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Structural Game Characteristics and Problematic Gaming

Introduction of the Risk Characteristics Checklist for Games (RCCG)

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Abstract: *Introduction:* The current state of research suggests that personal, environmental, and product-related risk factors contribute to the development and maintenance of gaming disorder. Concerning game related risk factors, evidence points to certain game features contributing to the overall risk of gaming disorder, as for example reward features, social features, and monetization features. However, no standardized instrument is available to capture risk enhancing game characteristics. *Methods:* Based on theoretical considerations and stepwise conducted qualitative analyses of in-game content, risk-enhancing game features were identified and specified. Furthermore, a pilot study was conducted comprising $N = 4,468$ students ($M[\text{Age}] = 14.54$ years, $SD = 1.37$ years). Game features of the preferred games of the students were analyzed regarding their predictive value of gaming disorder. *Results:* Data suggests that two features are associated most strongly with gaming disorder: 1) mandatory social interactions ($\beta = .20$), and 2) number of reward categories ($\beta = .12$). Based on these findings and further updates, the RCCG was refined and finalized. *Conclusions:* With the RCCG, a structured instrument to capture, describe, and evaluate risk enhancing structural characteristics of video games is available. The RCCG enables a general risk assessment of games as well as recommended age-classifications based on certain structural features unsuitable for specific age groups.

Keywords: gaming disorder, structural game characteristics, taxonomy, Risk Characteristics Checklist for Games (RCCG), assessment

Strukturelle Spielmerkmale und problematisches Spielen: Vorstellung der Risk Characteristics Checklist for Games (RCCG)

Zusammenfassung: *Einführung:* Der aktuelle Forschungsstand legt nahe, dass persönliche, umwelt- und produktbezogene Faktoren zum Risiko der Entstehung und Aufrechterhaltung einer Computerspielstörung beitragen. In Bezug auf spielbezogene Risikofaktoren weisen Studien darauf hin, dass Online- im Vergleich zu Offline-Spielen sowie eine Präferenz für bestimmte Spielgenres mit problematischem Spielverhalten assoziiert sind. Weitere Evidenz weist darauf hin, dass bestimmte Spielmerkmale zum Gesamtrisiko eines problematischen Spielverhaltens beitragen, wie z.B. Merkmale der Belohnung, soziale Interaktionen und Monetarisierungsfunktionen. Bis heute gibt es jedoch kein standardisiertes Instrument zur Erfassung relevanter struktureller Spielmerkmale. *Methoden:* Auf der Grundlage theoretischer Überlegungen wurde die Risk Characteristics Checklist for Games (RCCG) entwickelt. Durch schrittweise durchgeführte empirisch qualitative Analysen von genreübergreifenden Spielinhalten wurden risikoe erhöhende Spielmerkmale identifiziert und spezifiziert. Zusätzlich wurde eine Pilotstudie mit $N = 4.468$ Schülern ($M[\text{Alter}] = 14.54$ Jahre, $SD = 1,37$ Jahre) durchgeführt. Die Spieleigenschaften der bevorzugten Spiele der Schüler wurden im Hinblick auf den Vorhersagewert einiger der einbezogenen Merkmale analysiert. *Ergebnisse:* Die Daten legen nahe, dass zwei Merkmale am stärksten mit einer Spielstörung assoziiert sind: 1) Soziale Interaktionen, charakterisiert durch obligatorische soziale Interaktionen im Vergleich zu keinen möglichen sozialen Interaktionen ($\beta = .20$), und 2) Komplexität des Belohnungssystems, charakterisiert durch die Anzahl der im Spiel verfügbaren Belohnungskategorien ($\beta = .12$). Auf der Grundlage dieser Ergebnisse und weiterer Aktualisierungen wurde die RCCG verfeinert und finalisiert. Zu den weiteren erfassten Merkmalen gehörten u.a. die strukturelle Nähe des Spiels zum Glücksspiel, die Art und die Anzahl von Belohnungsfamilien (z.B. Erfahrungspunkte/Level, Spielitems), der Verlust von Belohnungen während des Spiels oder bei Abwesenheit, eine konkrete Simulation von Glücksspielformen, das Vorhandensein von Lootboxen und In-Game-Käufen sowie die Bedeutung sozialen Interaktionen. *Schlussfolgerungen:* Mit der RCCG liegt ein vollstrukturiertes Instrument zur Erfassung, Beschreibung und Bewertung risikoe erhöhender Strukturmerkmale von Computer und Videospiele vor. Das Instrument ermöglicht eine generelle Risikoeinschätzung eines Spiels sowie die Ableitung einer empfohlenen Alterseinstufung auf Basis von Strukturmerkmalen, die für bestimmte Altersgruppen ungeeignet sind. Trotz der empirischen Basierung in der Entwicklung sind Folgestudien für die Validierung des Instruments notwendig. Die RCCG kann sowohl in zukünftigen Studien als auch in den Feldern Prävention, Bildung und Jugendmedienschutz genutzt werden.

Schlüsselwörter: Computerspielstörung, spielstrukturelle Merkmale, Klassifikation, Risk Characteristics Checklist for Games (RCCG), Risikobewertung

Introduction

Gaming disorder has been officially recognized as a behavioral addiction in the 11th revision of the International Statistical Classification of Diseases and Related Health Problems (ICD-11; World Health Organization, 2019) following considerations of the evidence-based characteristics of this disorder as well as clinical needs (Rumpf et al., 2018; Saunders et al., 2017). Further advancements in our understanding of the etiology of gaming disorder are needed and must consider the contribution of personal (e.g., personality, biological factors), environmental, and product-related risk factors. Regarding product-related risk factors, online games tend to be more strongly related to problematic gaming compared to offline games (Lemmens & Hendriks, 2016; Männikkö et al., 2017; Rehbein et al., 2010). Furthermore, studies found players of specific games to be at a higher risk of excessive gaming time and symptoms of gaming disorder compared to players of other genres (Rehbein et al., 2021) which relates to Massively Multiplayer Online Role-Playing Games (MMORPG) shooter games and real-time-strategy/Multiplayer Online Battle Arena (MOBA) games. This suggests a connection between structural game characteristics and excessive as well as addictive gaming. To be clear, we are not arguing that games *qua* games are “addictive”, thus resulting in psychological impairment in all people playing them. Instead, we recognize (as did Skinner, 1966) that certain features of (game) environments interact with human psychology in predictable ways, some of which could lead to nonadaptive behavior patterns.

However, it remains unclear whether playing games with certain game features causally increases the risk of problematic gaming or whether problem gamers simply prefer games with certain game features over non-problem gamers. Despite the relevance of this topic, research addressing the role of certain structural game characteristics not only for enjoyment *per se* but for problematic gaming is still in its early stages and does not appear to have made substantial progress in recent years (Flayelle et al., 2023; Griffiths & Nuyens, 2017; Rehbein et al., 2021).

To make a comparison with a related field, it is well recognized that certain forms of gambling such as electronic gambling machines are more closely associated with problem gambling than other forms such as lotteries (Binde et al., 2017; Brosowski et al., 2021; Delfabbro et al., 2020). Conclusions can be drawn about the respective addictive potential (Griffiths et al., 2009) as for example high event frequency (i.e., fast game sequences) is clearly associated with an increased risk of addictive gambling.

A possible reason for the limited research addressing the role of structural game characteristics in gaming disorder is that the matter is somewhat more complicated

than with gambling. As games cover a wide range of genres they differ significantly in terms of key design features such as narration, objectives, rewards, gameplay, revenue model, and features of social cooperation. Unlike gambling, boundaries between video game genres often overlap and many structural characteristics are neither exclusive to one particular game genre nor do they necessarily have to be consistent within different games of a particular genre. Game developers regularly introduce new game concepts and create new game genres, as illustrated for example by the rise of the MOBA, Battle Royale, and open world Survival Game genres in the past 15 years. Thus, especially cross-genre taxonomies covering relevant structural game characteristics for problematic gaming (King et al., 2010b) are constantly challenged to stay up to date.

Another issue is that successful video games do not necessarily have to be “addictive” games just as highly addictive games do not have to be successful in terms of market value or business success (Rehbein et al., 2009). This rule also seems to apply when it comes to the structural characteristics found in games: Particular game features might not be enjoyed by players in general but may still be relevant to explain the elevated risk potential of a game (King & Delfabbro, 2009). For example, in many games, players must repeatedly perform certain repetitive actions to gain in game-resources enabling them to acquire certain rewards. These actions often referred to as ‘grinding’ might be boring or even annoying for many players but could still keep them engaged in a repeating cycle of reward-seeking behavior and thus intensified gaming behavior. Thus, enjoyable and risk-enhancing game features might not be the same.

In a systematic review of the literature concerning structural game characteristics and symptoms of gaming disorder or excessive gaming (Rehbein et al., 2021), only 11 publications in total could be identified (Barnes & Pressey, 2013; Dreier et al., 2017; Griffiths & Nuyens, 2017; Groves et al., 2014; Hsu et al., 2009; Hull et al., 2013; King et al., 2010a, 2010b, 2011, 2017; Klemm & Pieters, 2017). Taking into account this review as well as other recent publications, the state of research can be summarized as follows:

- Early research introduced rather abstract descriptions of structural game characteristics that might be relevant for the risk development of gaming disorder. The most recognized cross-genre taxonomy published to date is the five-feature model of structural game characteristics (King et al., 2010b) based on a literature review (King et al., 2010a). The five-feature model comprises a) social features, b) manipulation and control features, c) narrative and identity features, d) reward and punishment features, and e) presentation features, containing 24

subfeatures in total. However, no update or further refinement of the five-feature-model has been published since its introduction in 2010.

- The five-feature model stimulated further empirical research in the field. Two studies indicate that reward and punishment features (King et al., 2011) as well as social features (Hull et al., 2013) might be associated with addictive gaming. However, findings of both publications are partly inconsistent and both studies rely on small online samples of gamers asked to rate the subfeatures regarding entertainment value, importance and influence on their gaming behavior (King et al., 2011) or enjoyment (Hull et al., 2013). The reliability of these subjective attributions is somewhat limited, as they give no direct insight into which features are actually included in the games played (Rehbein et al., 2021). In yet another study, the five-feature taxonomy was applied to ten social network games comprising Simulation/RPG games and tile games and found differences between the included games regarding the structural characteristics (Groves et al., 2014).
- Some additional specialized work is available regarding the genres of MMORPG and Free2Play-games. In a recent theoretical paper, the authors state that especially random reward mechanisms (i.e., random ratio schedules; unpredictable time and quality of the next reward) as well as the necessity of social interactions and formation of social groups (guilds) to advance in MMORPG may help explain why this genre is more often connected to patterns of addictive gaming behavior (Klemm & Pieters, 2017). In free-to-play games, monetization features that stimulate impulsive in-game purchases might also contribute to the overall risk of gaming disorder (Dreier et al., 2017).
- Two other publications, an empirical study (King et al., 2017) and a non-systematic literature review (Griffiths & Nuyens, 2017) suggest that in-game rewards and the related reward-seeking behavior in players, as well as an increasing commitment and need to fulfill ever-higher standards in the game, may be central for the experience of symptoms of gaming disorder.
- In a recent literature review (Flayelle et al., 2023) a theory-driven general taxonomy of structural characteristics of digital media in general that influence uncontrolled online behavior was proposed. The taxonomy covers a variety of media activities as gaming, gambling, cybersex, online shopping, social networking and on-demand TV streaming differentiating between model-free and model-based mechanisms underlying problematic online behavior. Based on this approach, as model-free design features especially reinforcement schedules such as random loot boxes, randomly generated content, and surprise mechanics are derived to be relevant. As model-

based design features, role-playing elements, realistic graphics, in-game achievements, game rewards, in-game purchases, and persistent environment are suggested.

- Other work has emphasized the importance of loot boxes. A loot box is a collective name for different types of packs, chests, or boxes, containing a selection of items (i.e., loot) that may enhance the gameplay experience (Lemmens, 2022). Because users generally do not know the contents of loot boxes prior to opening them, these potential reward mechanics share psychological and structural similarities with gambling, encouraging the acquisition of loot boxes by paying for them (Drummond & Sauer, 2018). In fact, the mechanisms of loot boxes are very similar to those that make gambling potentially addictive, making these structural mechanics a contributing factor to the development of gaming disorder.

Based on the available literature, no suggestions exist on how to define the structural characteristics more clearly and on how to capture them appropriately. In recognition of this research gap, we here introduce a standardized instrument for the assessment of structural game features. The *Risk Characteristics Checklist for Games (RCCG)* can be used in the context of prevention, youth protection measures, intervention measures, educational measures and empirical research addressing the particular importance of game features for gaming disorder.

Methods

The RCCG was developed within the framework of a step-wise learning research project comprising about 10 years of development and testing (see Figure 1). The first stages of development began in 2010 and were supported via project-accompanying master's theses (Blaszcyk, 2014; Plöger-Werner, 2011; Salzer, 2012; Staudt, 2017). Initial game-content analyses of two MMORPG (Metin2, World of Warcraft) revealed complex reward systems and features fostering social bonding in players (Plöger-Werner, 2011; Salzer, 2012). Based on this early work, preliminary compilations of game features were developed, initially limited to the MMORPG genre.

Development of a Preliminary Taxonomy of Cross-Genre Game Characteristics

In the course of further game analyses, the derived features were successively applied and extended to a wider spectrum of video game genres in order to develop a

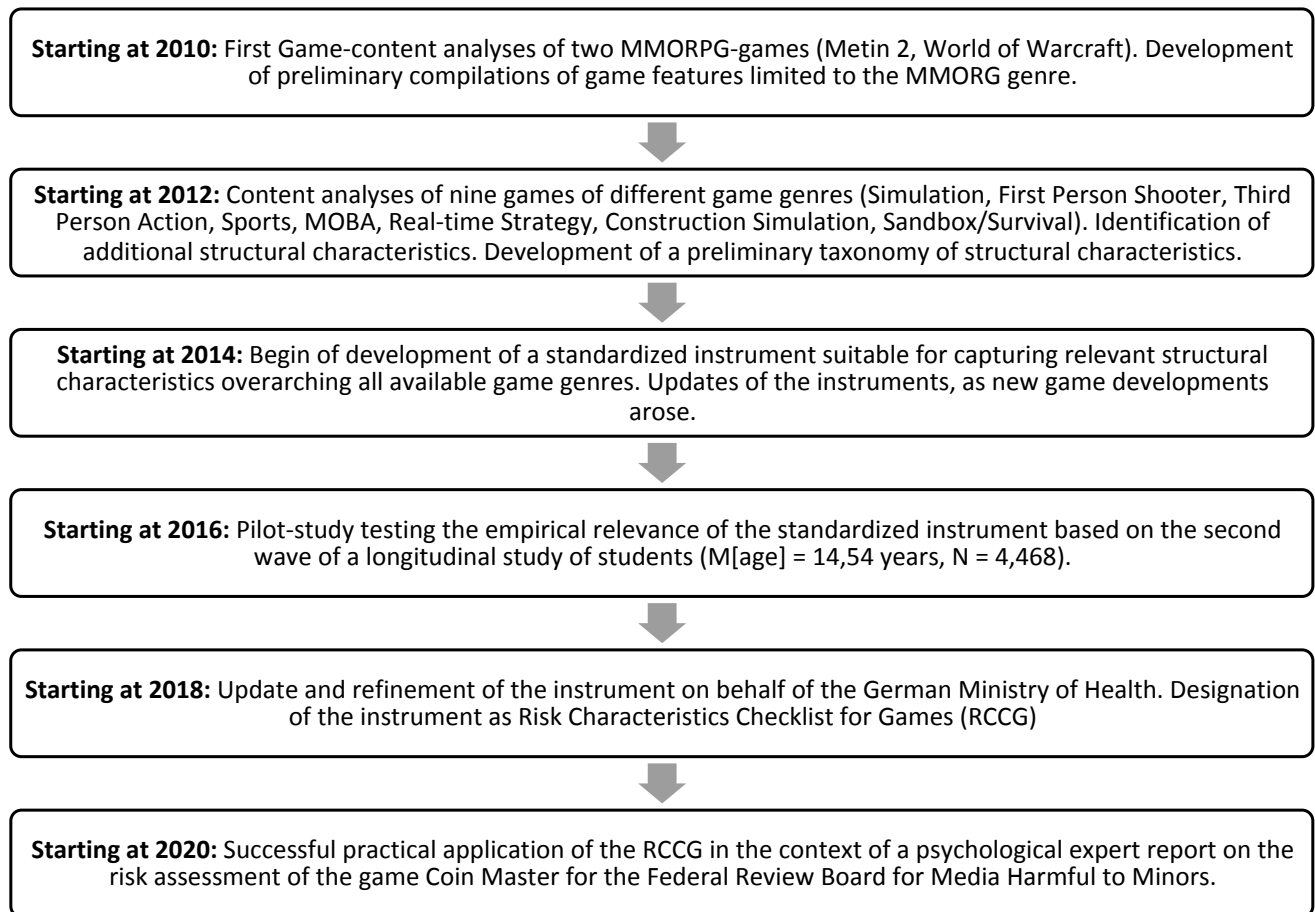


Figure 1. Process of the more than ten-year development and testing of the Risk Characteristics Checklist for Games (RCCG).

cross-genre taxonomy of structural game characteristics. In 2012, nine games were played by recruited gamers playing each game for roughly 40 hours (Rehbein et al., 2012): Farmville (Free-2-Play game; simulation), Farmerra (Free-2-Play game; simulation), Battlefield 3 (First-Person Shooter), Assassin`s Creed Revelations (Third-Person Action-Adventure), FIFA (Sports Game), League of Legends (MOBA), Starcraft II - Wings of Liberty (Real-time strategy), Civilization (construction simulation), Minecraft (sandbox/survival). The players were instructed to verbalize their thoughts while playing (thinking aloud method). All gaming sessions were auditory and visually recorded. The gamers answered standardized questions every 2 hours regarding current gaming motivation, enjoyment, and frustration. Based on these recordings, additional structural characteristics were identified and a preliminary taxonomy of structural characteristics was developed (Rehbein et al., 2012). The taxonomy shows some overlaps to the five-feature model proposed by King and colleagues (King et al., 2010b), however, with a stronger emphasis on the reward system, social features and in-game purchases.

Development of a Standardized Instrument

After the development of the preliminary taxonomy, the next objective was to develop a standardized instrument with which relevant structural game characteristics could be systematically identified and described. It was determined that the instrument should meet the following assessment requirements:

- The instrument should only capture game characteristics that could be assumed to increase the risk of gaming disorder in vulnerable players. The inclusion of game features can be derived from theoretical considerations as well as empirical data. Game features that primarily increase enjoyment of playing (for example sophisticated graphic effects, engaging storyline, interesting game characters) were not to be included.
- The instrument should be applicable to video games in general comprising mobile and stationary games as well as games of different genres. Based on the common knowledge of a game from a user's perspective, it must be possible to complete the instrument. No game features should be included that require exclusive knowl-

- edge about the structure of a game that is only accessible to the game designers themselves.
- c. The assessment procedure must be fully standardized. If assessment of free text data is necessary, evaluation rules must be available to convert them into standardized outcomes. Characteristics that cannot be determined objectively but only as the result of highly subjective attributions and interpretations should not be included.
 - d. Based on the assessment of the structural characteristics it should be possible to derive a total risk assessment score differentiating between low, moderate and high-risk games.
 - e. In addition to the general risk assessment of problematic gaming, the instrument should also provide information on whether a game contains certain features which call into question the suitability of the game for specific age groups. This concerns mainly, but not exclusively, monetization features and a structural similarity of a game to gambling.

On the basis of this assessment requirements, the first author of this paper gradually developed a structured instrument suitable for capturing relevant structural characteristics overarching all available games genres. As new game developments arose, adjustments and extensions to the instrument were implemented. This work was supported by two master's theses covering applicability of the work-in-progress instrument as well as empirical relevance of the recorded features (Błaszcyk, 2014; Staudt, 2017). In one master's thesis (Staudt, 2017), a pilot-study testing the empirical relevance of the recorded features was conducted. The work was based on a secondary analysis of the second wave of a longitudinal study conducted in the region of Hannover (Germany), comprising $N = 4,468$ students in grades seven to ten ($M[\text{Age}] = 14.54$ years, $SD = 1.37$ years). Data was collected in October 2012. Further information on the methodology of this study can be found elsewhere (Rehbein et al., 2012; Rehbein & Mößle, 2013). Students were asked to report up to three of their currently favorite video games. Structural characteristics of the 25 most frequently mentioned video games were assessed by a single coder applying a first draft version of the standardized instrument based on the preliminary taxonomy (Rehbein et al., 2012). Students using at least one of the top 25 games were included in the analysis ($n = 2,801$). Information on structural features was collected on relevant gaming websites, by sighting video game footage on popular video platforms or playing the game. Based on this data collection, the features of the students' most frequently played games were identified. Second, (stepwise) multiple regression analyses predicting symptom severity of gaming disorder (CSAS; English version: Rehbein, Kliem et al.,

2015; German version: Rehbein, Baier et al., 2015) by structural characteristics, whilst controlling for age and gender, was conducted. The predictors considered were importance of social interactions, reward system complexity, losses during the game, in-game sequences that cannot be interrupted, and purchases of in-game items for real money. Data suggested that two features might be of particular importance: 1) social interactions, as indicated by mandatory social interactions compared to no possible social interactions ($\beta = .20$), and 2) complexity of the reward system, as indicated by the number of reward categories ($\beta = .12$). Findings regarding the other structural characteristics, especially the ones concerning the relevance of monetization features, were less conclusive.

In accordance with the current state of research (Rumpf, 2017) the checklist was again updated by the first and the last author of this manuscript on behalf of the German Ministry of Health (Rehbein, 2019). Recently, the checklist was used in a psychological report evaluating the risk potential of the simulated gambling game *Coin Master for the Federal Review Board for Media Harmful to Minors* (Rehbein, 2020).

Results

The RCCG can be filled out by trained coders and can be used in various fields of work such as youth media protection, prevention, education, counseling and research. Knowledge and consideration of the entire game content including available game modes as well as early and possible end game content is necessary to complete the RCCG. Deeper knowledge can be acquired especially by playing a game for a sufficiently long time (depending on the degree of its complexity), watching video game footage and play-throughs, and research of information using game related wikis, reviews, game forums, and game stores.

The instrument contains four assessment sections (A to D) and a final evaluation section (see Table 1, Electronic Supplementary Material [ESM] 1 [English version] and ESM 2 [German version]).

In Section A, general information about the game is queried (title, publisher, version [build], genre, platform, online content, official age-classification and revenue model). The purpose of this section is to record the essential identification data of a game and is not included in the calculation of the risk score or suitable age classifications. It is possible to skip this section or parts of this section if certain information is not needed in the context of a particular RCCG practical application scenario.

Section B addresses one structural game characteristic suggesting a close proximity of the game design to gam-

bling games. B1: Possibility of real money stakes for randomly or unpredictable in-game rewards (e.g., loot boxes) or the possibility of game-currency stakes for unpredictable in-game awards where the game-currency can be bought in exchange for real money. Regardless of the risk assessment made in Part C, the RCCG results in a recommendation that games meeting Criterion B1 be released exclusively for adults, as gambling games are not suited for minors.

Section C covers risk-increasing game features. The game characteristics in this section build the core risk-assessment of the RCCG as calculated in the final evaluation and encompass the following structural characteristics. C1 & C2: Number of reward categories available in the game (complexity of the reward system). C3: Possibility of looting and/or opening of lootboxes (unpredictability of rewards). C4 & C5: Possibility to lose rewards during the game or in absence (reward deprivation). C6: Simulation of gambling activities like poker, blackjack, casino games, slot machines, sports betting or other actually existing forms of gambling (simulated gambling). C7 & C8: Presence and relevance of in-game purchases and spending limits for in-game purchases. C9: Reselling of in-game rewards. C10: Possibility to receive awards for extensive playing time (extensive gaming awards). C11: Relevance of social cooperation for in-game success (social cooperation and bonding).

Section D covers harm minimization features aimed on preventing or reducing overuse and addictive playing. The presence of harm minimization features is not considered in the calculation of the overall risk assessment of a game. This decision was made because, based on the state of research, it is not known to what extent risk-reducing game features can counteract a game design with a given risk potential. In addition, mixing risk-increasing and risk-reducing features into the overall score would reduce the transparency of the assessment result. The basic idea is of risk and harm minimization features to be determined independently from one another to be able to relate the overall risk potential of a game to protective measures implemented. Harm minimization features encompass the following characteristics: D1: Feedback on playing time. D2: Information on financial expenses. D3: Education of players about possible risks involved in gaming. D4: Game time limits. D5: Time or spending limits (self-limitation means). D6: Other preventive measures.

The last section of the instrument provides the evaluation section. First, the recommended age-classification is determined by taken into account the structural characteristics of section B and C (see Table 2). The age classification takes into account only structural characteristics as considered by the RCCG, so other relevant criteria for age classifications as for example violent content are not con-

sidered. Second, the general risk of a game to stimulate problematic gaming behavior in vulnerable players is determined. Based on all single assessments in Section C (no risk = 0 points, medium risk = 1 point, high risk = 2 points), a sum score is calculated ranging from 0 to 22 points. A higher sum score points out to a higher risk. The full instrument in its current version can be downloaded as Online-Supplement (ESM 1 [English version], ESM 2 [German version]).

Discussion

Without any doubt, structural game characteristics are just one side of the coin when elucidating the etiology of gaming disorder (King, Koster et al., 2019). The vast majority of gamers do not develop signs of problematic or addictive gaming behavior, and problematic behaviors typically have personal, social, environmental, and game-related factors that all contribute to the risk of gaming disorder.

Research on structural game characteristics and their contribution to problematic gaming is still limited (Flayelle et al., 2023; Rehbein et al., 2021). Progress has been slow since the introduction of a taxonomy in 2010 (King et al., 2010b). On the one hand, this could be due to methodological weaknesses in this field of research of behavioral addictions in general (Rumpf et al., 2019) or this specialized field in particular (Griffiths & Nuyens, 2017; King, Delfabbro et al., 2019; Rehbein et al., 2021). On the other hand, it could also be speculated that the slow progress is a consequence of insufficient efforts to systemize existing knowledge and apply it to develop instruments capturing relevant structural game characteristics in order to advance in this field, perhaps because games are constantly evolving. With the RCCG, a practically applicable instrument is available that will hopefully stimulate further systematic research. As the instrument enables a general risk assessment of a game to stimulate problematic gaming in vulnerable players, it could be used in the context of prevention and intervention measures to identify game related risks concerning certain players or risk populations. It also could be used in game-rating systems, as the “addictive” potential of games is something parents would like to know about. However, although the RCCG was developed on grounds of the existing literature and empirical data derived in a number of initial studies, further data are warranted to corroborate this instrument and validate it against general and clinical samples. A limitation of our pilot study is that correlations between risk characteristics and gaming behavior were only surveyed cross-sectionally. However, the relevance of the criteria as causal risk fac-

Table 1. Structure of the Risk Characteristics Checklist for Games (RCCG)

Part	Content
A) General information	
A1–A9	Game title, publisher, test date, game version (build), genre, distribution platform(s), test platform(s), online content, age classifications, monetization model
B) Structural characteristics similar to gambling	
B1	Possibility to purchase randomly or unpredictably awarded in-game rewards (e.g., loot boxes).
C) Risk-increasing structural game characteristics	
C1 & C2	Number of reward categories
C3	Looting and loot boxes
C4	Rewards can be lost during the game
C5	Rewards can be lost during absence
C6	Simulated gambling
C7	Presence of in-game purchases and spending limits
C8	Detailed assessment of in-game-purchases (types, significance for success)
C9	Reselling of in-game rewards
C10	Extensive gaming awards
C11	Relevance of cooperative social interactions
D) Harm minimization features	
D1	Feedback on gaming time
D2	Information about financial expenses
D3	Education of players about possible risks involved in gaming
D4	Game time limits
D5	Self-limitation means
D6	Other preventive measures

Note. See online supplement for the full instrument.

tors can only be proven in longitudinal studies. A suitable study design can be outlined by recording the games used by survey participants at several measurement time points, analyzing the structural characteristics present in these games using the RCCG, and examining the predictive value of these characteristics for later problem gaming behavior. In this context, it remains to be seen to what extent the RCCG will meet with acceptance on the part of potential users. It can be critically noted that the effort associated with the application of the RCCG is relatively high. However, this is primarily due to the complexity of modern game designs. From the experience of the research team, it appears that at least 4 hours of training are required to enable competent application of the RCCG and that coders must have in-depth expertise in playing games of different genres.

Related to ratings, the RCCG provides a recommended age-classification based on structural features unsuitable for minors found in video games more recently, especially game designs encouraging repeated impulsive purchases of in game items, resources or currencies, resale of in-game rewards as well as structural game characteristics stimulating gambling-like behavior. Thus far, age ratings for video games do not systematically take these as well as other structural characteristics stimulating problematic gaming in vulnerable players into account. However, as the question of controlled and healthy compared to uncontrolled and unhealthy gaming can be regarded to be at least one important aspect of video games' appropriateness for children and adolescents, understanding the nature of these differences is of paramount importance.

Table 2. Risk assessment, scoring and age classification of the Risk Characteristics Checklist for Games (RCCG)

B) Structural similarities to gambling	Feature not included		Feature included
Purchase of randomly awarded in game rewards possible (B1)	/		(Age: 18+)
C) Risk-increasing structural game characteristics	No risk	Medium risk	High risk
Number of reward categories (sum of C1 and C2)	0	2 (Age: 6+)	4 (Age: 12+)
Looting, Lootboxes (C3)	0	1 (Age: 6+)	2 (Age: 12+)
Losses of rewards during the game (C4)	0	1 (Age: 0+)	2 (Age: 6+)
Losses of rewards in absence of the game (C5)	0	1 (Age: 12+)	2 (Age: 16+)
Simulated gambling (C6)	0	1 (Age: 6+)	2 (Age: 12+)
In-game purchases (C7)	0	1 (Age: X+) ¹	2 (Age: 18+)
Detailed assessment of in-game purchases (C8)	0	1 (Age: 6+)	2 (Age: 12+)
Reselling of in game awards (C9)	0	1 (Age: 12+)	2 (Age: 16+)
Extensive gaming awards (C10)	0	1 (Age: 6+)	2 (Age: 12+)
Relevance of cooperative social interactions (C11)	0	1 (Age: 6+)	2 (Age: 12+)

Notes. See online supplement for the full instrument. General risk assessment of games derives from Criteria C1 to C11. Numbers show scoring of each risk criteria. Presence of a single risk-increasing structural game characteristic (medium risk or high risk) may suggest a particular age classification. Presence of Criterion B1 always suggest the product to be unsuitable for minors (18+). The strictest single age-recommendation determines the overall age-classification. The sum score of the risk assessment can reach 0 (no risk) to 22 points (high risk). ¹Recommended age classifications varies depending on the total expenditure per player.

Electronic Supplementary Material

The electronic supplementary material (ESM) is available with the online version of the article at <https://doi.org/10.1024/0939-5911/a000859>

ESM 1. Risk Characteristics Checklist for Games (RCCG, English version)

ESM 2. Risk Characteristics Checklist for Games (RCCG, German version)

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Publication Ethics

The pilot study is based on a student survey in the city and region of Hannover, Germany. The data protection concept of the study was approved by the State Education Authority of Lower Saxony. Participation in the study was voluntary for the students and informed consent was obtained from parents and students.

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