, explaining that they "*always feel a slight pressure to be doing something that is productive.*" Examples such as this illustrate that playing games in which one progresses through levels can be a useful way of fostering feelings of challenge which are foundational to post-work mastery experiences.

3.4.2 Psychological Detachment from Competitive Gameplay. Playing games competitively was used in participants' immersion optimisation strategies to increase their level of cognitive involvement. This was beneficial for recovery as it prevented them from thinking about work, allowing for psychological detachment to take place. This strategy is exemplified by P04, who organised a Need For Speed competition amongst friends after work. They found this competitive gameplay "*engaging, in the sense that you focus entirely on the game*", allowing them to "*come out of the game, thinking completely about the game, so you've diverted your attention [from work] completely*". P04 elaborated on this idea further stating that by playing the game competitively, they were "*jumping into something and jumping out of something, so I'm jumping out from the pressure from work and jumping into the game by focusing on it fully.*" This example demonstrates how players can exploit the effortful attention associated with competitive games to mentally disengage from their working day.

3.4.3 Relaxation from Lower Difficulty Modes. Another strategy that occurred frequently amongst our participants was to use exploits or settings which allowed them to play the game on a lower difficulty mode. This reduced their experience of challenge and allowed relaxation to take place. For example, P06 utilised this strategy when playing Spiderman: Remastered. They outlined that "*the strategy was essentially just make it easy, make it so that nothing is gonna frustrate or challenge me, and after my brain is dead from working all day*" and that "*if I'm just playing it after work to relax, challenge is not what I'm looking for.*" Thus, to reduce challenge they used accessibility settings to "*turn off the QuickTime events*" which they found challenging due to their "*slow reactions*". Crucially, they described this making the game "*one that I could play and then say 'yes I played this to relax'*". As well as formal difficulty settings, players could also use in-game exploits to artificially lower the difficulty of the game they were playing. For example, P06 also discussed how it was possible to cheat in Spades iOS (P06), again with the intention of achieving relaxation by minimising their experience of challenge. Taken together, the evidence from the HVM indicates that when engaging in post-work gaming episodes oriented towards relaxation, a successful strategy can be to play on a lower difficulty mode.

4 Discussion

This article aimed to explore the means by which people engage in immersion optimisation for post-work recovery. The MEC model was used to conceptualise the process of optimisation, in which attributes (game features) are leveraged to produce consequences (immersive experiences) that in turn influence values (recovery experiences and outcomes). Laddering interviews and analysis were conducted to generate MECs covering the optimisation strategies employed by our participants over the course of a working week. We found that various routes for immersion optimisation existed, with participants recruiting an array of game features to curate the immersive experiences required for recovery. Notably, the majority of these optimisation strategies centred around two particular dimensions of immersion: cognitive involvement and challenge. These immersive experiences were calibrated by participants to achieve psychological detachment, relaxation and (in the case of challenge) mastery. These findings are discussed in further detail below, and the implications for the successful use of digital games for post-work recovery are considered.

4.1 Diverse Routes for Optimisation (RQ1)

A diverse range of game attributes was recruited for the purpose of immersion optimisation in this study. Attributes were mostly concrete in nature, in line with other laddering studies focused on gaming experiences (e.g., [69]). These concrete attributes included specific game mechanics (e.g., levelled progression), game settings (e.g., difficulty settings) and gameplay modes/styles (e.g., competitive gameplay). A limited number of abstract attributes were also observed in the form of familiarity, easily understood game mechanics and engaging in a min-max strategy. This group of concrete and abstract attributes represented the foundation of the optimisation strategies employed by the participants.

Collectively, these optimisation-promoting attributes did not appear to be tied to a particular device or game genre. For instance, strategies centred on levelled progression were observed in players of both Super Meat Boy (a highly challenging platformer game which the participant played on a PC using a keyboard) and Candy Crush Saga (a causal game, played on a mobile using touch screen controls). Given the lack of apparent constraints, we tentatively suggest that most post-work gaming episodes should provide at least some scope for immersion optimisation. In practical terms, these findings suggest that there is no pressing need for players seeking recovery to adopt a new gaming device or to begin playing a new game genre. Rather, players looking to optimise immersion through gaming can simply ‘work with what they have’ to experience the recovery benefits.

Certain immersion-promoting features used in our participants’ optimisation strategies have been explored in prior research. For instance, Cutting & Cairns [21] found that games with levelled progression were more immersive, which concurs with the finding of this study that this game feature increased the immersive dimension of challenge. Moreover, Fairclough and Burns [25] found games played on an easier difficulty mode were experienced as less immersive. Again, this is in line with this study, which found that participants deliberately reduced the challenge dimension of immersion by playing on reduced difficulty modes. This is a particularly noteworthy finding, as it is typically assumed that optimal gaming experiences occur when there is a balance between the in-game challenge and the player’s skill [60, 61]. Though we did not directly measure the challenge-skill ratio experienced by our participants, certain strategies did appear to be designed to make the game as easy as possible. Thus, our findings suggest that a balance between challenge and skill when gaming is not always desirable and that participants will shift the ratio in favour of a simpler gaming experience when they are seeking relaxation.

The current study also identified optimisation strategies centred upon immersion-promoting game features which have not been explored previously. Examples include goal-oriented gameplay (with players selecting games with clear goals to increase their cognitive involvement), team/character choice (with participants’ selections designed to make the game easier and reduce their experience of challenge) and building/crafting mechanics (with players deliberately enhancing cognitive involvement by engaging in these in-game activities). Thus, our research extends the repertoire of evidence-based immersion-promoting game features which are available for players to use as the basis for their optimisation strategies.

4.2 Centrality of Cognitive Involvement and Challenge (RQ2)

Cognitive involvement was central to many of the optimisation strategies employed by the participants in this study. This finding is consistent with the extant literature investigating the impact of digital games upon recovery. For instance, cognitive involvement is a predictor of post-work psychological detachment [41], with greater involvement in the game thought to reduce one's capacity for work-related thoughts [45]. In this study, participants actively leveraged this phenomenon and curated player experiences which were high in cognitive involvement in order to psychologically detach from their working day. Similarly, participants sought out cognitive involvement during their gaming episodes to facilitate relaxation. We interpret this as being analogous to entering a relaxation flow state when gaming [16]. In this state, an intense focus on a given activity is found to be relaxing, provided the level of challenge does not exceed the person's abilities [20]. Taken together, these findings highlight that players looking to recover after work should use strategies observed in this study which increase the experience of cognitive involvement, such as selecting games with levelled progression, engaging in competitive gameplay and engaging in building/crafting activities.

In addition to cognitive involvement, challenge was the other major dimension of immersion which contributed to the participants' optimisation efforts. For instance, participants curated high-challenge experiences in order to psychologically detach from work. Such a connection between challenge and psychological detachment makes intuitive sense, as one might expect more demanding experiences to leave players with limited capacity for work-related thoughts. However, prior research has not found evidence that the experience of challenge influences psychological detachment [68]. A potential explanation for this inconsistency could be the extent to which players had agency over their post-work gaming episode. In this study, participants could select for themselves what games they played. By contrast, in [68], players had limited control over their gaming experience as they were allocated particular games to play by the researchers. For those who played more demanding games it is possible that their experience of challenge exceeded their desired levels, perhaps because they did not possess sufficient in-game skill [60, 61]. Thus, this might have resulted in a negative gaming experience which interfered with the ability of the game to promote psychological detachment. By contrast, participants in our study had full agency over the games they selected for their post-work recovery strategies. Thus, it is more likely that they were able to curate an optimal gaming experience for preventing work-related thoughts.

As well as psychological detachment, challenge was also optimised towards mastery and relaxation. Participants deliberately curated high-challenge experiences (e.g., by playing games with levelled progression) in order to experience mastery. In contrast, other participants deliberately sought out experiences which were low in challenge (e.g., by playing on a reduced difficulty mode) so that they could relax after work. These findings concur with those of Mella et al. [41] who also found that mastery relied on high-challenge experiences whereas relaxation arose when challenge was low. The fact that mastery and relaxation appear to require opposing player experiences highlights the difficulty of achieving both of these recovery experiences in a single gaming episode. For example, strategies that increase challenge to facilitate mastery might come at the cost of experiencing relaxation, which relies on a low-challenge experience. Conversely, strategies which lower challenge for the purpose of relaxation may impede the experience of mastery. However, presently this is a theoretical assumption based on the HVM and there is a need for future research which explicitly measures the impacts (both intended and unintended) of employing immersion optimisation strategies which centre upon challenge.

4.3 Benefits of Immersion Optimisation (RQ3)

Engaging in immersion optimisation was a broadly successful strategy for achieving post-work recovery. As can be seen in the HVM, by deliberately curating immersive experiences, participants were able to achieve three of the four recovery experiences (psychological detachment, relaxation and mastery). Some participants also reported that achieving recovery experiences led to positive recovery outcomes. Specifically, mastery was connected with experiencing a general sense of positive affect, whilst relaxation was associated with the specific affective response of being re-energised for the subsequent working day. The only recovery experience which participants did not report as being impacted by their optimisation strategies was control. This finding perhaps owes to the notion of player agency discussed in the prior section. It is possible that our participants' need for autonomy and freedom after work was met simply by the act of selecting which games they played and generating their own recovery strategies. Thus, the player experiences curated through their strategies may not have been directed towards achieving a sense of control with this dimension of recovery already being fulfilled.

No negative consequences of immersion optimisation were represented in the HVM, despite participants being invited to reflect upon such outcomes as part of the study. However, some participants did note disadvantages of their optimisation strategies. For example, one participant reported that the emotional involvement associated with their min-max strategy prevented them from relaxing. Examples such as these suggest that is possible for optimisation strategies to have unintended negative consequences for recovery. Nonetheless, these reported negative consequences were limited in number, with none reaching the HVM cut-off criteria of two.

Given the overall positive impact of immersion optimisation observed in this study, it is worth reiterating that participants were not explicitly asked to use this strategy, nor were they informed that immersion was the primary interest of the study. Rather, when asked to generate strategies to unwind from work using digital games, all participants were able to spontaneously generate at least one successful immersion optimisation strategy. Our findings contrast with those of Mella and colleagues who observed that not all digital game players leverage the immersive potential of games for recovery [41]. The crucial difference appears to be that participants in this study were explicitly instructed to use games to unwind from work, unlike in Mella and colleagues' research where naturally occurring post-work recovery episodes were studied without researcher intervention. Our results suggest that immersion optimisation can be a readily accessible and useful tool in the arsenal of real-world players looking to use games for post-work recovery [45], provided these individuals are intentionally using these gaming episodes to unwind from work. Thus, our article makes a significant contribution in light of the arguments presented in the Introduction that gaming episodes appear to vary in their efficacy for recovery. We suggest that intentionally adopting immersion optimisation strategies could offer players a means of improving the recovery potential of a given gaming episode, particularly for those who do not already use such strategies.

The finding that players can strategically leverage the immersive potential of games for the purpose of post-work recovery speaks to a wider debate within the literature regarding the wellbeing impacts of digital gaming. Specifically, this study provides a counterpoint to existing research suggesting that immersive experiences while gaming can harm psychological wellbeing. For instance, concerns have been expressed that experiencing immersion might make it more difficult to cease playing, resulting in the problematic overuse of games [34]. Indeed, relationships do exist between immersive experiences and problematic gaming scores [1, 51]. While the findings of the present study do not refute this evidence connecting harmful outcomes with immersion, they do also suggest that this player experience can be beneficial in certain circumstances, such as when engaging in post-work recovery. In this respect, immersion optimisation could be considered a form of "healthy escapism" [35], wherein players use games to leave behind their reality allowing them to regulate their emotions and cope with stress.

4.4 Implications for Players

The strategies captured in the Hierarchical Value Map offer a useful tool for making recommendations to players seeking to use post-work gaming sessions for recovery. Firstly, a recovery experience (or experiences) within the value level of the HVM would need to be identified as the target of the strategy. As per the findings of this study, this might be based on a specific recovery need arising from the events of a person's working day. With a desired recovery experience in mind, moving to the consequence level of the HVM would allow the required immersive experience to be identified. Subsequently, considering the attribute level would allow the identification of the game features that could be exploited to generate this immersive experience. For example, based on the HVM, a player with a need to relax after work could be recommended a low-challenge gaming experience. Following this, they could be advised what optimisation strategies would be useful for curating this player experience, such as playing on a lower difficulty mode or selecting a game with low or absent failure stakes. Future research could explore the development of tools which synchronise with a player's game library to make evidence-based recommendations derived from the HVM regarding the optimisation strategies they should adopt to meet their recovery needs.

4.5 Limitations

We do not claim that the HVM represents an exhaustive account of the immersion optimisation strategies available to players. For one, there are almost certainly strategies that exist outside of those identified in this research. Only a small subset of game features and mechanics were leveraged by our players, opening the door for future research to explore whether other routes to optimisation exist. Moreover, it is possible that players could take a less granular approach to optimisation than the means-end structure observed amongst our participants. Namely, real-world players could in principle neglect the attribute aspect of immersion optimisation MECs when devising their strategies. For instance, someone with a need for relaxation could simply choose a game that they know from experience will be less challenging. Whilst there might be specific game attributes which make the game in question less challenging, the player would not need to explicitly take this into account were they to rely on their past experiences of playing the game. Though we make no claims that the HVM comprehensively describes the totality of immersion optimisation, we believe that it possesses significant utility for players looking to use games to recover. This is because it reduces barriers to utilising immersion optimisation by providing an evidence-based framework which precludes a need for players to devise their own strategies.

Furthermore, there are caveats pertaining to our sample which must be considered when applying the findings of this study. Though the sample size was chosen to be in line with previous laddering studies of technology (e.g., [67]), using only 11 participants clearly limits our ability to conclude whether the effects of the observed immersion optimisation strategies reflect robust and generalisable principles that apply to the wider population of digital game players. Though we are satisfied that this sample size allowed our research questions to be addressed, this line of research would benefit from future work using larger sample sizes to test the reliability of the findings presented here. The diversity of the sample was also fairly limited, being English-speaking, majority male and with an age range between 19 and 41 years. Caution should be employed when applying these findings to players who do not share characteristics with our relatively homogeneous sample.

4.6 Methodological Reflections

In this section, we consider some of the unique implications for our findings arising from the use of a laddering analysis. Firstly, though it is a typical feature of laddering research that the frequency of connections within the means-end chains is reported in the HVM, it is important to avoid over-interpreting this data. Whilst tempting to assume that these values represent the strength or importance of a given connection within a means-end chain, in reality this is simply a descriptive measure of how frequently a particular linkage was made amongst a particular sample. In the case of this study, that means that we cannot conclude whether strategies which commonly occurred amongst our sample do have a greater impact on recovery than less frequently reported strategies. To address this point, in future research we intend to use the HVM as the basis for the testing of formal mediation hypotheses in which immersion dimensions serve as mediators between game attributes and recovery.

A second implication of undertaking a laddering analysis is that the experiences of individual participants are collapsed into a simple model. As a result, the HVM which is produced cannot account for the impact of individual differences among players. For example, players differ in their preferred game elements and gameplay styles [62, 63, 66]. Similarly, the experience of enjoyment arising from playing a digital game, which is distinct from the experience of immersion [40], can also vary between individuals depending on their personality [26] and motivations for play [53]. It is plausible that factors such as game preferences and enjoyment, which were not measured in this study, could moderate the impact of the immersion optimisation strategies. For instance, it is doubtful whether players will experience the recovery benefits of these strategies if they do not have a preference for or enjoy the game that they are playing. Hence, we caution against a one-size-fits-all approach to adopting optimisation strategies from the HVM and acknowledge that some strategies might be less effective for some individuals than others. Future work in this area should explore the role of preferences and enjoyment in determining the efficacy of optimisation strategies.

Finally, a related issue associated with a laddering analysis is that in offering a simplified model of participants' experiences, certain complexities in interpreting the HVM can be introduced. One such example from this study revolves around strategies based upon game attributes such as competitive gameplay and levelled progression, which were used by participants to increase their experience of both cognitive involvement and challenge. However, this poses a contradiction in terms of the anticipated impacts on recovery. According to the HVM, increased cognitive involvement should increase relaxation, whereas a more challenging experience should have the opposite effect. It is possible optimising through competitive gameplay or levelled progression can lead to both increases and decreases in relaxation. However, it might be the case that broader socio-emotional factors which relate to one's gaming experience might determine which of these effects occurs. For instance, models of appraisals [38, 54] suggest that demanding circumstances can be appraised as either a challenge (resulting in positive emotions) or a threat (causing negative emotions). It is possible that players using strategies revolving around levelled progression and competitive gameplay do not experience the relaxation benefits of cognitive involvement if they appraise the high-challenge gaming experience as a threat, due to the occurrence of incompatible negative emotions. Contrastingly, if this gaming experience is appraised as a challenge, then relaxation could occur in the absence of negative affective states. These ideas remain speculative at present, and a goal of future research should be to investigate potential interdependencies between optimisation strategies and appraisals to disambiguate the apparent contradictions observed in this study.

4.7 Conclusion

This article offers the first empirical investigation of the range of immersion optimisation strategies available to digital game players looking to recover from the demands of their working day.

Using laddering interviews and analysis, we decomposed our participants' optimisation strategies into a variety of mean-ends chains which highlighted how game features are leveraged to curate immersive experiences which promote post-work recovery. Notably, there existed a wide range of game attributes that we utilised as part of these strategies, though these tended to revolve around two dimensions of immersion: cognitive involvement and challenge. These findings contribute to our understanding of how digital games can be used to support post-work recovery, avoid the deleterious effects of work-related stress and ultimately benefit the health and wellbeing of players.

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