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Time spent on the Internet, problematic gaming and social media use among adolescents

Longitudinal findings on the impact of the COVID-19 pandemic

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Abstract

Increased Internet use during the COVID-19 pandemic and the possibility of problematic usage patterns and associated disorders among adolescents has become an important research topic. The longitudinal quantitative study presented in this article examines changes in adolescents' use of online games and social media over the four-year period 2018 to 2021, focusing on the existence of problematic patterns before and during the COVID-19 pandemic. Data were collected from adolescents and one parent each (multi-perspective approach) at intervals of one year (four measurement points, t3 to t6). The sample consisted of 852 dyads at t3, with 474 dyads remaining in the sample at t6. The adolescents were between 13 and 16 years old at t3; Young people with problematic Internet usage were oversampled. Statistical analyses of the data comparing mean values show that the total time spent online, the time spent on gaming, and the time spent using social media increased significantly over the period under investigation. However, the results clearly show that problematic gaming and problematic usage of social media decreased significantly: Increased time spent on gaming and social media was not associated with problematic usage patterns. Rather, problematic use decreased significantly over the period, which included the COVID-19 pandemic (2020–2021). These findings run counter to results of past studies that reported a rise in problematic usage patterns during the COVID-19 pandemic. Although our results show an increase in digital media usage during this four-year period, that increase was not accompanied by more problematic usage patterns.

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Internetnutzungszeiten, problematisches Online-Gaming und problematische Nutzung sozialer Medien durch Jugendliche. Längsschnittliche Ergebnisse vor und während der COVID-19-Pandemie

Zusammenfassung

Aufgrund des Anstiegs der Online-Zeiten von Jugendlichen während der COVID-19-Pandemie gewinnen Studien über problematische Nutzungsmuster und damit verbundenen Störungen als mögliche Folgen zunehmend an Bedeutung. Die in diesem Artikel vorgestellte quantitative Längsschnittstudie untersucht den Verlauf der Nutzung von Online-Spielen und sozialen Medien durch junge Menschen über vier Jahre und die Entwicklung problematischer Nutzungsmuster in Bezug auf diese Anwendungen. Es werden Daten, die von 2018 bis 2021 erhoben wurden, analysiert, um die zeitliche Entwicklung vor und während der COVID-19-Pandemie zu untersuchen. Die Daten wurden von Jugendlichen und je einem Elternteil (multiperspektivischer Ansatz) in Abständen von einem Jahr erhoben (vier Messzeitpunkte t3 bis t6). Die Stichprobe umfasste zum Zeitpunkt t3 852 Dyaden und zum Zeitpunkt t6 noch 474, die Jugendlichen waren zu t3 zwischen 13 und 16 Jahre alt und junge Menschen mit einem problematischen Internetgebrauch sind in der Studie überrepräsentiert. Die Mittelwertsvergleiche zeigen, dass die insgesamt online verbrachte Zeit, die Zeit für Online-Gaming und die Zeit für die Nutzung sozialer Medien deutlich anstiegen. Problematisches Spielen und die problematische Nutzung sozialer Medien gingen dagegen deutlich zurück. So kann festgehalten werden, dass hohe Internetnutzungszeiten für Online-Gaming und soziale Medien nicht unbedingt mit problematischen Nutzungsmustern verbunden sind. Es wurde vielmehr deutlich, dass diese problematischen Nutzungsmuster im Laufe der Zeit und damit auch während der COVID-19-Pandemie (Untersuchungszeitraum 2020 – 2021) deutlich abgenommen haben. Andere aktuelle Befunde zu steigenden Nutzungszeiten im Zusammenhang mit problematischen Nutzungsmustern während der COVID-19-Pandemie können daher nicht bestätigt werden. Vielmehr sind die Nutzungszeiten digitaler Medien in diesem Zeitraum zwar gestiegen, gehen aber nicht zwangsläufig mit einem problematischeren Nutzungsverhalten von Nutzenden einher.

1. Introduction

In 2020 and 2021, the global COVID-19 pandemic led to social distancing and contact restrictions in Germany (Bundesministerium für Gesundheit 2023). In 2020, at the start of the COVID-19 lockdowns in Germany, the amount of time children and adolescents spent online increased sharply. One year later (2021), the average amount of time young people spent online had declined slightly but was still higher than before the pandemic. In 2022, usage declined further to a level similar to that at

the beginning of the pandemic. In 2023, the amount of time children and adolescents spent online increased again. Young people in Germany currently spend an average of 224 minutes per day on the Internet. Given the integral role the Internet plays in their everyday lives, this is not surprising: adolescents communicate with their friends through social media, play online games, stream videos, and find information using search engines. Eighty-eight percent of adolescents currently use the Internet on a daily basis in their free time and 8% do so several times a week, underscoring that many crucial aspects of their everyday lives take place online. (MPFS 2023).

Several researchers have expressed concern with these developments (e.g., Király et al. 2020; Paschke et al. 2021; Rumpf et al. 2020) and have warned that a significant increase in usage could be accompanied by an increase in behavioral addictions (e.g., problematic gaming or social media use). Some have argued that children and adolescents with patterns of high Internet usage may be experiencing disturbances in personal, familial, and social functioning (Brüggen et al. 2022).

Due to the neuronal maturation processes taking place during adolescence and the important developmental tasks that still remain to be mastered, researchers consider this age group particularly susceptible to the emergence of problematic usage patterns in relation to digital media (Kuss and Griffiths 2012; Tejeiro et al. 2012). Furthermore, increased Internet use during the COVID-19 pandemic may have exacerbated problematic digital media usage behaviors. In-depth data on Internet usage over the course of the day and problematic use of social media and online gaming over longer periods of time with a special focus on possible consequences of the COVID-19 pandemic are needed to study these issues. Such data have been collected and analyzed as part of the VEIF (Trajectories of Excessive Internet Use in Families) project using a longitudinal and multi-perspective quantitative research design.[1]

2. State of research

The following section provides an overview of the current state of research on Internet use as well as problematic gaming and social media use among adolescents. We categorized the results regarding (1) differences in the amount of time spent using the Internet, (2) problematic usage patterns in association with usage time, and (3) problematic gaming and social media use over time and during the COVID-19 pandemic.

1 The VEIF research project is being conducted by Rudolf Kammerl (Friedrich-Alexander-Universität Erlangen-Nürnberg) and Lutz Wartberg (MSH Medical School Hamburg University of Applied Sciences and Medical University) and has been funded by the German Research Foundation (KA 1611/6-1, KA 1611/6-2, KA 1611/6-4) from 2015 to 2025.

2.1 Differences in usage time

Recent studies on adolescents in Germany show that the average amount of time spent using the Internet - and on social media and online gaming in particular - has tended to increase over recent years (e.g., Beisch and Koch 2023; Initiative D21; MPFS 2023). According to a 2023 ARD/ZDF online study, the average amount of time the German population aged 14 and older spent using the Internet was 160 minutes per day in 2022 in comparison to 99 minutes in 2019 (Beisch and Koch 2023). Among adolescents, more recent figures are even higher: Young people aged 12 to 19 spent an average of around 224 minutes per day on the Internet in 2023 - 20 minutes more than in 2022 (MPFS 2023). Use of digital games also increased from 81 minutes per day in 2019 to 92 minutes per day in 2023. And according to Koch (2023), use of social media among young people aged 14 to 29 was 69 minutes per day in 2023.

Various studies have shown that the pandemic and associated contact restrictions were accompanied by an increase in Internet usage among young people (e.g., Cakiroglu, Soylu, and Gormez 2021; DAK 2023; MPFS 2020; Neumann and Lindenberg 2022; Paschke et al. 2021; Pietrobelli et al. 2020; Vogel et al. 2021; Xiang, Zhang, and Kuwahara 2020). Longitudinal comparisons (2019–2023), however, reveal that current online usage is well above pre-pandemic levels, despite a reduction after the first lockdown and slight decrease compared to previous years (2021 and 2022 in comparison to 2020) (MPFS 2023). Beisch and Koch (2023) also confirm this result for Internet use in the population aged 14 and above.

There are also clear differences between age groups: Young people use digital media for significantly longer periods of time and more frequently than older age groups (e.g., Claesdotter-Knutsson, André, and Håkansson 2022; Geisel, Lipinski, and Kaess 2021). Up to early adulthood, usage times increase with age (e.g., Kammerl, Wartberg, and Zieglmeier 2018; MPFS 2023). Several studies also report differences by the gender of the adolescents (e.g., Cakiroglu, Soylu, and Gormez 2021; Geisel, Lipinski, and Kaess 2021; Kliesener et al. 2022; Paschke et al. 2021; Potzel et al. 2023), indicating that female adolescents spend more time on social media and that male adolescents spend more time on gaming.

Given that the research indicates a clear rise in usage time with increasing age in adolescence and during the COVID-19 pandemic, we expect data from before and during the pandemic to show a similar increase in our sample:

H1: Due to the COVID-19 pandemic, the total amount of time young people spent on the Internet - in particular, on gaming and social media - increased in comparison to pre-pandemic levels.

2.2 Problematic usage patterns in association with usage times

In light of the aforementioned increase in Internet usage during the pandemic, the question arises to what extent this led to problematic usage patterns among adolescents. It is important to note that high usage does not necessarily equate to problematic usage patterns. Rather, the term «problematic use» refers to an individual's inability to control their own media habits, leading to negative consequences for their life (Spada 2014). Especially in psychology, the term addiction is often used to refer to pathological characteristics. However, the terms «excessive» or «problematic use» also indicate patterns of behavior that are subjectively classified as problematic by the users and/or their family members (e.g., Huang 2022; Kammerl, Zieglmeier, and Wartberg 2021). Over the years, patterns of problematic Internet use have been identified in general and with a specific focus, for example, on problematic gaming and problematic use of social media (Long et al. 2018; van den Eijnden, Lemmens, and Valkenburg 2016; Wartberg, Zieglmeier, and Kammerl 2021). Problematic usage patterns are often analyzed using the existing World Health Organization ICD-11 criteria for computer gaming disorder (World Health Organization 2018). According to this classification, computer gaming disorder is associated with a loss of control, prioritization over other activities, and continued use despite negative consequences. The symptoms described relate to a period of the last 12 months. It is assumed that problematic usage patterns lead to significant impairments in personal, social, educational, and work-related areas of life. The problematic use of social media has not yet been included in classification systems such as the ICD-11, creating fundamental methodological problems for the research on this topic. Initial attempts have been made, however, to adapt the diagnostic criteria for problematic gaming to problematic use of social media (e.g., van den Eijnden, Lemmens, and Valkenburg 2016). Despite the distinctions between them, it has become clear that the different forms of problematic Internet usage are positively correlated (e.g., Lyvers, Narayanan, and Thorberg 2019; Wartberg and Kammerl 2020; Wartberg et al. 2023, Wong et al. 2020).

Despite the generally high usage of the Internet among young people in Germany, only a small percentage of these individuals experience negative consequences of their usage behavior: In a representative sample, only 3.5% of adolescents between 12 and 17 years of age displayed problematic gaming behavior and only 2.6% problematic social media use (Wartberg, Kriston, and Thomasius 2020). Geisel et al. (2021) conducted a selective literature search for records of Internet-related disorders among children and adolescents in Germany and found a prevalence of 5.8% for gaming disorders and Internet addiction among 12 to 17-year-olds in 2019 and a prevalence of 2.6% for problematic use of social networks among adolescents in 2021. The 2021 DAK study reports an increase from 3.2% in 2019 to 4.6% in 2021 in

the number of children and adolescents who were considered to have a pathological use of social media. Furthermore, in 2021 26.8% were estimated to have a risky use of social media (DAK 2021).

In addition to the association between Internet usage time and problematic usage patterns, which we focus on in this article, current research highlights other factors that should be considered regarding problematic usage behavior. Literature reviews offer overviews of significant factors (e.g., Chew 2022; Király et al. 2023; Lopes et al. 2022; Nielsen, Favez, and Rigter 2020; Saini and Hodgins 2023; Wang and Cheng 2022). Kammerl et al. (2023) summarized these results and concluded that an interplay of different »bundles« of factors appear decisive in the development of problematic gaming and problematic social media usage: Aside from technical characteristics, individual factors as well as social environments are relevant. Focusing on the relationship between Internet usage time and problematic usage behavior, most of the research supports the thesis of positive correlations between high usage and a higher risk of problematic gaming among adolescents. In a prospective cohort study with a two-year follow-up in South Korea, Jeong et al. (2021) analyzed a sample of 2,319 students ($M = 13.46$ years) and classified 7.5% of these individuals as having a high risk of problematic gaming at initial assessment. The results showed that spending more than four hours per day playing online games was associated with the onset or persistence of a high risk of problematic gaming. The German DAK study supports these findings (2023): Data collected between September 2019 and June 2022 on young people between the ages of 10 and 21 and their legal guardians show that in June 2022, daily usage of digital games was 3 hours among risky users,[2] 4.9 hours among pathological users, and 2.1 hours among non-risky users.

Further results of this study confirm these findings for social media, showing that high Internet usage was related to problematic social media usage (DAK 2023). In June 2022, social media usage was 4.3 hours among risky users and 4.6 hours among pathological users. Although the risky and pathological user groups did not differ statistical significantly, non-risky users showed significantly lower usage at 2.9 hours. Research has also explored a connection between the intensiveness and frequency of social media use and problematic usage: Boer et al. (2020) identified moderate positive correlations ($r = .48$) between intensive social media use and problematic social media use in an international sample of 154,981 adolescents ($M = 13.5$ years) from 29 countries between 2017 and 2018.

2 Description of pathological and risky users in the DAK study (based on ICD-11 from the WHO): »According to ICD-11, computer gaming disorder is associated with a loss of control, prioritization over other activities and continued use despite negative consequences. The behavior usually persists over a period of at least 12 months. This results in significant impairments in personal, social and educational/professional areas of life. In contrast to this definition, hazardous [risky] gaming behavior is also associated with the acceptance of negative consequences due to time-intensive use, for example, but without the consequences having already occurred in this case. There is no time criterion for this. Under certain conditions, risky use can turn into pathological use.« (DAK 2023, S. 48f.)

Paschke et al. (2021) report findings on (problematic) gaming and problematic social media usage before and during the COVID-19 pandemic. They interviewed a representative sample of over 1,200 participants at the ages of 10 to 17 in Germany between September 2019 and April 2020. Their results support the link between problematic usage and significantly longer screen times compared to users in their sample with low-risk Internet usage. The respective screen time was statistically proven to be a predictive factor, explaining around 23% of the variance in problematic use for gaming and 7% of the variance for social media in 2019, but only 8% and 3% respectively in 2020.

In general, current research shows that adolescents are on average less concerned about their own usage behavior than their parents or guardians. Parents are therefore more likely to view their children's behavior as problematic (Toh et al. 2019). There are some families in which adolescents' computer and Internet use is described (primarily by the parents) as problematic due to high usage, but without further evidence of negative consequences for the adolescents (Kammerl et al. 2012). Furthermore, there are families in which adolescents exhibit problematic Internet use according to both parents and the adolescents themselves (Hirschhäuser and Rosenkranz 2012). Empirical results show that taking into account the multiperspectivity of problematic usage patterns is of great importance for both research and educational practice (e.g., Kammerl et al. 2012; Kammerl and Wartberg 2018; Wartberg, Zieglmeier, and Kammerl 2019). It is necessary to include both perspectives - those of the young people and those of their parents or guardians. We therefore formulate the following hypothesis:

H2: Increased amounts of time spent on gaming and social media are accompanied by increased problematic use of online gaming and social media—from the perspectives of both parents and adolescents.

2.3 Problematic gaming and social media use over time

Long-term studies on problematic gaming and problematic social media use are relatively rare due to the newness of this phenomenon (Huang 2022; Valkenburg 2022). Meta-analyses of problematic usage behavior highlight the continued lack of longitudinal study designs to analyze not only changes over time but also factors that are influential in the long term (Ji et al. 2022; Király et al. 2023).

Richard et al. (2020) conducted a scoping review of 57 research papers and found that the temporal stability of problematic gaming among adolescents varied according to age of the survey participants and the duration of the study, ranging from 20 to 84%. Mihara and Higuchi (2017) confirmed this in their literature review and showed that the natural development of problematic gaming varied but tended to be more stable in adolescence than in adulthood.

Using data from our longitudinal VEIF study, Wartberg et al. (2018) found problematic gaming behavior to be consistent over the course of a year among only a subgroup of adolescents. In a long-term study, Carbonell et al. (2018) analyzed perceptions of problematic Internet and smartphone use from 2006 to 2017 among 800 university students starting at age 17, with all participants coming from Western countries, and compared the results with findings of previous studies from 2006 to 2017. The results showed an increase in participants' perceptions of problematic Internet and smartphone use over the last ten years, with social networks being blamed for this increase. Furthermore, the participants from 2017 reported higher negative consequences of both Internet and cellphone use than the participants in the 2006 survey. However, long-term observations showed a decrease in problematic use after a strong rise in 2013.

Taking a comparative perspective, Neumann and Lindenberg (2022) showed an increase in problematic Internet usage in the same age group from 2015 to 2021. They surveyed 743 adolescents in Germany on problematic Internet usage in two waves. The first wave consisted of adolescents ($M = 15.7$ years) and was carried out between 2015 and 2016. In the second wave, a second sample of adolescents ($M = 15.3$ years) were surveyed from July to December 2021. Results showed that the severity of the symptoms relating to problematic Internet use increased significantly in this age group and revealed a doubled prevalence of problematic use (from 7.1% before the COVID-19 pandemic to 14.8% during the pandemic).

Nevertheless, explicit longitudinal results about the development of problematic gaming and problematic social media usage in the wake of the COVID-19 pandemic are still rare since it is extremely difficult to assess the long-term consequences yet. Initial findings from a study by the DAK (2023), which focused on the consequences of the COVID-19 pandemic in Germany, show that risky and pathological patterns of digital game and social media use continued to rise between 2021 and 2022. The findings were updated in 2024 (DAK 2024) to include the August/September 2023 survey wave, providing indications of post-pandemic developments. The results in 2023 showed declining usage and a decrease in pathological use of digital games among children and adolescents in Germany. At 4.3% in 2023 (2022: 6.3%), the prevalence of computer gaming disorder had returned to May/June 2021 levels. The researchers therefore assume a certain «normalization» of media use following the intensive Internet use during the COVID-19 pandemic. In 2023, there was a significant decline in the pathological use of digital games. However, the use of social media shows a different trend, with 2023 usage still significantly above pre-pandemic levels. All in all, pathological social media usage remained high among children and adolescents at a prevalence of 6.1% in 2023 and statistically unchanged relative to the previous year.

Furthermore, a comparison of different age groups shows an increase in the use of digital games until mid-adolescence and a decrease thereafter (Kammerl et al. 2023). In this regard, studies have shown that the age or the developmental phase of adolescence is a risk factor that has an «inverse U-shaped» relationship with problematic gaming (Tejeiro et al. 2012), with the risk of problematic gaming being highest in adolescence and typically decreasing towards the end of the second decade of life (Kuss and Griffiths 2012).

Due to the limited availability of longitudinal studies and the differing statements about the temporal stability of problematic gaming and problematic use of social media in the existing research, further research is needed, especially with a view to the COVID-19 pandemic. Based on initial findings on changes resulting from the COVID-19 pandemic, we assume an increase in problematic use of gaming and social media:

H3: Due to the COVID-19 pandemic (in 2020 and 2021), problematic use of gaming and social media increased relative to pre-pandemic levels (from 2018 and 2019).

3. Methods

We analyzed data from the DFG-funded VEIF project. As part of the quantitative longitudinal study, multi-perspective data were collected from adolescents and one of their parents or guardians at intervals of one year at a total of eight measurement points using computer-assisted personal interviews (CAPI). In this dyadic design, information was collected on possible problematic Internet use by adolescents. The research project focuses primarily on the influencing factors of family climate, parental mediation, mental health, and formal education as well as their predictive significance for changes in problematic Internet use among adolescents over time. To obtain a sufficiently high number of young people with problematic Internet use for the sample, this group was oversampled: More adolescents with subjectively perceived problems in the use of digital media (Internet, computer, smartphones, or gaming consoles) were included than are normally represented in the general population (around 70% of the sample with higher risk group family dyads and 30% without risk). To separate the dyads into the two groups, each adolescent and the corresponding parent were asked two screening questions at the beginning of the survey on the self-perceived frequency of excessive usage and the extent of problematic use of digital media by the adolescent. For the longitudinal analyses, which include data from before and during the COVID-19 pandemic, survey waves 3 to 6 of the VEIF project were evaluated (2018–2021). Survey waves 3 to 5 were fielded between January and March 2018, 2019, and 2020, whereas survey wave 6 was fielded between January and April 2021. Survey waves 5 and 6 were conducted during the

period of social distancing and contact restrictions due to the COVID-19 pandemic in 2020 and 2021. COVID-19 reached Germany at the end of January 2020, and social distancing was increased over time. The first restrictions were introduced in March 2020 and were relaxed or reinforced periodically thereafter. The second, almost six-month COVID-19 lockdown in Germany ended in May 2021 (Bundesministerium für Gesundheit 2023).

3.1 Description of the sample

Of the original 1,095 dyads, we were able to interview 852 dyads at t3 and 474 dyads at t6. In the third survey wave of the VEIF project, the young people were between 13 and 16 years old (*M = 14*.86) and there was a relatively balanced distribution between female and male adolescents (see Table 1).

Measurement point	Family dyads (*N*)	Age of the adolescents	Gender
2018 (t3)	852	13–16 (*M*=14.86)	male: 50.6% female: 49.4%
2019 (t4)	633	14–17 (*M*=15.79)	male: 52.8% female: 47.2%
2020 (t5)	491	15–19 (*M*=16.84)	male: 55.6% female: 44.4%
2021 (t6)	474	16–20 (*M*=17.94)	male: 55.1% female: 44.9%

Tab. 1: Descriptive data for the sample at all measurement points. Note: Waves 5 and 6 were surveyed in 2020 and 2021 during the social distancing and contact restrictions due to the COVID-19 pandemic.

3.2 Description of the instruments used

To record the time spent using the Internet in general as well as the time spent using social media and playing games on the Internet, the adolescents were asked about the duration of their Internet use in hours and minutes on weekdays as well as on weekends. They were instructed to provide information about their private Internet use only. For the analysis, all data were recoded and combined into one variable (weighted reflecting five weekdays and two weekend days). The summative value was then divided to obtain the average usage time per day. The descriptive data are given in Table 2.

	Total Internet usage time		Usage time for gaming		Usage time for social media	
	N	*M* *(SD)*	*N*	*M* *(SD)*	*N*	*M* *(SD)*
2018 (t3)	852	204.50 *(134.52)*	852	103.43 (*122.37*)	852	120.35 *(117.96)*
2019 (t4)	633	218.96 *(138.48)*	593	113.44 (*128.02*)	633	129.13 *(120.21)*
2020 (t5)	492	207.05 *(108.72)*	457	100.94 (*95.63*)	492	110.39 *(84.79)*
2021 (t6)	475	237.92 *(140.75)*	442	113.40 (*106.87*)	475	117.67 *(103.91)*

Tab. 2: Descriptive data on the variables total Internet usage time, usage time for gaming, and usage time for social media (in minutes per day). Note: Waves 5 and 6 were surveyed in 2020 and 2021 during the social distancing and contact restrictions due to the COVID-19 pandemic.

Problematic behavior regarding online gaming in the last 12 months was determined using the Internet Gaming Disorder Scale (IGDS) (Lemmens, Valkenburg, and Gentile 2015). Based on the criteria of the DSM-5 (American Psychiatric Association 2013), the IGDS comprises nine self-reported items on the perception of problematic gaming behavior (example item: «Have you shown no interest in hobbies or other activities in the past year because you would rather play?»). A binary response format (0 = no and 1 = yes) was used for the self-reports. A sum value was calculated from the respondents' answers. A higher sum indicates a higher risk of problematic gaming. Based on Lemmens et al. (2015), a cutoff value was determined for the scale; if this is greater than or equal to five, problematic use is assumed.

The standardized Social Media Disorder Scale (SMDS) derived from van den Eijnden et al. (van den Eijnden, Lemmens, and Valkenburg 2016) was translated into German and used to record problematic use of social media. The SMDS was developed based on the IGDS according to the criteria of the DSM-5 (American Psychiatric Association 2013), and the items were adapted for problematic use of social media (van den Eijnden, Lemmens, and Valkenburg 2016) (example item: »Have you regularly neglected other activities (e.g., hobbies, sports) in the past year because you wanted to use social media?«). The scale comprises a total of nine questions in a dichotomous response format (yes = 1 or no = 0). A higher value therefore indicates a greater degree of problematic use of social media. A total value of five or more is considered problematic use of social media.

To gain multi-perspective insights, both the young people and their parents were interviewed. The questions were adapted for the parents to also obtain their views on the problematic use of social media and online games by their children. The PSMDS and PIGDS (referring to the parents' perceptions) were therefore included in the analysis.

3.3 Statistical Analyses

All calculations were performed with the statistical software SPSS (version 27.0, IBM, 2020, New York, NY, USA). Descriptive statistics (mean values and standard deviations) as well as reliability measures were first calculated. The descriptive data are given in Tables 2 and 3.

	IGDS (sum score)				SMDS (sum score)			
	Youth view		Parent view		Youth view		Parent view	
	N	*M* (*SD*)	*N*	*M* (*SD*)	*N*	*M* (*SD*)	*N*	*M* (*SD*)
2018 (t3)	852	2.03 (*2.55*)	852	1.95 (*2.50*)	852	1.81 (*2.36*)	852	1.77 (*2.42*)
2019 (t4)	633	1.90 (*2.34*)	633	1.99 (*2.44*)	633	1.55 (*2.20*)	633	1.79 (*2.33*)
2020 (t5)	492	1.48 (*2.18*)	497	1.68 (*2.43*)	492	1.19 (*1.88*)	497	1.47 (*2.14*)
2021 (t6)	475	1.20 (*1.98*)	478	1.25 (*2.08*)	475	.85 (*1.69*)	478	.98 (*1.84*)

Tab. 3: Descriptive data for the Internet Gaming Disorder Scale and Social Media Disorder Scale. Note: Waves 5 and 6 were surveyed in 2020 and 2021 during the social distancing and contact restrictions due to the COVID-19 pandemic.

The reliability coefficients (Cronbach's alpha) were over r =.80 for all scales in all waves included, which are therefore considered to be highly reliable. The exact values are listed in Table 4.

		2018 (t3)	2019 (t4)	2020 (t5)	2021 (t6)
IGDS	Youth view	.85	.82	.83	.83
	Parent view	.86	.84	.87	.85
SMDS	Youth view	.84	.83	.80	.82
	Parent view	.85	.83	.83	.84

Tab. 4: Reliability coefficients (Cronbach's alpha) of the Internet Gaming Disorder Scale and the Social Media Disorder Scale.

Subsequently, several t-tests for paired samples with a paired case exclusion were carried out for the four measurement points to analyze significant changes between them. In addition, a single-factor analysis of variance with repeated measures was calculated to describe the course of changes in the mean values. Following this, non-parametric testing (chi-square test) was used to calculate differences in the cutoff values for Internet gaming and social media disorder from the perspective of both the adolescents and the parents to be able to trace variances between the group with problematic use and the group without problematic use.

4. Results

4.1 Findings on usage times over time

The t-tests were used to compare the mean values for total Internet usage time, the usage of social media, and usage of online gaming as depicted in Table 5. There are statistically significant mean differences between the survey waves t3 and t4 for total Internet usage time ($t(632) = -3.28$; $p = .001$, $d = 0.130$) and usage times for social media ($t(632) = -4.10$; $p < .001$, $d = 0.163$), as well as between t5 and t6 for total Internet usage time ($t(461) = -4.86$; $p < .001$, $d = 0.226$) and usage time for online gaming ($t(408) = -2.64$; $p = .009$, $d = 0.131$). Overall, there was a statistically significant increase in all usage times across all survey periods from t3 to t6. Between survey waves t4 and t5, in contrast, a decrease in all Internet usage times was observed, although this was not statistically significant (total Internet usage time: $t(461) = -4.86$; $p = .193$, $d = -0.060$; gaming: $t(417) = 1.59$; $p = .114$, $d = -0.078$; social media: $t(463) = 1.29$; $p = .199$, $d = -0.060$). The graphical presentation (Figure 1) shows the development of the mean values over time and illustrates the findings above.

	Total Internet usage time	Usage time for gaming	Usage time for social media
	t	t	t
2018–2019 (t3–t4)	-3.28**	-1.22	-4.10***
2019–2020 (t4–t5)	1.30	1.58	1.29
2020–2021 (t5–t6)	-4.86***	-2.64**	-1.15
2018–2021 (t3–t6)	-6.57***	-2.93**	-4.04***

Tab. 5: Results of the paired t-tests on usage time (in minutes per day) across the survey waves. Notes: *p < .05, **p < .01, ***p < .001; Waves 5 and 6 were surveyed in 2020 and 2021 during the social distancing and contact restrictions due to the COVID-19 pandemic.

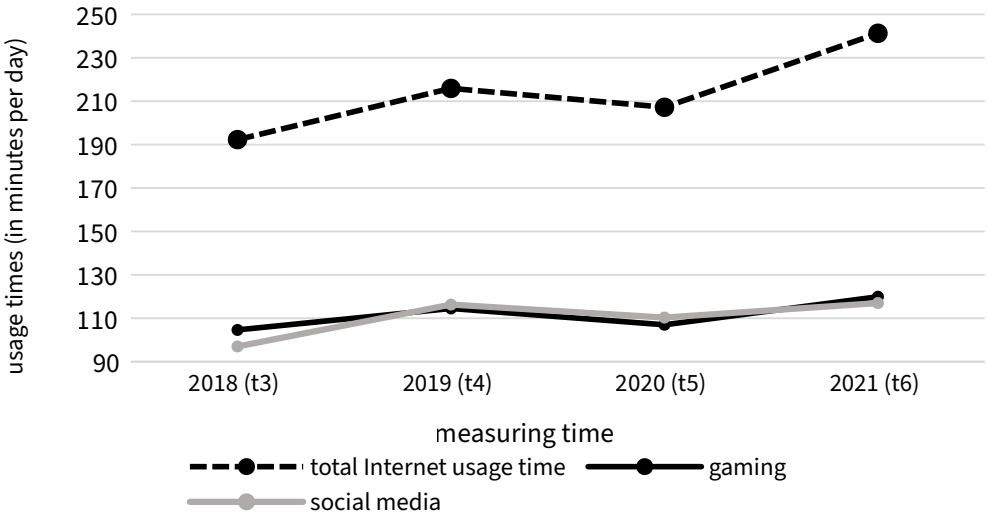

Fig. 1: Mean values for usage time over the course of the four survey waves.

4.2 Findings on problematic usage behavior for gaming and social media over time

The pairwise mean value comparisons also provided information on the progression of problematic Internet gaming and problematic social media use over time from the perspective of both adolescents and parents. The calculations shown in Table 6 relate in each case to the sum values of the Internet Gaming and Social Media Disorder Scale. Only the calculations of differences between t3 and t4 show statistically significant differences for the adolescents' assessments (IGDS: $t(632) = 2.42$; $p = .016$, $d = -0.096$) and SMDS: $t(632) = 2.607$; $p = .009$, $d = -0.104$). Between t4 and t5, however, there were statistically significant differences in the mean values for Internet gaming

disorder from both perspectives and for social media disorder from the parents' perspective (IGDS: $t(463) = 3.58$; $p < .001$, $d = -0.166$ and PIGDS: $t(464) = 2.93$; $p = .004$, $d = -0.136$; PSMDS: $t(464) = 2.06$; $p = .040$, $d = -0.095$). Between t5 and t6, statistically significant differences were found between all mean values for Internet gaming and social media disorder from both perspectives (IGDS: $t(461) = 3.20$; $p < .001$, $d = -0.149$; PIGDS: $t(465) = 4.11$; $p < .001$, $d = -0.190$; as well as SMDS: $t(461) = 4.22$; $p < .001$, $d = -0.196$ and PSMDS: $t(465) = 5.25$; $p < .001$, $d = -0.243$). This is also shown for the observation from t3 to t6 over three years (IGDS: $t(455) = 8.48$; $p < .001$, $d = -0.397$ and PIGDS: $t(459) = 7.58$; $p < .001$, $d = -0.353$, as well as SMDS: $t(455) = 7.80$; $p < .001$, $d = -0.365$ and PSMDS: $t(459) = 6.71$; $p < .001$, $d = -0.313$). In a comparison of all survey waves, consistently decreasing sum values can be reported for the IGDS and PIGDS as well as the SMDS and PSMDS. The only exception occurs between survey waves t3 and t4 for the PSMDS, where the parents perceived a slight but not significant increase in problematic use of social media ($t(632) = -0.11$; $p = .912$, $d = 0.004$). The developments of the social media and Internet gaming disorder scales from both perspectives and their mean values are presented graphically in Figure 2.

	IGDS (sum score)		**SMDS (sum score)**	
	t		t	
	Youth view	Parent view	Youth view	Parent view
2018–2019 (t3–t4)	2.42*	.58	2.60**	-.11
2019–2020 (t4–t5)	3.58***	2.93**	1.79	2.06*
2020–2021 (t5–t6)	3.20**	4.11***	4.22***	5.25***
2018–2021 (t3–t6)	8.48***	7.58***	7.80***	6.71***

Tab. 6: Results of the paired t-tests on Internet gaming and social media disorder across the survey waves. Notes: *p < .05, **p < .01, ***p < .001; Waves 5 and 6 were surveyed in 2020 and 2021 during the social distancing and contact restrictions due to the COVID-19 pandemic.

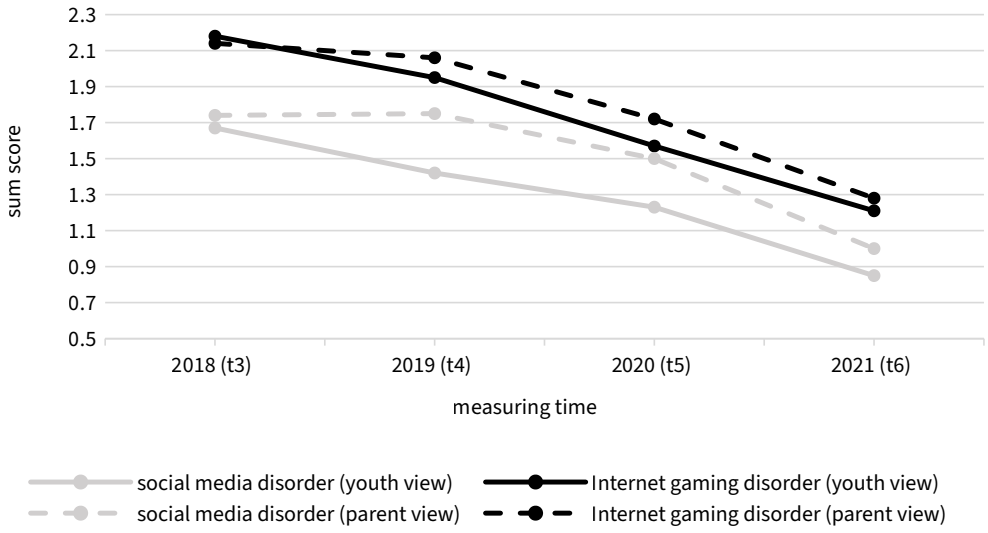

Fig. 2: Mean values for Internet and social media disorder (sum scores) from both perspectives over the course of four survey waves.

4.3 Trends toward Internet gaming and social media disorder over the years

Table 7 shows the percentage of youth reaching cutoff values for problematic online gaming and problematic social media use over the course of the years from t3 to t6. The highest percentages for IGDS and SMDS were recorded at t3 (IGDS: 17.4% and SMDS: 14.2%). The assessments of the parents and adolescents were equivalent across all survey waves, and the values were approximately the same. A consistent decline in the values for IGDS and SMDS from both perspectives can be observed.

	IGDS (persons above the cutoff points)		**SMDS (persons above the cutoff points)**	
	Youth view	Parent view	Youth view	Parent view
	prevalences in percent			
2018 (t3)	17.4%	17.5%	14.2%	13.6%
2019 (t4)	15.6%	15.5%	11.2%	12.5%
2020 (t5)	11.4%	13.9%	9.1%	9.9%
2021 (t6)	9.1%	9.6%	5.7%	6.7%

Tab. 7: Frequency details of youth reaching IGDS and SMDS cutoffs. Note: Waves 5 and 6 were surveyed in 2020 and 2021 during the social distancing and contact restrictions due to the COVID-19 pandemic.

In addition, chi-square tests comparing whether there were statistically significant differences in the groups under and above the cutoff points were carried out between the four survey waves and over the entire period for the respective scales

(IGDS, PIGDS, SMDS, and PSMDS). There were statistically significant changes between the survey waves compared to the values from the previous year. There was a consistent decline in the group of excessive users for both online gaming and social media disorder from the perspective of adolescents and parents (Table 8).

	IGDS (persons above the cutoff points)		**SMDS (persons above the cutoff points)**	
	Youth view	Parent view	Youth view	Parent view
	chi-square values			
2018–2019 (t3–t4)	69.00***	102.18***	86.86***	75.53***
2019–2020 (t4–t5)	63.90***	85.56***	40.96***	44.82***
2020–2021 (t5–t6)	80.91***	101.05***	57.07***	66.13***
2018–2021 (t3–t6)	54.86***	59.40***	27.24***	48.36***

Tab. 8: Results of chi-square tests on IGDS and SMDS above the cutoff points across the survey waves. Notes: *p<.05, **p<.01, ***p<.001; Waves 5 and 6 were surveyed in 2020 and 2021 during the social distancing and contact restrictions due to the COVID-19 pandemic.

4.4 Summary of the results

In summary, it can be stated that there was a statistically significant increase in all surveyed usage times across all survey periods from t3 to t6. The results indicate that during the COVID-19 pandemic, both total Internet usage time and time spent playing Internet games and using social media increased. For this reason, we confirm the first hypothesis, which states that due to the COVID-19 pandemic, young people spent more time on online games and social media than before (H1).

Furthermore, the pairwise mean comparisons were used to illustrate the development of Internet gaming and social media disorder over time from the perspective of both adolescents and parents. The calculations between t3 and t4 showed a statistically significant decrease for the adolescents' assessments only. Between t4 and t5, in contrast, there were statistically significant decreases in the mean values for social media disorder from the parents' perspective and for Internet gaming disorder from both perspectives. Between t5 and t6, statistically significant decreases were found between all mean values for social media disorder and from both perspectives for Internet gaming disorder. This is also evident when looking at t3 to t6 over three years. In a comparison of all survey waves, consistently decreasing sum values were reported for the IGDS and PIGDS as well as the SMDS and PSMDS. The

calculations of the cutoff values for SMDS and IGDS were also equivalent to the results of the t-tests: There was a consistent decrease in the number of young people who showed IGD or SMD (according to their own assessment or that of their parents) over the years from t3 to t6. Several chi-square tests carried out between the four survey waves and for the respective scales showed the same results: There was a statistically significant change from the previous year and a consistent decrease in scores for both Internet gaming and social media disorder from the adolescent and parent perspective throughout. The results clearly show that there were consistently fewer young people in the problematic user group. The conflicting results make it clear that high usage times for gaming and social media are not necessarily accompanied by problematic usage patterns in this sample. Therefore, the second hypothesis (H2) has to be rejected. In addition, the results above clearly show that there was no increase in problematic gaming and problematic social media usage patterns due to the COVID-19 pandemic. Rather, the number of adolescents with problematic gaming and social media usage patterns decreased. For this reason, we also reject the third hypothesis (H3).

5. Discussion and outlook

All in all, current research points to an increase in Internet usage among adolescents over recent years (e.g., Beisch and Koch 2023; Initiative D21; MPFS 2023). In line with the results of earlier studies indicating a clear rise in usage with increasing age (up to a certain stage of life) and especially during the COVID-19 pandemic (e.g., Cakiroglu, Soylu, and Gormez 2021; DAK 2023; MPFS 2020; Neumann and Lindenberg 2022; Paschke et al. 2021; Pietrobelli et al. 2020; Vogel et al. 2021; Xiang, Zhang, and Kuwahara 2020), we found a rise in private Internet use in our sample comparing data from before and during the pandemic, thus confirming previous results. Other studies have reported a decline to »normal« Internet usage after the pandemic (e.g., Beisch and Koch 2023). We were unable to examine this with the survey waves used in this article, so the question will have to be addressed in future research.

Based on our results, we cannot confirm past findings on the association between high usage times and problematic gaming and problematic usage of social media (e.g., Jeong et al. 2021; Paschke et al. 2021). As we observed decreasing numbers for problematic gaming and problematic social media usage with increasing age of the adolescents in contrast to rising usage times, we can state that intensive use of the Internet, especially for gaming and social media, is not necessarily equivalent to problematic usage patterns. Rather, other individual and social factors appear to have a decisive influence. One of these could be an age effect. Previous studies have

shown a decline in problematic gaming with increasing age up to early adulthood. There are still no reliable results for problematic social media usage. However, similar results to those for gaming are quite plausible.

Regarding problematic gaming and social media use over time and with a view to the COVID-19 pandemic, our results conflict with recent research reporting an increase in problematic usage patterns due to the COVID-19 pandemic (e.g., DAK 2023; Neumann and Lindenberg 2022). Our sample showed consistent results throughout: Overall, there was a consistent decrease in problematic use of online games and social media in our sample. The number of young people who self-reported or whose parents reported problematic gaming or problematic social media usage also decreased over the survey waves. We would like to stress that further data collected after the COVID-19 pandemic should be analyzed to verify the stability of observed long-term effects. Furthermore, it should be noted that only paired-sample t-tests and chi-square tests were calculated. These basic analyses of the longitudinal data should be extended in further research to utilize the potential of the data set (e.g., using mixed-effect models), since multiple testing of the same data also increases the risk of false-positive results.

Nonetheless, we conclude that compared to the general population, the VEIF study sample consisted of a higher proportion of young people with subjectively perceived problems in the use of digital media than represented in the general population (oversampling method). On the one hand, this makes it possible to analyze a broader set of data on a vulnerable group. On the other hand, this fact must be considered in the results since there could, for example, be an error of central tendency.

Above all, it should be noted that the increase in Internet usage time during the COVID-19 pandemic may have been related primarily to restrictions such as the lockdowns and social distancing introduced to contain the pandemic. As social life was limited during these periods and young people could have almost no contact with their friends, it does not seem surprising that Internet usage increased. We therefore conclude that the motivations for high usage are crucial in determining whether large amounts of time spent on gaming or social media become a risk for young people. These reflections must be investigated in further studies. Furthermore, the increase in Internet usage may also be due to the developmental phase of adolescence. Internet use increases with age, but excessive behavior is by no means always the result.

References

American Psychiatric Association. 2013. *Diagnostic and Statistical Manual of Mental Disorders: DSM-5.* 5th ed. Washington: American Psychiatric Publishing.

Beisch, Natalie, and Wolfgang Koch. 2023. «Aktuelle Aspekte Der Internetnutzung in Deutschland: ARD/ZDF-Onlinestudie: Weitergehende Normalisierung Der Internetnutzung Nach Wegfall Aller Corona-Schutzmaßnahmen». *Media Perspektiven* 23. https://www.ard-zdf-onlinestudie.de/files/2023/MP_23_2023_Onlinestudie_2023_Fortschreibung.pdf. Accessed February 12, 2024.

Boer, Maartje, Regina J. J. M. van den Eijnden, Meyran Boniel-Nissim, Suzy-Lai Wong, Joanna C. Inchley, Petr Badura, Wendy M. Craig et al. 2020. «Adolescents' Intense and Problematic Social Media Use and Their Well-Being in 29 Countries». *The Journal of Adolescent Health: Official Publication of the Society for Adolescent Medicine* 66 (6S): S89–S99. https://doi.org/10.1016/j.jadohealth.2020.02.014.

Brüggen, Nils, Stephan Dreyer, Christa Gebel, Achim Lauber, Georg Materna, Raphaela Müller, Maximilian Schober, and Sina Stecher. 2022. «Gefährdungsatlas: Digitales Aufwachsen. Vom Kind Aus Denken. Zukunftssicher Handeln». https://www.bzkj.de/resource/blob/197826/5e88ec66e545bcb196b7bf81fc6dd9e3/2-auflage-gefaehrdungsatlas-data.pdf.

Bundesministerium für Gesundheit. 2023. «Coronavirus-Pandemie: Was Geschah Wann? Chronik Aller Entwicklungen Im Kampf Gegen COVID-19 (Coronavirus SARS-CoV-2) Und Der Dazugehörigen Maßnahmen des Bundesgesundheitsministeriums». https://www.bundesgesundheitsministerium.de/coronavirus/chronik-coronavirus.html.

Cakiroglu, Suleyman, Nusret Soylu, and Vahdet Gormez. 2021. «Re-Evaluating the Digital Gaming Profiles of Children and Adolescents During the COVID-19 Pandemic: A Comparative Analysis Comprising 2 Years of Pre-Pandemic Data». *ADDICTA: The Turkish Journal on Addictions* 8 (1): 51–57. https://doi.org/10.5152/ADDICTA.2021.21019.

Carbonell, Xavier, Andrés Chamarro, Ursula Oberst, Beatriz Rodrigo, and Mariona Prades. 2018. «Problematic Use of the Internet and Smartphones in University Students: 2006-2017». *International Journal of Environmental Research and Public Health* 15 (3). https://doi.org/10.3390/ijerph15030475.

Chew, Peter K. H. 2022. «A Meta-Analytic Review of Internet Gaming Disorder and the Big Five Personality Factors». *Addictive Behaviors* 126:107193. https://doi.org/10.1016/j.addbeh.2021.107193.

Claesdotter-Knutsson, Emma, Frida André, and Anders Håkansson. 2022. «Gaming Activity and Possible Changes in Gaming Behavior Among Young People During the COVID-19 Pandemic: Cross-Sectional Online Survey Study». *JMIR Serious Games* 10 (1): e33059. https://doi.org/10.2196/33059.

DAK. 2021. «Mediensucht Während Der Corona-Pandemie: Ergebnisse Der Längsschnittstudie Von 2019 Bis 2021 Zu Gaming Und Social Media Mit Dem UKE Hamburg». https://www.dak.de/dak/download/praesentation-2508260.pdf.

DAK. 2023. *Mediensucht in Zeiten Der Pandemie: DAK-Längsschnittstudie: Wie Nutzen Kinder Und Jugendliche Gaming, Social Media Und Streaming?* https://www.dak.de/dak/download/report-2612370.pdf.

DAK. 2024. «Problematische Mediennutzung Im Kindes- Und Jugendalter in Der Post-Pandemischen Phase: Ergebnisbericht 2023». Ausgewählte Ergebnisse der sechsten Erhebungswelle im August/ September 2023. https://caas.content.dak.de/caas/v1/media/57130/data/1e99c74f76c82194594692bcf2e2337d/dzskj-dak-mediensuchtstudie-2023-24-ergebnisbericht.pdf.

Geisel, Olga, Anneke Lipinski, and Michael Kaess. 2021. «Non-Substance Addiction in Childhood and Adolescence–The Internet, Computer Games and Social Media». *Deutsches Arzteblatt international* 118 (1-2): 14–22. https://doi.org/10.3238/arztebl.m2021.0002.

Hirschhäuser, Lena & Rosenkranz, Moritz. 2012. «Exzessive Internetnutzung in Familien». *tv diskurs* 16 (4): 14–19. https://mediendiskurs.online/data/hefte/ausgabe/62/hirschhaeuser_rosenkranz014_tvd62.pdf.

Huang, Chiungjung. 2022. «A Meta-Analysis of the Problematic Social Media Use and Mental Health». *The International Journal of Social Psychiatry* 68 (1): 12–33. https://doi.org/10.1177/0020764020978434.

Initiative D21. *D21 Digital Index 2021/2022: Jährliches Lagebild Zur Digitalen Gesellschaft*. https://initiatived21.de/uploads/03_Studien-Publikationen/D21-Digital-Index/2021-22/d21digitalindex-2021_2022.pdf.

Jeong, Hyunsuk, Hyeon Woo Yim, Seung-Yup Lee, Hae Kook Lee, Marc N. Potenza, and Hyunyong Lee. 2021. «Factors Associated with Severity, Incidence or Persistence of Internet Gaming Disorder in Children and Adolescents: A 2-Year Longitudinal Study». *Addiction (Abingdon, England)* 116 (7): 1828–38. https://doi.org/10.1111/add.15366.

Ji, Yinan, Margaret Xi Can Yin, Anna Yan Zhang, and Daniel Fu Keung Wong. 2022. «Risk and Protective Factors of Internet Gaming Disorder Among Chinese People: A Meta-Analysis». *The Australian and New Zealand Journal of Psychiatry* 56 (4): 332–46. https://doi.org/10.1177/00048674211025703.

Kammerl, Rudolf, Lena Hirschhäuser, Moritz Rosenkranz, Christiane Schwinge, Sandra Hein, Lutz Wartberg, and Kay-Uwe Petersen. 2012. *Exzessive Internetnutzung in Familien: Zusammenhänge Zwischen Der Exzessiven Computer- Und Internetnutzung Jugendlicher Und Dem (Medien-)Erzieherischen Handeln in Den Familien.* Lengerich: Pabst Science Publ.

Kammerl, Rudolf, Michaela Kramer, Katrin Potzel, and Lutz Wartberg. 2023. «Förderung Von Exzessivem Nutzungsverhalten Bei Games. Gutachten Für Die Kommission Für Jugendmedienschutz (KJM). 11.12.2023». https://www.kjm-online.de/publikationen/studien-und-gutachten/foerderung-von-exzessivem-nutzungsverhalten-bei-games/.

Kammerl, Rudolf, and Lutz Wartberg. 2018. «Zusammenhänge zwischen problematischer Internetnutzung im Jugendalter und Medienerziehung in der Familie». *Praxis der Kinderpsychologie und Kinderpsychiatrie* 67 (2): 134–53. https://doi.org/10.13109/prkk.2018.67.2.134.

Kammerl, Rudolf, Lutz Wartberg, and Matthias Zieglmeier. 2018. «Kritische Perspektiven auf den Umfang der Internetnutzung Jugendlicher. Eine Frage der Generationenzugehörigkeit?» In *Medienkritik im digitalen Zeitalter*, edited by Horst Niesyto and Heinz Moser, 207–20. Medienpädagogik interdisziplinär 11. München: kopaed.

Kammerl, Rudolf, Matthias Zieglmeier, and Lutz Wartberg. 2021. «Diskussionsfelder Der Medienpädagogik: Problematische Internetnutzung – Desiderat Der Medienpädagogik?» In *Handbuch Medienpädagogik*, edited by Uwe Sander, Friederike von Gross, and Kai-Uwe Hugger, 1–9. Wiesbaden: Springer Fachmedien Wiesbaden.

Király, Orsolya, Patrik Koncz, Mark D. Griffiths, and Zsolt Demetrovics. 2023. «Gaming Disorder: A Summary of Its Characteristics and Aetiology». *Comprehensive Psychiatry* 122:152376. https://doi.org/10.1016/j.comppsych.2023.152376.

Király, Orsolya, Marc N. Potenza, Dan J. Stein, Daniel L. King, David C. Hodgins, John B. Saunders, Mark D. Griffiths et al. 2020. «Preventing Problematic Internet Use During the COVID-19 Pandemic: Consensus Guidance». *Comprehensive Psychiatry* 100:152180. https://doi.org/10.1016/j.comppsych.2020.152180.

Kliesener, Tobias, Christof Meigen, Wieland Kiess, and Tanja Poulain. 2022. «Associations Between Problematic Smartphone Use and Behavioural Difficulties, Quality of Life, and School Performance Among Children and Adolescents». *BMC Psychiatry* 22 (1): 195. https://doi.org/10.1186/s12888-022-03815-4.

Koch, Wolfgang. 2023. «Ergebnisse Der ARD/ZDF-Onlinestudie 2023: Soziale Medien Werden 30 Minuten Am Tag Genutzt – Instagram Ist Die Plattform Nummer Eins». *Media Perspektiven* 2023 (26). https://www.ard-zdf-onlinestudie.de/files/2023/MP_26_2023_Onlinestudie_2023_Social_Media.pdf.

Kuss, Daria Joanna, and Mark D. Griffiths. 2012. «Internet Gaming Addiction: A Systematic Review of Empirical Research». *International Journal of Mental Health and Addiction* 10 (2): 278–96. https://doi.org/10.1007/s11469-011-9318-5.

Lemmens, Jeroen S., Patti M. Valkenburg, and Douglas A. Gentile. 2015. «The Internet Gaming Disorder Scale». *Psychological Assessment* 27 (2): 567–82. https://doi.org/10.1037/pas0000062.

Long, Jiang, Tieqiao Liu, Yueheng Liu, Wei Hao, Pierre Maurage, and Joël Billieux. 2018. «Prevalence and Correlates of Problematic Online Gaming: A Systematic Review of the Evidence Published in Chinese». *Current Addiction Reports* 5 (3): 359–71. https://doi.org/10.1007/s40429-018-0219-6.

Lopes, Lucas Silva, João Pedro Valentini, Thomas Hagemann Monteiro, Marcelo Cunha de Freitas Costacurta, Luiza Oliveira Nicastro Soares, Lucy Telfar-Barnard, and Paula Villela Nunes. 2022. «Problematic Social Media Use and Its Relationship with Depression or Anxiety: A Systematic Review». *Cyberpsychology, Behavior, and Social Networking* 25 (11): 691–702. https://doi.org/10.1089/cyber.2021.0300.

Lyvers, Michael, Shreas S. Narayanan, and Fred A. Thorberg. 2019. «Disordered Social Media Use and Risky Drinking in Young Adults: Differential Associations with Addiction-linked Traits». *Australian Journal of Psychology* 71 (3): 223–31. https://doi.org/10.1111/ajpy.12236.

Mihara, Satoko, and Susumu Higuchi. 2017. «Cross-Sectional and Longitudinal Epidemiological Studies of Internet Gaming Disorder: A Systematic Review of the Literature». *Psychiatry and Clinical Neurosciences* 71 (7): 425–44. https://doi.org/10.1111/pcn.12532.

MPFS – Medienpädagogischer Forschunsverband Südwest. 2022. *JIM-Studie 2022. Jugend, Information, Medien: Basisuntersuchung Zum Medienumgang 12- Bis 19-Jähriger:* Medienpädagogischer Forschungsverbund Südwest.

MPFS – Medienpädagogischer Forschunsverband Südwest. 2023. *Jim-Studie 2023 Jugend, Information, Medien: Basisuntersuchung Zum Medienumgang 12- Bis 19-Jähriger in Deutschland.* Stuttgart: MPFS. https://www.mpfs.de/fileadmin/files/Studien/JIM/2022/JIM_2023_web_final_kor.pdf.

Neumann, Ina, and Katajun Lindenberg. 2022. «Internetnutzungsstörungen Unter Deutschen Jugendlichen Vor Und Während Der COVID-19-Pandemie». *Kindheit und Entwicklung* 31 (4): 193–99. https://doi.org/10.1026/0942-5403/a000390.

Nielsen, Philip, Nicolas Favez, and Henk Rigter. 2020. «Parental and Family Factors Associated with Problematic Gaming and Problematic Internet Use in Adolescents: A Systematic Literature Review». *Current Addiction Reports* 7 (3): 365–86. https://doi.org/10.1007/s40429-020-00320-0.

Paschke, Kerstin, Maria Isabella Austermann, Kathrin Simon-Kutscher, and Rainer Thomasius. 2021. «Adolescent Gaming and Social Media Usage Before and During the COVID-19 Pandemic». *SUCHT* 67 (1): 13–22. https://doi.org/10.1024/0939-5911/a000694.

Pietrobelli, Angelo, Luca Pecoraro, Alessandro Ferruzzi, Moonseong Heo, Myles Faith, Thomas Zoller, Franco Antoniazzi, Giorgio Piacentini, S. Nicole Fearnbach, and Steven B. Heymsfield. 2020. «Effects of COVID-19 Lockdown on Lifestyle Behaviors in Children with Obesity Living in Verona, Italy: A Longitudinal Study». *Obesity (Silver Spring, Md.)* 28 (8): 1382–85. https://doi.org/10.1002/oby.22861.

Potzel, Katrin, Michaela Kramer, Lutz Wartberg, Michael Abler, and Rudolf Kammerl. 2023. «Familiale Ressourcen Als Bedingungsfaktoren Für Problematisches Online-Gaming». In *Computerspielforschung: Interdisziplinäre Einblicke in Das Digitale Spiel Und Seine Kulturelle Bedeutung*, edited by Ralf Biermann, Johannes Fromme, and Florian Kiefer, 91–116: Verlag Barbara Budrich.

Richard, Jérémie, Caroline E. Temcheff, and Jeffrey L. Derevensky. 2020. «Gaming Disorder Across the Lifespan: A Scoping Review of Longitudinal Studies». *Current Addiction Reports.* https://doi.org/10.1007/s40429-020-00339-3.

Rumpf, Hans-Jürgen, Matthias Brand, Elisa Wegmann, Christian Montag, Astrid Müller, Kai Müller, Klaus Wölfling et al. 2020. «Covid-19-Pandemie Und Verhaltenssüchte». *SUCHT* 66 (4): 212–16. https://doi.org/10.1024/0939-5911/a000672.

Saini, Nirav, and David Carson Hodgins. 2023. «Investigating Gaming Structural Features Associated with Gaming Disorder and Proposing a Revised Taxonomical Model: A Scoping Review». *Journal of Behavioral Addictions* 12 (2): 352–74. https://doi.org/10.1556/2006.2023.00019.

Spada, Marcantonio M. 2014. «An Overview of Problematic Internet Use». *Addictive behaviors* 39 (1): 3–6. https://doi.org/10.1016/j.addbeh.2013.09.007.

Tejeiro, Ricardo A., Jorge L. Gómez-Vallecillo, Manuel Pelegrina, Agustín Wallace, and Enrique Emberley. 2012. «Risk Factors Associated with the Abuse of Video Games in Adolescents». *PSYCH* 03 (04): 310–14. https://doi.org/10.4236/psych.2012.34044.

Toh, Siao Hui, Erin K. Howie, Pieter Coenen, and Leon M. Straker. 2019. «From the Moment I Wake up I Will Use It…every Day, Very Hour»: A Qualitative Study on the Patterns of Adolescents' Mobile Touch Screen Device Use from Adolescent and Parent Perspectives». *BMC Pediatrics* 19 (1): 30. https://doi.org/10.1186/s12887-019-1399-5.

Valkenburg, Patti M. 2022. «Social Media Use and Well-Being: What We Know and What We Need to Know». *Current Opinion in Psychology* 45:101294. https://doi.org/10.1016/j.copsyc.2021.12.006.

van den Eijnden, Regina J.J.M., Jeroen S. Lemmens, and Patti M. Valkenburg. 2016. «The Social Media Disorder Scale». *Computers in Human Behavior* 61:478–87. https://doi.org/10.1016/j.chb.2016.03.038.

Vogel, Mandy, Christof Meigen, Carolin Sobek, Peggy Ober, Ulrike Igel, Antje Körner, Wieland Kiess, and Tanja Poulain. 2021. «Well-Being and COVID-19-Related Worries of German Children and Adolescents: A Longitudinal Study from Pre-COVID to the End of Lockdown in Spring 2020». *JCPP Advances* 1 (1): e12004. https://doi.org/10.1111/jcv2.12004.

Wang, Hsin-Yi, and Cecilia Cheng. 2022. «The Associations Between Gaming Motivation and Internet Gaming Disorder: Systematic Review and Meta-Analysis». *JMIR Mental Health* 9 (2): e23700. https://doi.org/10.2196/23700.

Wartberg, Lutz, and Rudolf Kammerl. 2020. «Empirical Relationships Between Problematic Alcohol Use and a Problematic Use of Video Games, Social Media and the Internet and Their Associations to Mental Health in Adolescence». *International Journal of Environmental Research and Public Health* 17 (17). https://doi.org/10.3390/ijerph17176098.

Wartberg, Lutz, Michaela Kramer, Katrin Potzel, and Rudolf Kammerl. 2023. «Problematic Use of Video Games, Social Media, and Alcohol: Associations with Mother-Child Relationship». *Psychopathology* 56 (1-2): 117–26. https://doi.org/10.1159/000525148.

Wartberg, Lutz, Levente Kriston, and Rainer Thomasius. 2020. «Internet Gaming Disorder and Problematic Social Media Use in a Representative Sample of German Adolescents: Prevalence Estimates, Comorbid Depressive Symptoms and Related Psychosocial Aspects». *Computers in Human Behavior* 103:31–36. https://doi.org/10.1016/j.chb.2019.09.014.

Wartberg, Lutz, Levente Kriston, Matthias Zieglmeier, Tania Lincoln, and Rudolf Kammerl. 2018. «A Longitudinal Study on Psychosocial Causes and Consequences of Internet Gaming Disorder in Adolescence». *Psychological Medicine* 49 (2): 287–94. https://doi.org/10.1017/S003329171800082X.

Wartberg, Lutz, Matthias Zieglmeier, and Rudolf Kammerl. 2019. «Accordance of Adolescent and Parental Ratings of Internet Gaming Disorder and Their Associations with Psychosocial Aspects». *Cyberpsychology, Behavior, and Social Networking* 22 (4): 264–70. https://doi.org/10.1089/cyber.2018.0456.

Wartberg, Lutz, Matthias Zieglmeier, and Rudolf Kammerl. 2021. «An Empirical Exploration of Longitudinal Predictors for Problematic Internet Use and Problematic Gaming Behavior». *Psychological Reports* 124 (2): 543–54. https://doi.org/10.1177/0033294120913488.

Wong, Hiu Yan, Hoi Yi Mo, Marc N. Potenza, Mung Ni Monica Chan, Wai Man Lau, Tsz Kwan Chui, Amir H. Pakpour, and Chung-Ying Lin. 2020. «Relationships Between Severity of Internet Gaming Disorder, Severity of Problematic Social Media Use, Sleep Quality and Psychological Distress». *International Journal of Environmental Research and Public Health* 17 (6). https://doi.org/10.3390/ijerph17061879.

World Health Organization. 2018. «International Statistical Classification of Diseases and Related Health Problems (11th Revision)». https://icd.who.int/browse11/l-m/en.

Xiang, Mi, Zhiruo Zhang, and Keisuke Kuwahara. 2020. «Impact of COVID-19 Pandemic on Children and Adolescents' Lifestyle Behavior Larger Than Expected». *Progress in Cardiovascular Diseases* 63 (4): 531–32. https://doi.org/10.1016/j.pcad.2020.04.013.