

CRUNCH IN THE VIDEO GAME INDUSTRY: A SCOPING REVIEW

CRUNCH EN LA INDUSTRIA DE LOS VIDEOJUEGOS: UNA REVISIÓN DE ALCANCE

CRUNCH NA INDÚSTRIA DE JOGOS DIGITAIS: UMA REVISÃO DE ESCOPO

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ABSTRACT

“Crunch,” or “crunch time,” in the digital gaming industry refers to the extension of work through long hours, often unpaid, which can be permanent or temporary. This study sought to systematize knowledge about this phenomenon through a scoping review. The search was conducted in ten sources of information, resulting in 48 included studies. The thematic analysis identified the main characteristics of crunch, and the antecedents and consequences that operate at the individual, organizational, and social levels in maintaining crunch. The results enable a greater understanding of the phenomenon, highlight gaps, and provide suggestions for future research.

Keywords: crunch; video game; work hours.

RESUMEN

En la industria de los videojuegos, el término «crunch» o «crunch time» se refiere a la prolongación de la jornada laboral mediante largas jornadas, a menudo no remuneradas, que pueden ser permanentes o temporales. Este estudio buscó sistematizar el conocimiento sobre este fenómeno mediante una revisión de alcance. La búsqueda se realizó en diez fuentes de información, lo que dio como resultado 48 estudios incluidos. El análisis temático identificó las principales características del crunch, así como los antecedentes y las consecuencias que operan a nivel individual, organizacional y social en el mantenimiento del crunch. Los resultados permiten una mayor comprensión del fenómeno, ponen de manifiesto las lagunas existentes y ofrecen sugerencias para futuras investigaciones.

Palabras Clave: crunch; videojuego; horas de trabajo.

RESUMO

“Crunch”, ou “crunch time”, na indústria de jogos digitais, diz respeito à extensificação do trabalho por meio de longas jornadas, frequentemente não remuneradas, que podem ser permanentes ou temporárias. Este estudo buscou sistematizar o conhecimento sobre esse fenômeno através de uma revisão de escopo. A busca foi realizada em dez fontes de informação, resultando em 48 estudos incluídos. A análise temática identificou as principais características do crunch, e os antecedentes e consequentes que operam a nível individual, organizacional e social na manutenção do crunch. Os resultados possibilitam maior compreensão sobre o fenômeno, evidenciam lacunas e sugestões para pesquisas futuras.

Palavras-chave: Crunch, jogos digitais, jornada de trabalho.

1. INTRODUCTION

The term “crunch”, of English origin, means “to crush” or “to grind” and is used in the game industry to describe the practice of extending the workday beyond the usual hours to finish a project. The International Game Developers Association (IGDA, 2019) defines “crunch” as a period where professionals are subjected to long workdays, often exceeding their regular contracts and frequently without additional pay, to meet project deadlines. According to the latest census by the IGDA (Weststar; Lentini, 2024), 28% of professionals reported having experienced crunch, and of these respondents, 30% worked more than 60 hours per week, and 29% worked between 50 to 59 hours per week.

Crunch has been associated with harm to the mental and physical health of game industry workers. The phenomenon is linked to sleep deprivation, inadequate nutrition, and reduced physical and leisure activities (Cote; Harris, 2021). These effects are similar to those identified by Burke and Fiksenbaum (2008) regarding the intensification and extensification of work in the general market. Long work hours can lead to mental health issues, chronic fatigue, and cardiovascular risks, even leading to death from overwork in extreme cases (Burke; Fiksenbaum, 2008). From a public health perspective, the impacts of crunch go beyond the individual level, as they can contribute to an increased demand for healthcare services (Coppins *et al.*, 2022).

Although widely recognized within the sector, crunch remains a phenomenon surrounded by ambiguity and taboos. In certain contexts, different terminologies are used, such as the word “effort” as a synonym for crunch, to avoid using the direct term (Ouellet, 2010). Additionally, it is common for professionals not to recognize crunch as harmful when it is self-imposed, meaning when the decision to extend the workday comes from them, not from a direct demand by the company. In these cases, many fail to associate the practice of working long hours with crunch itself. Thus, crunch remains recurrent with gaps in its identification process in work contexts (Cote; Harris, 2020; Romine, 2016; Wright, 2015a).

A non-sensitized literature search on this phenomenon also reveals that these gaps extend to the academic sphere. When using the words “crunch” and “game” in Google Scholar, IEEE, Scopus, and Web of Science it was found one review on the topic. Niemelä (2021) investigated the causes, effects, and solutions for crunch, mapping 36 studies between 2008 and 2021. The review’s results indicated a predominance of qualitative studies and surveys, the absence of a consensual definition of crunch, and a lack of assessment of its health effects. Furthermore, the review conducted by Niemelä (2021) presented significant methodological limitations. The search strategy in databases was not sensitive to the diversity of terms used to refer to crunch, which may have restricted the

number of included studies. Additionally, the author did not detail the eligibility criteria for the studies, which prevents the review's reproducibility. Due to these characteristics and because the review did not present evidence of the phenomenon's prevalence and characteristics, some doubts remained regarding crunch occurrence, therefore, a new review was chosen to be conducted on the topic, and the following research question was proposed: "What is known about the phenomenon of crunch in the digital games industry?". In accordance with that, the objective of this review is to systematize the existing scientific evidence on crunch in the digital games industry.

2. METHOD

Considering that crunch is a present phenomenon in the game industry, that it has negative impacts on professionals in the field, and that there is no solid synthesis of evidence on this topic, a scoping review on this phenomenon was performed. A scoping review is a method through which it is possible to map empirical evidence on a new phenomenon in academic literature, identify its gaps, and suggest directions for future research (Barbosa Filho; Tricco, 2019; Peters *et al.*, 2020).

2.1 Eligibility criteria

The inclusion criteria were defined as: (1) empirical studies, (2) with gameworkers, (3) with evidence about crunch, and (4) contextualized in the digital games industry. Studies were included if they were (5) published in Roman-alphabet languages and (6) offered original data not already captured by another included research. All studies published in languages that use the Roman alphabet (5) and do not repeat the results of other studies included in the review were included (6). Furthermore, studies were included without restriction to the quality of the study (7), nor regarding the year of publication or the region where the study was conducted (8). On the other hand, the complementary exclusion criteria were: (1) theoretical and review studies, news articles, blogs, opinion-based publications, institutional documents, books, book chapters, book reviews, book introductions, research reports; (2) research on players, streamers, YouTubers, or influencers in the game industry, play-to-earn workers, analog game developers; and (3) studies about crunch without evidence about the phenomenon.

2.2 Information sources and search strategy

The Population, Concept, and Context (PCC) question model was used (Peters *et al.*, 2020). For this model, population is the digital game industry workers, the concept is crunch, and the context is the digital games industry. Search keys were developed based on reading the main articles in the

field and including keywords, indexed keywords, natural terms, and controlled vocabulary (AGROVOC and MeSH thesaurus). The main search strategy used in the information sources is provided on Table 1¹.

Table 1 - Complete search strategy used in main peer-viewed databases.

((("worker" OR "workers" OR "workforce" OR "gameworker" OR "gameworkers" OR "game worker" OR "game workers" OR "video game worker" OR "video game workers" OR "videogame worker" OR "videogame workers" OR "employee" OR "employees" OR "personnel" OR "occupational groups" OR "professional" OR "developer" OR "developers" OR "game developer" OR "game developers" OR "video game developer" OR "video game developers" OR "videogame developer" OR "videogame developers")) AND ("crunch" OR "crunched" OR "crunch time" OR "crunch culture" OR "culture of crunch" OR "types of crunch" OR "workload" OR "work load" OR "employee work load" OR "employee workload" OR "staff work load" OR "staff workload" OR "extreme workload" OR "extreme work" OR "overload" OR "overloaded" OR "overtime" OR "overtime work" OR "sustained overtime" OR "unpaid overtime hours" OR "overwork" OR "sustained overwork" OR "unpaid overwork" OR "working hours" OR "working time" OR "job hours" OR "work-hours" OR "work hours" OR "hours of work" OR "hours at work" OR "project-based work" OR "long work hours" OR "long working hours" OR "long hours" OR "long hours at work" OR "long hours of work" OR "extended hours" OR "insane hours" OR "shift work schedule" OR "work schedule tolerance" OR "working conditions" OR "unpaid work" OR "work strain" OR "job strain" OR "work intensity" OR "work intensification" OR "intensification of work" OR "labor" OR "compulsory labor" OR "work-life balance" OR "life-work imbalance" OR "work-family balance" OR "work-life conflict" OR "passion" OR "workaholism" OR "workaholic")) AND ("video games" OR "video game" OR "videogame" OR "videogames" OR "game" OR "games" OR "game industry" OR "video game industry" OR "videogame industry" OR "digital game" OR "digital games" OR "digital game industry" OR "digital games industry" OR "game development" OR "video game development" OR "videogame development" OR "game project" OR "game projects" OR "video game project" OR "video game projects" OR "videogame project" OR "videogame projects" OR "video game labor" OR "gamework" OR "culture of gamework" OR "video game workplace" OR "videogame workplace" OR "video game culture" OR "videogame culture" OR "culture of digital games" OR "electronic games" OR "computer games" OR "game studies")))

Source: Authors

Araújo *et al.* (2024) suggest performing the search in three to six information sources, including disciplinary and multidisciplinary databases to ensure broad research coverage. The following sources were used for the search: Engineering Village, IEEE, PsycINFO, SciELO, Scopus, and Web of Science. For gray literature, the following information sources were used: Dimensions,

¹ Supplementary Documents available on OSF website on the following link:

https://osf.io/2a3yj/?view_only=fec6a0d271bc44fc8aae2195edbca4be

Please note that this is a private and anonymous link. After the article is published, the documents will be made public.

Google Scholar, Networked Digital Library of Theses and Dissertations (NDLTD), Open Access Theses and Dissertations (OATD), and references from the articles included in the review.

2.3 Study selection process

The results were allocated to EndNote (<https://endnote.com>), a bibliographic reference management software. In it, automated exclusion of duplicate references and manual exclusion of duplicate references were performed. The references retrieved in the searches were incorporated into Rayyan® software (<https://www.rayyan.ai/>), an application that allows the organization and reading of texts in the literature review process. In this application, duplicate references were detected, and the eligibility criteria were applied. In the first phase, titles and abstracts of the records were read by two researchers in a double-blind format. In the second phase, the same format was used, but with the reading of full texts and the application of eligibility criteria in an Excel table. Discrepancies that arose in the inclusion and exclusion process were resolved in consensus meetings between the researchers.

2.4 Data extraction and analysis

The included studies were stored in a new Excel spreadsheet, in which the following information was inserted: study title, year of publication, authorship, author's country of affiliation, type of publication, repository, research field, objective, research design, data collection and analysis method, instruments used in the collection, and data collected on crunch. Data analysis was done using Thematic Analysis (TA), starting with open coding of the data based on the types of evidence found about crunch, which then formed structured coding in themes and sub-themes (Braun; Clarke, 2006).

From the analyses, 10 themes were identified: crunch prevalence, crunch duration, individual aspects, organizational aspects, social and business aspects, compensation for crunch, absence of compensation for crunch, punishments for not crunching, health damages linked to crunch, and other outcomes related to crunch. The protocol for this review is published on the Open Science Framework (OSF) with the title "Crunch in the video game industry: A scoping review" and identifier: DOI 10.17605/OSF.IO/RC4M3.

3. RESULTS

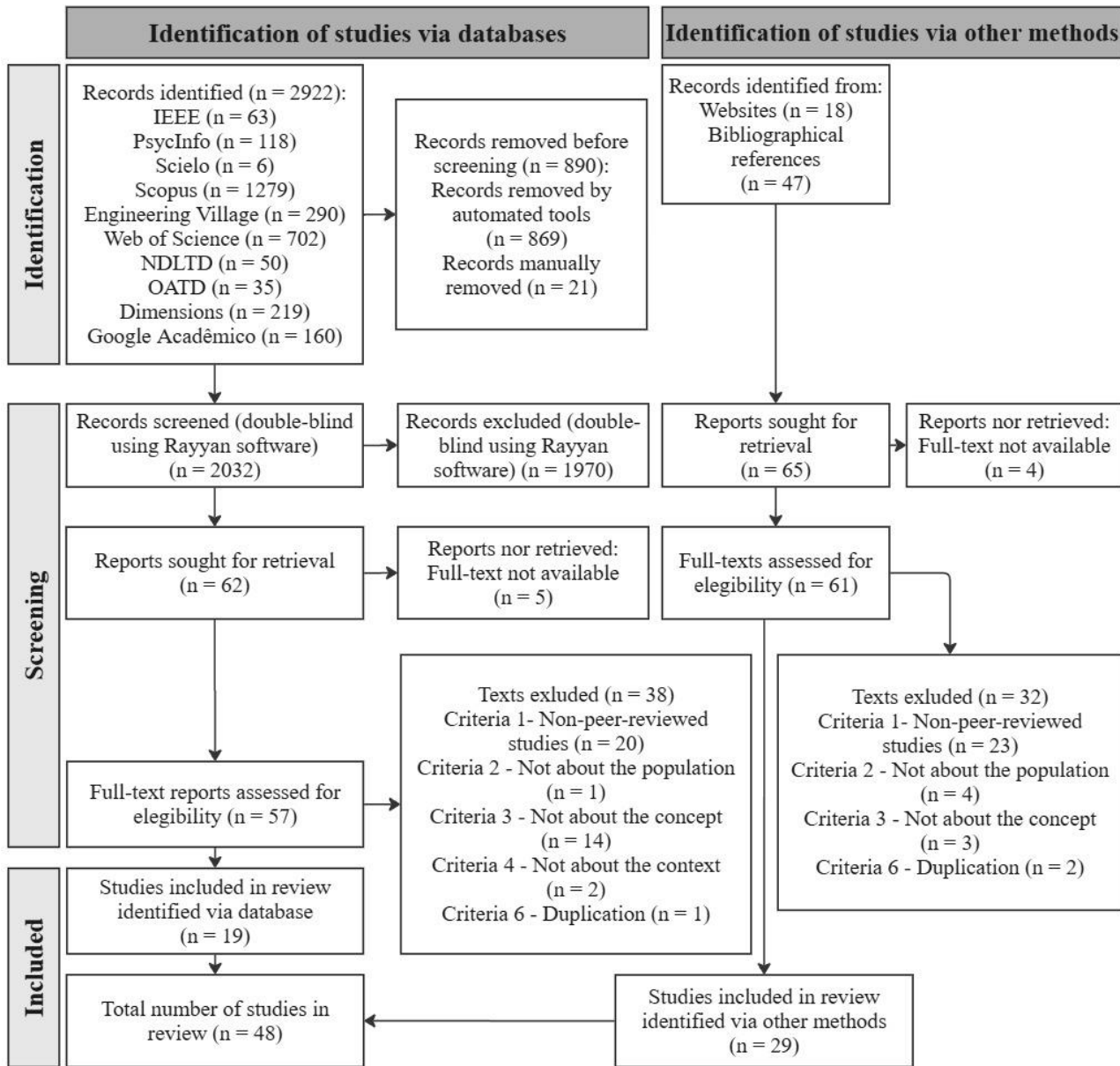
The workflow on the process of searching and screening for studies is presented in Figure 1. The database search was conducted on May 18, 2023, across 10 information sources (IEEE,

PsycINFO, SciELO, Scopus, Engineering Village, Web of Science, NDLTD, OATD, Dimensions, and Google Scholar), resulting in 2,922 studies. These studies were imported into the EndNote platform, where the first automated duplicate exclusion was performed. Subsequently, the studies were transferred to Rayyan for a second automated duplicate exclusion, which removed 869 studies. An additional 21 duplicate studies were manually removed, totaling 890 duplicates eliminated.

During the screening phase, 2,032 abstracts were reviewed to apply the eligibility criteria. In the abstract reading stage, 1,970 studies were excluded for not meeting the inclusion criteria, and 62 studies moved on to the full-text reading phase. Among these 62, five could not be retrieved and 19 were included in the review. Additionally, 65 studies were identified through other methods, four could not be retrieved, and 29 were included based on the eligibility criteria. At the end of the process, 48 studies were included in the scoping review. The complete list of the references analyzed, and the data collected for this scoping review are available on Supplementary Documents on OSF website².

² https://osf.io/2a3yj/?view_only=fec6a0d271bc44fc8aae2195edbca4be

Figure 1 - PRISMA 2020 flow diagram for this scoping review



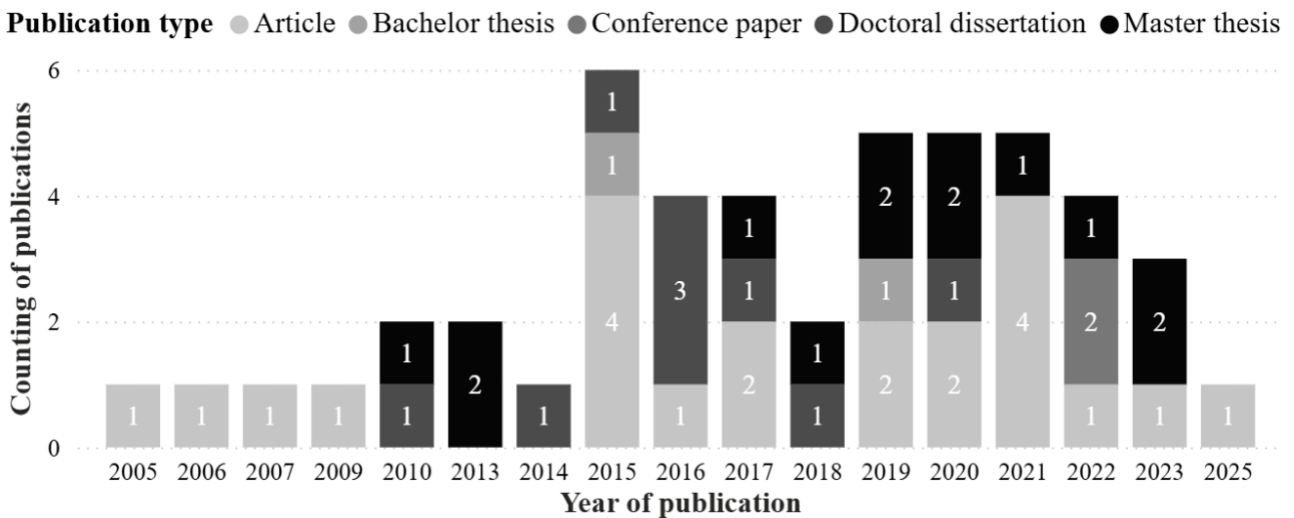
Source: Authors

Most of the studies are from the Communication field (15), followed by Human Sciences (11) and Management (10). Furthermore, Video Game Studies have three included studies, Software Technology and Sociology of Work both have two studies, and the remaining areas have one study each (Computer Science, Economics, Information Technology, Psychology and System Sciences). As for the authors' country of affiliation, the country with the most publications is the United States (11), followed by Canada (10), Sweden (6), Finland (5), England (4) and South Korea (3). Brazil and

Estonia both have two articles. The countries with one study each are: Ireland, Portugal, Germany, the Netherlands, Australia, and Scotland.

Of the 48 studies included, 22 are articles, 13 are master’s theses, nine are doctoral dissertations, two are undergraduate monographs and two are conference papers. Figure 2 shows that the first publication dates from 2005 (De Peuter; Dyer-Witthof, 2005), and from that year until 2014, the number of publications remained relatively stable, varying between one and two publications per year. In 2015, however, there was an increase in research on crunch, with production peaking at six studies. In the following years, there was a variation of two to five studies.

Figure 2 - Count of publication types on crunch by year



Source: Authors

Forty-four studies used primary data, and four used secondary data (Anderson; Orme, 2022; Cote; Harris, 2020; Cote; Harris, 2021; Ullmann *et al.*, 2022). Additionally, 42 (87.5%) of the 48 studies are qualitative, five used mixed methods, and three are quantitative. Thirty studies collected data through interviews (28 qualitative and two mixed-method studies), and six studies used questionnaires (three are mixed-method and three with quantitative design). Six studies used post-mortem as a data source, four studies used online publications as the object of analysis, and two are case studies. Seven studies did not report on the data collection method used in the research; of these, three are ethnographies and two are case studies. It was found that only 14 (31.1%) of the 48 studies presented the instruments used in the collection (questionnaire, interview script), and 24 presented the analysis method (statistical analysis, thematic analysis, discourse analysis, etc.).

3.1 Crunch prevalence

The empirical studies in this review made it possible to identify the prevalence of crunch in different samples (Table 2). In studies with post-mortems, the occurrence of crunch was identified in 45% of the samples (Edholm *et al.*, 2017; Petrillo *et al.*, 2009). One study analyzed the occurrence of crunch in studios, where the prevalence was in three of four studios investigated (Edholm *et al.*, 2017). In studies with workers, the presence of crunch varied between 70% and 85%, indicating a high crunch prevalence (Larsson, 2018; Lipkin, 2016; Mendes, 2020; Ouellet, 2010; Roininen, 2013; Westerdahl, 2019).

Table 2 – Crunch prevalence

Citation	Sample	Prevalence
Petrillo <i>et al.</i> (2009)	15 post-mortem	Crunch was identified in 45% of them
Edholm <i>et al.</i> (2017)	78 post-mortem	Crunch was identified in 45% of them
Edholm <i>et al.</i> (2017)	Four game studios	Three studios make crunch
Larsson (2018)	130 workers	84% experienced crunch
Mendes (2020)	193 workers	85% experienced crunch
Lipkin (2016)	20 workers	70% experienced crunch
Westerdahl (2019)	28 workers	56,5% crunched several times 36% crunch rarely
Roininen (2013)	56 workers	44,6 % crunch at final beta testing 26,8% crunch with high frequency 23,2% don't crunch
Ouellet (2010)	53 workers	52% crunch on critical moments 26% crunch rarely or don't crunch 22% crunch constantly

Source: Authors

3.2 Crunch duration

Out of 17 studies, it was possible to synthesize that work time during crunch varies from 10 to 20 hours per day (Chung; Kwon, 2020; De Peuter; Dyer-Witthford, 2005; Deuze; Martin; Allen, 2007; Kim; Lee, 2021; Lipkin, 2016; Petrillo *et al.*, 2009; Wright, 2015b) or from 50 to 100 hours per week (LaLonde, 2020; Roininen, 2013). Crunch periods can last between three to seven consecutive days (Chung; Kwon, 2020; Lipkin, 2016; Petrillo *et al.*, 2009), two weeks (Deuze;

Martin; Allen, 2007; Larsson, 2018), or even months (Bulut, 2014; Chung; Kwon, 2020; Jackson, 2020; Kim; Lee, 2021; Lipkin, 2016; Newbery, 2013; Petrillo *et al.*, 2009) and years (Newbery, 2013).

3.3 Individual aspects linked to crunch

The occurrence of crunch is often related to individual factors. Some professionals report liking crunch, associating it with social connections and passion for the work (Jackson, 2020; Roininen, 2013), while others express frustration, guilt, and discontent with unrecognized overload (Chung; Kwon, 2020; De Peuter; Dyer-Witthoford, 2005; Edholm *et al.*, 2017; Johnson, 2010; Newbery, 2013; Ouellet, 2010; Schmidt, 2021). Love, passion, or emotional connection to work are elements mentioned 12 times in 10 studies (Archontakis, 2019; Edholm *et al.*, 2017; Jackson, 2020; Newbery, 2013; Sundin; Johansson, 2022; Thompson; Parker; Cox, 2015; Wright, 2015a; Zaklan, 2023) and seven studies demonstrated that passion for work is a prerequisite for working in the sector (Archontakis, 2019; Cote; Harris, 2020; Lee, 2019; Ozimek, 2019; Wright, 2015a). The emotional involvement with the industry, project, or team, combined with creative pleasure and the difficulty of separating personal life and work, favors self-imposed crunch, which is when the workers, even without explicit company pressure, submits to crunch (Cote; Harris, 2021). This was the most cited individual element in the occurrence of crunch (Chung; Kwon, 2020; Cote; Harris, 2020; Edholm *et al.*, 2017; Legault; Weststar, 2015; Legault; Weststar, 2017; Rossi, 2023; Sundin; Johansson, 2022; Zaklan, 2023).

Other individual characteristics are reported as facilitators or not for crunch. The literature indicates that men (Newbery, 2013), young people and/or those with less career experience (Newbery, 2013; Ouellet, 2010), and single people without children (Newbery, 2013) would be more predisposed to crunch, as they have more time and energy available to work excessive hours. Design and leadership positions were also signaled as related to crunch, although there is no research analyzing such associations (Johnson, 2010; Newbery, 2013; Romine, 2016). Sick professionals or those with a high degree of specialization are seen as less compelled to crunch, due to these characteristics being seen, respectively, as a place of weakness and of high professional hierarchy, which gives them the possibility to choose whether or not to crunch and not be penalized for their choice (Jackson, 2020; Legault; Weststar, 2017; Lipkin, 2016; Newbery, 2013; Ouellet, 2010).

3.4 Organizational aspects linked to crunch

The occurrence of crunch is linked to organizational and social factors within the digital game industry, with an emphasis on challenges in people management, leadership failures, and team structuring. Key issues include the absence of adequate management skills or techniques (Archontakis, 2019; Edholm *et al.*, 2017; Jackson, 2020; Ouellet, 2010; Politowski *et al.*, 2021; Roininen, 2013; Romine, 2016; Sundin; Johansson, 2022; Westerdahl, 2019), the low level of professional maturity of managers (Ouellet, 2010), and a lack of understanding by leaders about the mechanisms that result in crunch (Jackson, 2020).

Cultural and environmental elements reinforce this logic, such as the existence of showers (Bulut, 2014), sofas, and unimpeded sleeping at work (Chung; Kwon, 2020; De Peuter; Dyer-Witthford, 2005; Johnson, 2010). The cult of productivity and the symbolic value of masculinity associated with effort and social pressure among peers also reinforce the naturalization of crunch (Deuze; Martin; Allen, 2007; Edholm *et al.*, 2017; Jackson, 2020; Kim; Lee, 2021; Legault; Weststar, 2017; Rossi, 2023; Ruiz-Bravo, 2019; Schmidt, 2021; Wright, 2015a; Zaklan, 2023).

Poor time and project management, identified through unrealistic schedules, unstable scopes, difficulty in predicting how long tasks will take to be executed, a lack of prototyping, and last-minute changes, were also identified in companies where crunch is performed (Cote; Harris, 2020; Edholm *et al.*, 2017; Kim; Lee, 2021; Legault; Weststar, 2015; Lipkin, 2016; Ouellet, 2010; Petrillo *et al.*, 2009; Politowski *et al.*, 2021; Ruiz-Bravo, 2019; Sundin; Johansson, 2022; Suorsa, 2017; Westerdahl, 2019). Ouellet (2010) states that crunch can occur at the end or beginning of a project and, in general, is related to specific phases of production (Johnson, 2010). However, the majority of evidence indicates that crunch precedes deadlines or the completion of a project (Dyer-Witthford; De Peuter, 2006; Jackson, 2020; Josefsson, 2017; Kerr; Kelleher, 2015; Kim; Lee, 2021; LaLonde, 2020; Legault; Weststar, 2015; Legault; Weststar, 2017; Lipkin, 2016; Newbery, 2013; Petrillo *et al.*, 2009; Roininen, 2013; Romine, 2016; Young, 2018; Zaklan, 2023). Specifically, it was found that 44.6% of people in one sample crunched during final testing (Roininen, 2013) and 52% crunch at the end of the project or near deliveries (Ouellet, 2010), which supports the argument that crunch is preceded by deadlines. In addition, some studies show that organizations adopt strategies to avoid crunch. Examples include having no-crunch policies, limiting the workday, and using project schedule-centric management practices (Jackson, 2020; Ruiz-Bravo, 2019; Sotamaa, 2021; Vanderhoef, 2016).

3.5 Social and business aspects linked to crunch

It became evident in the analysis that socioeconomic and market aspects may also contribute to the occurrence of crunch. The digital games market is described as “immature” in organizational terms, which would end up compromising management processes and work coordination (Legault; Weststar, 2015; Sundin; Johansson, 2022). This situation can be intensified by the high competitiveness and fast-paced technological changes that characterize the field, with short delivery deadlines and pressure for greater productive agility (Chung; Kwon, 2020; Cote; Harris, 2020; Lee, 2019; Legault; Weststar, 2015).

Business aspects, such as the creation of studios during game development (Suorsa, 2017) and corporate merger processes (Jackson, 2020), can also contribute to organizational instability and difficulties in work and time management. Added to this is the use of arbitrary performance evaluations (Ouellet, 2010) and pressure for productivity (Ozimek, 2019), which tend to increase job insecurity and lead workers to accept crunch to avoid underemployment or unemployment. It was also identified that factors such as the lack of legal recognition of overtime and the non-mandatory nature of its compensation can contribute to the naturalization of crunch in organizations (Legault; Weststar, 2017; Ouellet, 2010). Finally, the influence of publishers is highlighted, who, by imposing reduced deadlines, volatile scopes, multiple demands, and not sharing development kits, could also be intensifying harmful production practices, leading teams to crunch (Bulut, 2014; Legault; Weststar, 2015; Politowski *et al.*, 2021).

3.6 Compensation for crunch

Compensation for crunch can take different forms in the game industry. Payment for overtime, bonuses linked to the game’s success, and profit-sharing agreements (golden shackles) were related to the occurrence of crunch (Dyer-Witthford; De Peuter, 2006; Ouellet, 2010). In addition, time off and vacations, generally granted after periods of crunch, also function as a form of compensation (Chung; Kwon, 2020; Johnson, 2010; Josefsson, 2017; LaLonde, 2020; Ouellet, 2010; Roininen, 2016; Ruiz-Bravo, 2019; Sotamaa, 2021; Vanderhoef, 2016). Career development is also seen as a reward for crunch, through strengthening professional reputation, promotions, and improving the portfolio (Ouellet, 2010; Sundin; Johansson, 2022; Thompson; Parker; Cox, 2015; Wright, 2015b; Young, 2018). Complementarily, elements such as food, drinks, games, and social parties during crunch days are perceived as immediate benefits that can naturalize and incentivize crunch occurrence (Bulut, 2014; Dyer-Witthford; De Peuter, 2006; Johnson, 2010; Josefsson, 2017; LaLonde, 2020; Legault; Weststar, 2017; Ouellet, 2010; Schmidt, 2021).

3.7 Absence of compensation for crunch

Some authors pointed out that crunch is not always compensated. In a sample with 56 people, 25% reported not receiving any type of compensation for overtime (Roininen, 2013), and for another sample of 130 people, crunch compensation does not occur very often (average of 2.51 on a 5-point scale) (Larsson, 2018). Other investigations corroborate this lack of compensation, showing that crunch can occur even without compensation in sight (Chung; Kwon, 2020; Legault; Weststar, 2017; Thompson; Parker; Cox, 2015).

3.8 Punishments for not crunching

Refusing to crunch can have negative consequences for developers, including a damaged reputation, unfavorable performance evaluations, lower salaries, and reduced opportunities for promotion or career longevity in the industry (Kim; Lee, 2021; Legault; Weststar, 2015; Legault; Weststar, 2017; Ouellet, 2010; Ozimek, 2019; Thompson; Parker; Cox, 2015; Wright, 2015a). Furthermore, professionals may choose to pursue freelance careers (Rossi, 2023; Wright, 2015a) or even leave the digital games sector to avoid crunching or the punishments related to crunch (Archontakis, 2019; Schmidt, 2021).

3.9 Health damages linked to crunch

The relationship between crunch and health in the game industry was addressed in 17 studies, of which 15 are qualitative and, of these, 13 are composed of interviews. It was found that only Mendes (2020) used a validated instrument to measure a health outcome - burnout (Oldenburg Burnout Inventory), which requires caution in interpreting the results of the other studies, as they do not allow for establishing a relationship between crunch and health.

The authors interpret that overload and lack of time are the main factors leading to negative health outcomes from crunch (Edholm *et al.*, 2017; Lipkin, 2016). The reports indicate damages such as headaches, shoulder pain, carpal tunnel syndrome in the hand and arm (Kim; Lee, 2021), and neck and wrist pain (Kim; Lee, 2021; Lee, 2019). Psychological impacts are also highlighted, such as burnout (Edholm *et al.*, 2017; Jackson, 2020; Kim; Lee, 2021; Mendes, 2020; Newbery, 2013; Ouellet, 2010; Rossi, 2023; Schmidt, 2021; Sundin; Johansson, 2022), mental exhaustion (Archontakis, 2019; Edholm *et al.*, 2017; Jackson, 2020; Kim; Lee, 2021; Lipkin, 2016), and stress (Dyer-Witthford; De Peuter, 2006; Edholm *et al.*, 2017; Jackson, 2020; Josefsson, 2017; Kim; Lee, 2021; Rossi, 2023).

3.10 Other outcomes linked to crunch

Nineteen studies pointed out that crunch is associated with individual, organizational, and social effects, negatively impacting the quality of life of professionals and their relationships inside and outside the work environment. Twenty mentions of possible damages to the quality of life of those who experience crunch were identified, including: the imbalance between personal and professional life (Edholm *et al.*, 2017; Lee, 2019; Sundin; Johansson, 2022; Wright, 2015a); the perception that overwork makes it difficult to care for oneself, others, and one's home (Sundin; Johansson, 2022); the absence of a social life (Bulut, 2014); the unavailability to attend appointments; and harming interpersonal relationships (Archontakis, 2019; Cote; Harris, 2021; Edholm *et al.*, 2017; Jackson, 2020; Petrillo *et al.*, 2009).

In the organizational context, Deuze, Martin and Allen (2007), Sundin and Johansson (2022), and Bulut (2014) point out that crunch may reduce productivity and be counterproductive. Specifically, the fatigue generated by overwork has been linked to the occurrence of errors and bugs in projects (Edholm *et al.*, 2017; Lipkin, 2016; Petrillo *et al.*, 2009). Despite this, authors also found that crunch can have positive effects on the project schedule (Edholm *et al.*, 2017; Schmidt, 2021) and positive effects on the team, promoting cohesion among co-workers (Schmidt, 2021), although there is no empirical evidence of such affirmations as well.

4. DISCUSSION

The results of this scoping review reveal a panorama that reflects both the current state of scientific production on crunch in the game industry, its gaps, and future research possibilities. The geographical distribution of the studies shows a predominance of countries in the Global North, especially the United States and Canada. This geographical concentration can be explained by the fact that the digital games industry is consolidated in these countries (Kerr, 2017), which predisposes interest in researching this area and facilitates access to data for research. However, the still timid presence of countries from the Global South, such as Brazil, signals the need to expand the focus on crunch, incorporating diverse sociocultural contexts and their labor specificities.

Regarding methods, most of the research collects data through interviews, which are predominant in the human and social sciences (Thelwall; Nevill, 2021). The majority use of qualitative design reinforces an important gap concerning this phenomenon: the absence of data that estimates the extent and the effects related to crunch. The studies that partially cover this gap are the annual censuses developed by the IGDA, which, since 2004, have included questions about crunch

(IGDA, 2004). Furthermore, the limited presentation of the studies' collection instruments also demonstrates challenges of methodological transparency and replicability of studies regarding this phenomenon.

The prevalence of crunch observed in the Developer Satisfaction Survey from 2019 and 2021 showed that 35% and 41% of participants, respectively, reported that their work involved crunch time (Kumar *et al.*, 2022; Weststar; Kumar, 2020). In 2023, the Developer Satisfaction Survey found that 28% of developers reported experiencing crunch, while another 25% said they worked long hours (Weststar; Lentini, 2024). Therefore, these samples indicate an apparent decrease in the occurrence of crunch. However, in the present review, the prevalence of this phenomenon among professionals in the sector ranges from 70% to 85%, indicating a higher predominance of crunch in the industry. This demonstrates that there is a significant difference in the prevalence of crunch between academic papers and IGDA's research, which is intriguing, and the fact that academic research presents higher percentages of people who experienced crunch should be further explored to understand this divergence.

A crucial factor to consider is the collection method used to identify crunch. For instance, Larsson (2018, p.63) asks: "Have you ever experienced crunch at your workplace?". On the other hand, Mendes (2020) investigated the number of hours worked per week, in addition to identifying how often people crunch. Furthermore, IGDA uses the self-report method through closed and multiple-choice questions, in which respondents choose between categories, such as "overwork identified as crunch" and "overwork not identified as crunch" (Weststar; Lentini, 2024). Thus, it is evident that crunch is not measured equivalently in different studies. While some research understands that it is possible to verify the presence of crunch through work time (Mendes, 2020), others ask if the individual crunches, regardless of the meaning of crunch, which may result in different data about the same phenomenon. The inconsistency in the collection methods shows that it is not possible to compare results from different research and that it is necessary to develop a measurement that represents the phenomenon and, consequently, is standardized for respondents.

The duration of workdays during crunch periods demonstrates the phenomenon's relevance to the health field. The fact that crunch involves workdays of 10 to 20 hours daily or 50 to 100 hours per week exceeds the limits recommended by the International Labour Organization (ILO). ILO defines excessive work as workdays exceeding or 10 hours daily or 48 hours per week — conditions that significantly increase the risk of serious health problems, such as a stroke (ILO, 2022). It is, therefore, a potentially harmful overload to workers' health. It is also worth noting that the overload

does not occur only sporadically: there are records of crunch that last for consecutive days, months, or years (Bulut, 2014; Newbery, 2013), which can lead to a chronic state of exhaustion.

The fact that crunch is a normative practice in game development conflicts with the impacts of this phenomenon on the health of professionals, topic already signaled by Niemelä's review (2021) and reiterated in the present research. Although only one study used a standardized instrument for health/illness assessment (Mendes, 2020), the number of reports about exhaustion, burnout, physical pain, and emotional suffering is significant and deserves attention (Jackson, 2020; Kim; Lee, 2021; Sundin; Johansson, 2022). Furthermore, it is already established in other fields that the unbridled centrality attributed to work tends to compromise the adoption of healthy habits, reducing the time dedicated to self-care, leisure, and rest (Shields, 1999). This dynamic contributes to the emergence of chronic fatigue, obesity, mental disorders, cardiovascular diseases (Antunes, 2020; Burke; Fiksenbaum, 2008; Kuroda; Yamamoto, 2018; Lin; Lin, 2022; Sato; Kuroda; Owan, 2020), and fatal outcomes (Iwasaki; Takahashi; Nakata, 2006).

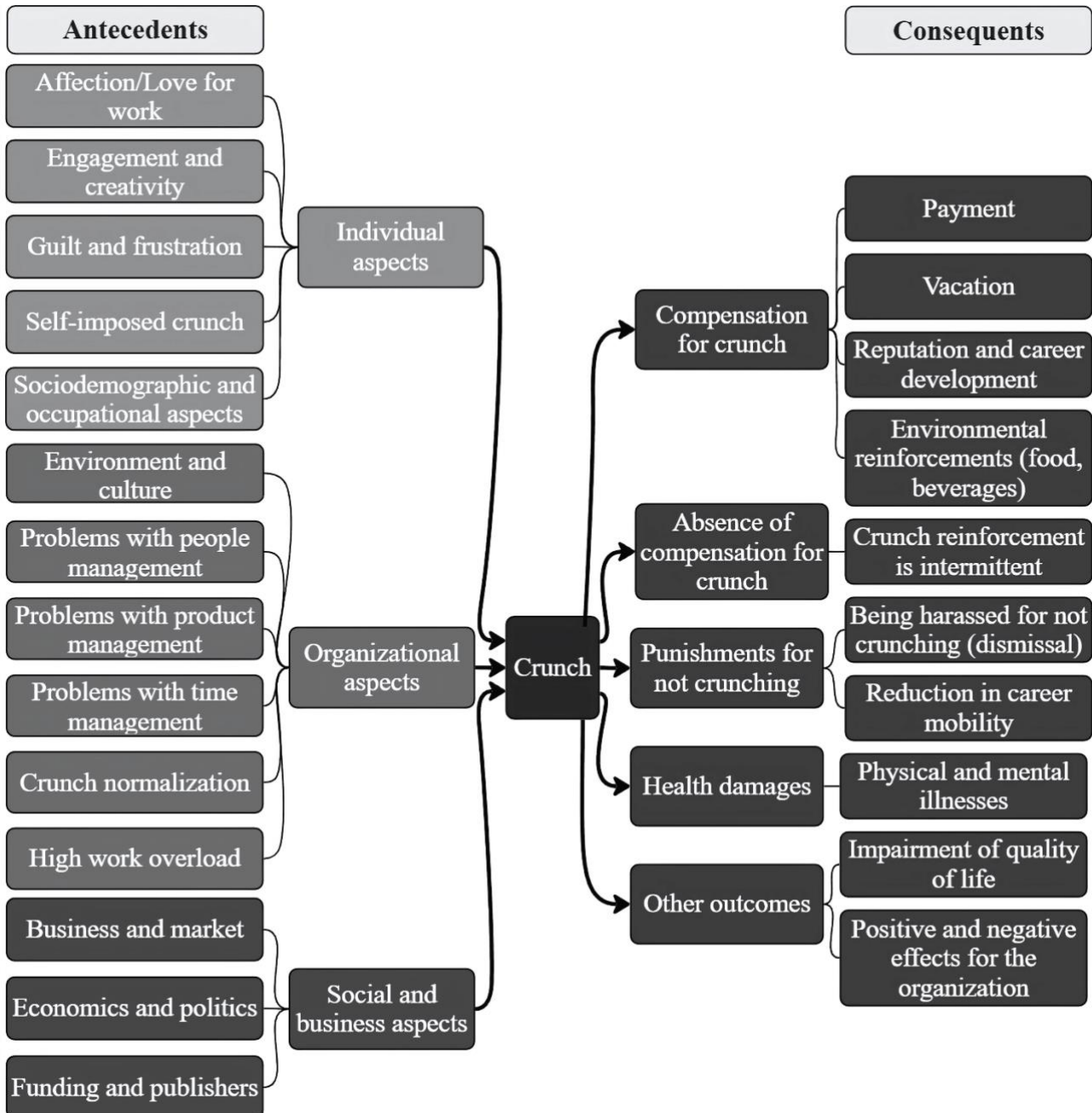
It was possible to identify that crunch is the result of a complex interaction between social and business, organizational, and individual factors that, together, reinforce and normalize excessive workdays in the digital games industry. At the social and business level, labor precarization, pressure for productivity, and the influence of publishers can lead to the occurrence of crunch, especially in the absence of adequate regulation (Legault; Weststar, 2017; Ouellet, 2010). At the organizational level, practices such as selecting professionals willing to crunch (Bulut, 2014; Tunnel; Norbistrath, 2023), lack of hour control, and poor project management create an environment conducive to overload. On an individual level, emotional involvement with work, the desire for belonging, and passion for the project can also play a significant role in the decision to accept crunch, even in the face of health damages. These three levels operate together as a system of reinforcements and punishments that make it difficult to break with this practice (Ouellet, 2010).

By interviewing 53 developers, Ouellet (2010) demonstrated how crunch normalization is part of an industry that punishes those who do not crunch, pushing professionals who refuse to crunch to the margins of the industry: receiving lower salaries and bonuses, taking on less valued roles, forcing them to lower their professional ambitions, and increasing their chances of being fired. Simultaneously, the industry rewards those who engage in crunch, reinforcing the notion that success depends on excessive overwork and the total renunciation of work-life balance (Ouellet, 2010).

Thus, it is understood, with the support of Figure 3, that the antecedents for the existence and maintenance of crunch are organized into three major groups: individual aspects, organizational aspects, and social and business aspects. At the same time, this phenomenon is related to consequent

factors, which are also responsible for maintaining the crunch pattern in operation, they are: compensation or lack of crunch compensation, punishment for not crunching, health damages from crunch, and other outcomes related to crunch.

Figure 3 Antecedents and consequents of crunch in game development



Source: Authors

The main categories and subcategories discussed provide an overview of the functioning of this phenomenon, demonstrating the number of different variables indicated in this process of crunch

maintenance during game development. The scientific community is invited to use this scheme in conducting new empirical studies about crunch, which can facilitate the understanding of the phenomenon and deep the analysis of the factors that converge for its occurrence.

It is therefore recognized that crunch is sustained by several antecedents that foster an environment conducive to its emergence, along with consequences that either reward its presence or punish its absence. Although evidence suggests that crunch leads to detrimental outcomes, such as health issues and negative impacts on the studio, these consequences are insufficient to deter the practice, indicating they play a minor role in its mitigation. By aligning this empirical framework with the theoretical framework proposed by Ouellet (2010), it becomes clear that crunch is forged within a logic of reward and punishment. This logic permeates the industry, coercing and shaping worker behaviors, identities, and narratives to normalize excessive work. Ultimately, this transforms crunch into a mechanism that is embedded in the work cultures of these contexts and, more broadly, reflects the neoliberal socioeconomic system in which this industry operates (Peticca-Harris; Weststar; McKenna, 2015).

Sugarman and Thrift (2017) argue that the neoliberal mode of production is sustained by and directed toward the acceleration of production and consumption, rooted in the logic that “time is money”. They observe that a fast-paced lifestyle – along with its detrimental effects on health – is typically portrayed as a biological or individual problem, requiring better time management to maintain efficiency. Complementing this, Souza (2021) argues that contemporary management practices isolate workers, leaving them vulnerable to market volatility and intensifying interpersonal competition. This demonstrates how market acceleration dictates the rhythm of both work and life, modeling human behavior to meet systemic demands (Sugarman; Thrift, 2017).

Accordingly, Han (2019) discusses that, in the interpenetration between work and personal life, the worker's time is colonized by a productive logic in which an individual's value is measured by their capacity for delivery and endurance. This colonization of time manifests through everyday management practices and the development of technologies that increase flexibility while expanding work into new times and spaces (Souza, 2021). In this context, rest is viewed as an obstacle to productivity and is minimized within the worker's routine. Consequently, the body and mind are pushed to their limits, leading to physical and mental illness. This is further evidenced by the widespread use of performance-enhancing medications intended to sustain high output, rather than the adoption of strategies to slow down or allow for recuperation (Souza, 2021). In these terms, work ceases to be an activity limited to a daily shift and instead occupies the center of existence, shaping relationships, habits, schedules, and even the body.

Therefore, neoliberalism offers a crucial framework for understanding both the antecedents and consequences of crunch. This suggests that crunch is not simply a failure of time management or productivity; rather, it is a phenomenon shaped by economic and political realities and embedded within industry and market dynamics. In that sense, crunch is configured as an organizational practice that imposes profound human costs, often rendered invisible by rhetoric emphasizing passion and commitment to games (Paškvan; Kubicek, 2017; Peticca-Harris; Weststar; Mckenna, 2015). The normalization of crunch, reinforced by networks of reward and punishment, strengthens the belief that personal sacrifice is a requirement for professional success, thus perpetuating inequalities and fostering a cycle of exhaustion (Bulut, 2014; Ouellet, 2010; Ruiz-Bravo, 2019). Ultimately, addressing crunch demands structural changes, and critically analyzing this phenomenon is fundamental to developing more ethical and sustainable alternatives for workers and the creation of digital games.

5. CONCLUSION

This scoping review answered the following question: what is known about the phenomenon of crunch in the digital games industry? This question led to the selection of 48 studies that met the established inclusion criteria. The analysis of the results made it possible to identify ten thematic categories that synthesize the current knowledge on crunch: crunch prevalence, crunch duration, individual aspects, organizational aspects, social and business aspects, compensation for crunch, absence of compensation for crunch, punishments for not crunching, health damages linked to crunch, and other outcomes related to crunch. The articulation of the categories with the evidence extracted from the studies enabled a comprehensive understanding of the phenomenon, revealing its complexity and highlighting relevant gaps that require investigation.

The findings of this review indicate that crunch is a widespread practice, frequently associated with extensive workdays, with various causes identified for its occurrence, from organizational failures and unrealistic deadlines to individual factors, such as passion for work and self-imposed crunch. The reported effects include damages to physical and mental health and compromised quality of life and personal relationships. Although there are experiences that demonstrate the possibility of organizational cultures that reject crunch, these initiatives remain as exceptions in the industry.

The high concentration of research in specific geographical contexts, with insufficient and predominantly qualitative methodological description, restricts the analysis of the phenomenon in terms of its extent and relationships with other phenomena or individual and contextual

characteristics. Given this scenario, it is recommended that future studies invest in quantitative approaches, with methodologies that are outlined and reproducible, in order to deepen the understanding of crunch from the perspective of workers, especially in countries of the Global South, where the games industry has been expanding according to its own dynamics.

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