Massively multiplayer online game addiction: Instrument development and validation

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ABSTRACT

The primary objective of this paper is to develop and validate an instrument for massively multiplayer online game (MMOG) addiction. Three stages of instrument development were undertaken to achieve this objective: item generation, scale development, and instrument testing. The results of a confirmation factor analysis confirmed the existence of seven dimensions of MMOG addiction, namely *Salience*, *Mood Modification*, *Tolerance*, *Withdrawal*, *Conflicts*, *Relapse*, and *Loss of Control*. The final instrument exhibits adequate levels of reliability, convergent validity, discriminant validity, and nomological validity. The instrument is expected to assist future empirical research on MMOG addiction. The theoretical and practical implications are discussed.

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1. Introduction

Massively multiplayer online games (MMOGs) are among of the most popular online game genres, constituting the largest segment of the online game business. Being highly challenging, interactive and immersive, however, MMOGs are often presented as being potentially dangerous, particularly as leading to addiction [43]. We have witnessed an increasing number of reported cases of negative consequences associated with excessive use of or addiction to MMOGs, such as loss of consciousness and crime [117], and even notable deaths [95]. As concerns grow about the negative consequences, MMOG addiction has become a critical societal challenge and has received increasing attention from the scientific community [27,103,116]. However, research on MMOG addiction has been hindered by a present lack of consensus and consistency on instruments, which highlights the need for developing and validating an instrument that captures the breadth and complexity of MMOG addiction in addition to providing a consistent and solid foundation for diagnosis and assessment of MMOG addiction.

Developing and validating instruments are important steps in advancing empirical research because they bring rigor to the scientific inquiry process, enhance the trustworthiness and replicability of findings, and allow for confirmatory research [8,94,85,3]. Theoretically and empirically rigorous instruments to measure latent constructs have frequently been called for in the information systems (IS) literature [94,10,83,63,25]. Addiction to massively multiplayer online games is one area that has attracted increasing attention from IS researchers and that is in need of a consistent measurement tool.

MMOG addiction in this study is defined as use of MMOGs that encompasses the following seven key dimensions of behavioral addiction, namely, *Salience* (e.g., MMOG use is the most important activity in the gamer's life), *Mood Modification* (e.g., the gamer modifies his/her mood with MMOG use), *Tolerance* (e.g., an increasing amount of time or resources is given to MMOG use), *Withdrawal* (e.g., unpleasant feelings result from discontinuing MMOG use), *Conflicts* (e.g., problems result from excessive MMOG use), *Relapse* (e.g., a tendency to revert to prior excessive MMOG use patterns), and *Loss of Control* (e.g., an inability to limit the time or resources allocated to MMOG use) to the extent that a gamer's normal functioning is impaired [12,36].

MMOG addiction is an emerging phenomenon, and the literature on the topic is still culturally diverse. The terminology used to describe MMOG addiction includes the terms "online game addiction," "pathological online game use," "excessive online gaming," and "problematic online gaming" [46]. Most of the prior

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studies on MMOG addiction have concentrated on examining risk factors (e.g., [43]) and on understanding diagnoses, symptom management and treatment strategies (e.g., [116]). There have been a considerable number of studies on the dimensions and scale of MMOG addiction (e.g., [27,19]); however, the conceptualization and scale development across these studies has been inconsistent and ambiguous.

A considerable number of MMOG addiction instruments have been adapted directly from diagnostic criteria based on the Diagnostic and Statistical Manual of Mental Disorders [5] (e.g., substance dependency, substance abuse, impulse control disorder, and pathological gambling), which are primarily used for clinical assessment (see Table 1). These studies have typically used a categorical approach for diagnosis, hindering any theoretical or empirical investigation into the development of MMOG addiction.

Some researchers have operationalized MMOG addiction as a unidimensional construct with a metric scale (e.g., [21,88,70]). These studies attempted to identify the relationship between MMOG addiction and its antecedent variables. As shown in Table 1, most researchers have adopted a multidimensional view of MMOG addiction to best capture the breadth and complexity of the construct (e.g., [27,19,58,60]). However, the existing multidimensional scales on MMOG addiction suffer from a number of limitations, such as a lack of vigorous instrument development and validation processes, overlapping dimensions, and missing key dimensions [27,48]. None of these studies extended beyond an initial exploration, and they included only first-order factors. Although there are many plausible competing measurement models, the relative veracity of these models is poorly understood. Confirmatory studies are thus needed to complete the research cycle. As research on MMOG addiction has emerged, it has been beset by conflicting conceptualizations and operationalizations of the addiction.

This study aims to address these limitations by (1) conceptualizing and operationalizing MMOG addiction, (2) developing and validating an MMOG addiction instrument using a rigorous approach, and (3) uncovering the multifaceted structure underlying MMOG addiction. This study presents a theoretically derived instrument of MMOG addiction and its rigorous development and validation processes. Building on the theoretical dimensions of behavioral addiction frameworks (e.g., [12,36]), an initial measurement instrument set for MMOG addiction was identified and validated empirically with a field survey. The final instrument set of 37 items demonstrated adequate psychometric properties of reliability, convergent and discriminant validity, and nomological validity. The seven-factor structure of MMOG addiction provides a good fit with the data and reflects logical consistency.

2. Theoretical foundations

2.1. MMOG addiction conceptualization

MMOG addiction as a research concept has been examined across multiple disciplines, including social psychology, biochemistry, psychiatry, education, communication, and information systems (e.g., [43,103,47,62]). Various terminologies have been used to describe the phenomenon of excessive involvement in online gaming and its associated negative outcomes, such as "online game addiction," "pathological online game use," "online game addictive behavior," and "problematic online game use" [46]. In addition to the inconsistency in terminology use, there have also been disagreements in the literature on how to theoretically and operationally define MMOG addiction. For example, MMOG addiction has been defined as MMOG use that meets half or more of the DSM diagnostic criteria (e.g., [1]), causes physical and psychological problems (e.g., [46]), exhibits

withdrawal symptoms (e.g., [61]), or encompasses the key dimensions of behavioral addiction (e.g., [88,18]). A thorough and comprehensive review of MMOG addiction scales was conducted to better conceptualize MMOG addiction.

Following the approach recommended by Kuss and Griffiths [52], 53 empirical studies that measured MMOG addiction were identified. Sets of diagnostic criteria (e.g., pathological gambling and impulse control disorders) from the DSM [5] are commonly used in assessing addiction behaviors and most of the existing MMOG addiction instruments are highly associated with these criteria. Nevertheless, a number of distinct instruments that measure MMOG addiction have emerged over the years. Twenty-one distinct instruments were found among the 53 identified studies. Despite the possible theoretical and semantic overlaps, the identified instruments were classified according to their operationalizations of MMOG addiction. There are three major classifications: DSM diagnostic criteria, unidimensional MMOG addiction constructs, and multidimensional MMOG addiction constructs (Table 1).

Four sets of DSM diagnostic criteria were frequently adapted to identify potential MMOG addicts, namely, impulse control disorder criteria (e.g., [51,57]), pathological gambling criteria (e.g., [59]), substance abuse criteria (e.g., [37]), and substance dependence criteria (e.g., [1]). Generally, individuals who do not meet half of the stated criteria in each set are not considered pathological MMOG players. However, the categorical system that is inherent in DSM criteria has been criticized on numerous grounds. For instance, despite its categorical approach and atheoretical nature, the DSM criteria that have been used were originally derived for diagnosis purposes, and thus the DSM approach lacks a robust theoretical underpinning [49]. Although the categorical diagnostic approach is prominent in clinical assessment and research, it may not be entirely applicable to social science research.

A considerable number of the studies measured MMOG addiction as a unidimensional construct. A number of unidimensional instruments that measured MMOG addiction were found in a wide variety of literature, including Young's Internet Addiction Scale [113] and the Generalized Problematic Internet Use Scale [15] from the Internet use literature, the Exercise Addiction Inventory [98] in the sport and exercise literature, and the Addiction-Engagement Questionnaire [17] from the computer use literature. Young's Internet Addiction Scale is the most popular unidimensional instrument used to measure MMOG addiction. Fifteen of the 53 identified studies used a form of this scale. Unidimensional instruments, such as Young's Internet Addiction Scale, surpass the DSM categorical diagnostic criteria by allowing for the development of a theoretical and empirical understanding of the relationships between MMOG addiction and other concerning variables.

Despite the widespread adaptation of DSM diagnostic criteria and unidimensional instruments to measure MMOG addiction, some studies examined the multiple dimensions underlying MMOG addiction. The three most frequently adapted multidimensional MMOG addiction instruments were the Game Addiction Scale [58], the Internet Addiction Scale for Taiwanese [60], and the Problematic Video Game Playing Scale [81]. After an iterative literature review process, the major dimensions that pertain to MMOG addiction were identified: Salience, Preoccupation, Obsession, Mood Modification, Absorption, Immersion, Escape, Euphoria, Tolerance, Withdrawal, Conflicts, Problems, Relapse, Loss of Control, and Failure of Self-Control (see Table 1). Although there may be semantic overlaps and some dimensions may be significantly more important than others, it is generally agreed that a multidimensional view of MMOG addiction can best capture the breadth and complexity of the phenomenon [19]. Assessing