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Media addiction in children and adolescents—a study protocol for development, piloting and evaluation of a sustainable, integrative rehabilitation program (MeKi)

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Introduction: The proportion of children and young people in Germany who have problematic media use has increased, particularly as a result of the coronavirus pandemic. The presence of comorbidities such as anxiety disorders, depression, sleep disorders, impulsivity and lack of social skills are interdependent with media addiction. Medical rehabilitation is suitable for the long-term care of children and adolescents with media addiction. As part of the MeKi study, a rehabilitation program for children and adolescents with media addiction is being developed and piloted in a cooperating rehabilitation clinic. The trial is registered under DRKS-ID: DRKS00034461, Medienabhängigkeit bei Kindern und Jugendlichen—Entwicklung, Pilotierung und Evaluation eines nachhaltigen, integrativen Rehabilitationskonzepts.

Methodes and analysis: As part of a mixed methods design a multimodal rehabilitation concept for children and adolescents with media addiction will be developed in a preparation phase based on the results of a scoping review as well as interviews and focus groups with affected children and adolescents, their parents and experts. In a trial phase the concept will be implemented with a planned sample of 80 Children and adolescents over a period of 1.5 years and evaluated by means of a results evaluation using a questionnaire survey and a process evaluation using interviews and focus groups.

Discussion: The lack of a standardized definition for problematic media use in children and adolescents complicates both the scientific discourse and the practical care of those affected. Furthermore, there are currently only a few therapeutic offers and these are only available in the acute sector. The development and piloting of a rehabilitation program for children and adolescents with media addiction is intended to provide sustainable rehabilitative care, which is to be transferred to other clinics after the end of the project.

Trial registration: The trial is registered under DRKS-ID: DRKS00034461, Medienabhängigkeit bei Kindern und Jugendlichen—Entwicklung, Pilotierung und Evaluation eines nachhaltigen, integrativen Rehabilitationskonzepts.

KEYWORDS

media addiction, children, adolescent, media-related interference, social media, gaming, streaming

1 Introduction

Digitalization has significantly impacted people's lifestyles, relationships, health, and work processes. With continuous technological advancements, the use of digital media through various devices is now possible at almost any time and place. However, this has also led to an increase in problematic usage behavior. A notable trend, particularly among children and adolescents, is the increasing (problematic) use of the internet and digital media (1, 2). Nevertheless, obtaining reliable data on the extent and prevalence of such behaviors is difficult due to the lack of standardized and universally accepted definitions (3). In German-speaking countries, the problem is compounded by the absence of a unified term and the terminology itself is often imprecise. Terminologies such as internet addiction, media addiction, pathological internet use, excessive or compulsive internet use, but also mobile phone addiction are used interchangeably (4, 5).

Children and adolescents today are considered "digital natives" and make up a large portion of global internet users (2). In Germany, nearly all 12- to 19-year-olds (96%) own a smartphone, giving them constant access to the digital world. On average, they spend 3.4 h online daily (6), with a significant increase in screen time observed during the COVID-19 pandemic (7). In 2022, 85% of 10- to 17-year-olds in Germany used digital games, 89% used social media, and 83% video streaming (2).

International studies also describe an increase in media use among children and young people, particularly during the coronavirus pandemic (8–10).

Initial results on the situation in Germany were presented in 2011 in the study "Prevalence of Internet Addiction" (PINTA) (11). In 2013, these results were expanded upon in a second study (PINTA DIARI) (12), which found a prevalence of 1% in the overall population and 1.4 million people who are also considered to be at risk of becoming individuals with internet addiction. What is striking about the results is the higher prevalence at a young age (2.4% among 14- to 26-year-olds and 4% among 14- to 16-year-olds) (3, 13).

In the study "WhatsApp, Instagram and co.—social media is so addictive", the DAK examined the intensity of use and the effects associated with the use of social media by 12–17-year-old children and young people for the first time in Germany in 2018. According to the study, children and young people spend an average of around two and a half hours a day on social media, which causes various health problems (14). According to a study by the German Center for Addiction Issues in Childhood and Adolescence at the UKE Hamburg on behalf of the health insurance company DAK-Gesundheit "Gaming, Social Media and Corona" (as part of the 2020 media addiction prevention campaign), pathological computer gaming and social media addiction has increased among children and adolescents during the corona pandemic. According to the report, more than 4% of German ten to 17-year-olds exhibit pathological usage behavior (1, 2).

International studies also describe an increase in media use among children and young people, particularly during the coronavirus pandemic (15–17).

On an international level, the term "internet gaming disorder" (IGD) was included in the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) in 2013. IGD describes the problematic use of video games (both online and offline), whereby the diagnosis is based on nine criteria, of which at least five must have been met in the last 12 months (8) in order to be diagnosed with IGD (10). Furthermore, the World Health Organization (WHO) officially classified "gaming disorder" (both online and offline) in April 2019 as a behavioral addiction in the ICD-11, grouping it under addiction disorders (3).

In the following and for the planned study, the term "media addiction" will be used in reference to children and adolescents (aged 12–17 years). This term refers to excessive, problematic, and inappropriate media use that can lead to pathological and treatment-requiring behavior (9, 18). Media use includes social media, digital online and offline games as well as streaming services.

Comorbidities related to media addiction can include anxiety disorders, depression, attention disorders, obsessive-compulsive disorders, and sleep disorders (4, 12, 19) as well as impulsivity caused by pronounced cognitive instability (12, 18, 20) and a lack of social skills (21). These conditions may occur either before or after the onset of media addiction (19, 22). Many adolescents with high-risk media use patterns show signs of psychological distress, though the causality can work in both directions (23–25).

Parental and family factors, such as the parental role model, parenting behavior, and intrafamilial communication, also play an important role in the development and management of media addiction (26). Beyond these comorbidities, long-term negative consequences of media addiction come to the forefront, affecting various aspects of life such as health, performance and social interactions (12). Other consequences include impaired functioning, academic failure and therefore limited career prospects. These issues may lead to challenges in social participation and increased social costs, necessitating prompt attention (19).

In the United States and various East Asian countries, awareness of the problem and treatment strategies for media addiction in adolescents and adults has been a topic of major public interest for some time (27). To date, however, there is no evidence of a comprehensive rehabilitation approach to the treatment of media addiction. Previous findings relate primarily to preventive and early interventions, acute inpatient treatment concepts or the treatment of adults. This study situation provides indications of potentially effective concepts, but implies the development of innovative measures. With regard to adequate treatment concepts for different forms of media addiction (social media, gaming, streaming, etc.) for children and adolescents in particular, further scientific efforts are required (19, 28, 29).

In addition to existing acute care facilities in Germany, the concept of rehabilitation offers a promising option for treating children and adolescents with media addiction holistically (30). An inpatient rehabilitation program is beneficial as a first step because it allows those suffering from media addiction to get away from their everyday life, concentrate primarily on their condition and—particularly in the case of children and

adolescents—provide potential facilitation for parents. In this article, the term "parents" is used to refer not only to the biological parents, but also to the primary caregivers responsible for raising children. In addition, the term may include more than two individuals to take account of different family structure. Ideally, parents can accompany their children to the rehabilitation center and participate in the treatment process, receiving appropriate training to manage their child's condition in daily life (30). Inpatient rehabilitation is characterized by a biopsychosocial, multimodal and interdisciplinary approach, making it an optimal solution for treating children and adolescents with media addiction and supporting their families.

To date, there are no existing inpatient rehabilitation programs in Germany specifically designed for treating media addiction in children and adolescents as research shows.

Comparable project approaches for children and adolescents with media-related disorders in Germany have so far only existed in the acute inpatient sector (2) and for adults in inpatient rehabilitation. Inpatient rehabilitation for children and adolescents with media addiction is a gap in the German care system. So, the development and implementation of a rehabilitation program for children and adolescents with media addiction represents an innovation. The rehabilitation program represents, for example, the continuation of the care process for children and adolescents coming out of acute psychiatric treatment. Furthermore, the inpatient rehabilitation service is particularly suitable for children and adolescents with evidence of a media use disorder for whom acute psychiatric treatment is not yet necessary.

The planned pilot project aims to adapt and establish existing concepts to the setting of inpatient rehabilitation and aftercare for children and adolescents and to the target group of children and adolescents. Existing effective elements from acute inpatient care in Germany and from existing concepts in the international area are to provide orientation and a basis for the development of an innovative rehabilitation concept.

Like the other rehabilitation concepts in Germany, this program for children and adolescents with media addiction will also be holistically oriented. These include, among other things: Group and individual discussions, psychoeducation, sports and exercise offerings, creative therapy and health promotion.

As it is an inpatient program, the therapy elements of the rehabilitation program will be applied every day. At the weekends, supervised free-time activities will probably be offered. The exact design of the program will then be finalized during the preparation and development phase.

The development and implementation of a rehabilitation program for children and adolescents with media addiction also represents an innovation on various levels.

The rehabilitation aftercare included in the concept, which should regularly follow the inpatient rehabilitation program, is also an innovative element in itself and stands out from standard practice. Rehabilitation aftercare concepts for children and adolescents are still not established. There are only a few such services for only a few indications (predominantly for obesity), meaning that comprehensive care in this area is far from being guaranteed in Germany (31). Further innovative components of the rehabilitation aftercare included in the concept are the low-threshold nature of the aftercare offered in the form of online implementation on the one hand and the organization and "initiation" of the aftercare program during the rehabilitation program on the other. This concept therefore covers the barriers mentioned by the main stakeholders involved—namely the lack of accessibility and difficult access.

The primary aim of the pilot project is to develop and implement a rehabilitation concept for treating media-addicted children and adolescents. The objective is to foster both immediate and sustainable behavioral changes (controlled media use) and improve quality of life, thereby enabling long-term social participation and the possibility of future employability.

The secondary aim is to evaluate the manualized rehabilitation concept.

Ultimately, the long-term aim is to integrate this concept into general healthcare to fill a gap in rehabilitation services for children and adolescents with media addiction.

2 Methods and analysis

2.1 Study design

This study is a convergent research mixed methods design. In a preparation and development phase a six-week, multimodal rehabilitation concept for children and adolescents with media addiction will be developed based on the results of a scoping review as well as interviews and focus groups with affected children and adolescents, their parents and experts. In the trial phase the concept will be implemented over a period of 1.5 years and evaluated by means of a results evaluation using a questionnaire survey and a process evaluation using interviews and focus groups.

As this is an initial trial of a newly developed concept, a control group is not being used here. If the results of the before-and-after comparison are positive, the use of a control group could be considered in a follow-up project.

2.2 Study setting

The research team at Charité—Universitätsmedizin Berlin (Germany) will conduct the surveys during the preparation and development phase.

The implementation of the testing phase and the piloting of the rehabilitation concept will take place at the cooperating rehabilitation clinic, Rehabilitationsklinik Schönsicht in Berchtesgaden, Bavaria (Germany). Eligible participants will be identified by a study nurse affiliated with the rehabilitation clinic.

2.3 Sample size

In the preparation and development phase, we will conduct approximately 10 semi-structured, guideline-based interviews

with children and adolescents and around 10 narrative interviews with the parents of media-addicted children and adolescents as well as 10 interviews with experts.

As part of focus groups, the results from the integration of the literature review and the interviews will be discussed by the staff of the participating rehabilitation clinic. Two focus groups with five to eight participants from different professional backgrounds will be conducted.

Subsequently, two focus groups (with five to eight participants each) will be conducted with the parents who have already been interviewed, in which a first draft of the rehabilitation concept will be discussed. The age and gender of the participants will be as diverse as possible.

In a testing phase, the rehabilitation program developed will be tested for its practicability. Initially, one or two test runs of the developed rehabilitation program will be carried out with 10 or 20 participants over six or 12 weeks. Upon successful completion of the testing phase, the program will proceed to the piloting phase. The goal is to reach a total of approximately 80 children and adolescents over the course of one year, which corresponds 85% of eight rehabilitation cycles, each lasting six weeks and involving around 15 participants.

As it will not be possible to recruit a sample larger than the calculated sample, a confirmatory test of the secondary outcomes will be omitted. Since only the primary outcome will be subjected to significance testing, a correction for multiple testing will not be necessary. The secondary outcome will be evaluated on an exploratory basis only. These will then be examined in a study with a larger sample size (32, 33).

A questionnaire survey will be conducted as part of the process evaluation. The sample size for this survey will correspond to the planned number of cases for the pilot study. Additionally, four focus groups are planned, each consisting of five to eight children and adolescents and four focus groups with five to eight parents. For the document analysis, approximately 30 participating children and adolescents are expected to contribute. Besides, feedback loops will be set up in four workshops with around 10 clinic employees.

2.4 Data analysis

The quantitative survey data will be analyzed using IBM SPSS Statistics 28.

The data will be initially analyzed using a descriptive univariate approach. Possible correlations between socio-demographic data and patient characteristics and individual variables and individual variables will be then analyzed bivariately using chi-square tests. Changes in outcomes will be calculated on the one hand using a *t*-test for dependent samples and on the other hand using Pearsons chi-square Test for proportions.

The open questions, which can be answered with a free text entry, will be analyzed qualitatively in terms of content. The respective answers will be coded by the researchers using a categorization scheme. The category system is developed inductively based on the text material.

Interviews and focus groups will be digitally recorded, anonymized and transcribed.

The evaluation will be carried out using the framework analysis method (25), supported by MAXQDA software (VERBI Software GmbH, Germany).

2.5 Recruitment

2.5.1 Preparation and development phase

Children and adolescents with a subjectively problematic media use behavior and their parents will be recruited for interviews by contacting addiction counseling centers with a focus on media addiction, schools, pediatricians' offices, and social pediatric centers (Sozialpädiatrische Zentren).

Experts will be recruited through networks such as professional associations and working groups, as well as through existing contacts with rehabilitation clinics. These experts will be invited for telephone interviews as part of a purposive sampling strategy.

Clinic employees at the cooperating clinic will also be recruited for planned focus groups via purposive sampling. Moreover, parents who will have already participated in interviews at the beginning of the study will be invited to take part in focus groups at this stage, whereby a pragmatic approach will be taken, as it is assumed that only a few parents will be willing to participate.

2.5.2 Trial phase

For piloting the rehabilitation concept, recruitment will occur through an "awareness-raising and information phase". Professionals responsible for identifying and diagnosing children and adolescents with media addiction and referring them to the participating rehabilitation clinic will be informed about the pilot project. This will be done by means of leaflets, information brochures, short articles or advertisements in specialist journals and websites.

Pediatric practices from the federal states whose pension insurance providers are participating in the study will be identified through online search on the website of the German National Association of Statutory Health Insurance Physicians. In this way, the addresses of all registered professionals can be retrieved, and information materials will be sent to them.

Access to study participants and interview or focus group participants will be arranged on site at the rehabilitation clinic where the rehabilitation program will take place, through a study nurse.

In the preparation and development phase, participants will be selected using selective procedures typical of qualitative methods, with attention to ensuring the greatest possible heterogeneity among participants based on predefined criteria. The following criteria, among others, include gender, age, family structure, socioeconomic status, migration biography. For the expert interviews, it will also be important to represent as many different job profiles as possible.

In the preparation and development phase, children and adolescents between the age of 12 and 17 with a subjectively

perceived media-related disorder will be included for the interviews.

2.5.3 Inclusion and exclusion criteria for study participants

Children and adolescents between the age of 12 and 17 with media addiction will be identified and recruited for the study by pediatricians and family doctors.

A self-created questionnaire, based on the screening questionnaires of the German Center for Addiction Research in Childhood and Adolescence (GADIS-A, SOMEDIS-A, STREDIS-A) (23–25), will be used to identify children and adolescents with media addiction.

If the test is positive, the paediatricians refer the children and adolescents to a cooperating rehabilitation clinic. As there is still no specific diagnosis other than gaming disorder in ICD 11, the diagnoses F63.8 and F68.8 from ICD 10 are used to justify psychosomatic rehabilitation and initiate the application process.

If the result of the screening test indicates possible unspecific mental health problems or risky behavior, it is the doctor's responsibility to monitor this further or to initiate specific diagnostic procedures and care options. These children and adolescents are not referred to rehabilitation and are therefore excluded from the pilot project.

As the interviews and the additional surveys during the testing and pilot phase will be conducted in German, sufficient language skills will be a prerequisite for participation in the model project.

2.6 Study structure

2.6.1 Preparation and development phase

The first phase of the project aims to raise awareness of media addiction among children and young people and disseminate information about the pilot project as well as on professionals who recognize and diagnose media addiction and refer affected children and adolescents to the participating rehabilitation clinic.

Scoping Review: In the preparation and development phase, existing effective treatment concepts and theoretical assumptions on the etiology of media addiction will be examined as part of a scoping review.

Interviews: The individual perspectives of all study participants will be examined in order to supplement and refine existing disorder models for media addiction from the literature. Qualitative interviews will be conducted to gain a deeper understanding of the causes, motives and reflections of the respective children and adolescents on their own behavior. Semi-structured guided interviews will focus on their perceptions, while narrative interviews will explore the perceptions and influences of parents. Expert interviews will be conducted with professionals such as pediatricians, family doctors, psychotherapists and addiction disorder experts.

The respective children and adolescents will be viewed as experts of their own lives, with their insights and views being placed at the center.

Focus Groups: In order to derive potential therapy modules, the results from the literature review and interviews will be integrated and initially discussed in focus groups involving employees from the participating rehabilitation clinic. Different perspectives will be considered by including as many different specialist disciplines as possible.

Subsequently, a first draft concept will be evaluated and discussed in focus groups by the parents of the children and adolescents interviewed in the first phase. The goal is to obtain open feedback from parents, while also discussing criteria such as feasibility, practicality and sustainability for home use.

Workshops: The draft of the rehabilitation concept will be presented in workshops to the involved staff of the participating rehabilitation clinic, addiction specialists, representatives of the cooperating pension insurance providers as well as children and adolescents with a media addiction and their parents. The concept will be discussed in these workshops and refined on the basis of feedback. After a thorough review and approval of the concept, it will be finalized and documented in the form of a manual that outlines the procedures for inpatient rehabilitation and subsequent aftercare. This process will conclude the preparation and development phase.

2.6.2 Trial phase

The core of the pilot project lies in the trial phase, in which the rehabilitation concept for children and adolescents with media addiction, developed in the first phase, will be tested and evaluated in the participating rehabilitation clinic.

The testing phase will involve one or two rehabilitation cycles, each lasting either six or 12 weeks, with 10 or 20 participants respectively.

Following the successful testing phase, the pilot phase will run for 1.5 years, involving approximately eight rehabilitation cycles of six weeks each and a subsequent telemedical aftercare rehabilitation program over a period of six months. The pilot phase includes a process and result evaluation. At the end the results of all surveys will be compiled. The findings from the process and result evaluation will be summarized and incorporated into the rehabilitation concept, with the manual adjusted accordingly. This will be done in consultation with all the involved parties.

To ensure sustainability, the results will also be disseminated across various levels of the supply system.

2.6.2.1 Evaluation of processes

To assess the acceptance of and satisfaction with the new rehabilitation concept a process evaluation will be carried out.

Questionnaire Survey: Participating children and adolescents will fill out self-created questionnaires on their expectations of the program and wishes in relation to the program and their own wishes in relation to their media addiction at the beginning of the rehabilitation program as well as their acceptance with regard to the course of the program and their personal perception and situation and satisfaction with the program in terms of the goals set, personal success and the specific therapy elements at the end of the program and six months after its completion.

A self-constructed questionnaire is being developed that combines validated measurement instruments with self-created questions. The development of the self-constructed questionnaire is based on a literature research on the subject of media addiction and media-related disorders.

Focus Groups with Children and Adolescents: Focus groups will be conducted with children and adolescents to reflect on their rehabilitation journey at various stages. Using a visual timeline, participants describe and discuss their understanding of the rehabilitation process, their motivation for participating and the learning effects they will have experienced. They will also provide an outlook on sustainable behavior change.

After the rehabilitation program ends, the children and adolescents also comment on the goals formulated during the program on a virtual pinboard (document analysis). This approach will intend to encourage self-reflection and participation in the research process, offering participants the opportunity to analyze their own behavior (34). The comments and keywords posted by the children and adolescents will provide researchers with deeper insights into their thoughts and contribute to the evaluation of the program's impact and quality.

Focus Groups with Parents: The attention of the parental focus groups will be on their involvement in the rehabilitation concept as well as on the observed behavioral changes of their children resulting from the rehabilitation program. Moreover, individual therapy components will be discussed regarding their importance, feasibility and sustainability, particularly in relation to the children's return to their home environment.

Workshops: As part of the process evaluation, feedback loops will be established with the involved clinic staff at regular intervals during the trial phase in order to incorporate any identified needs for optimization or adaptation into the implementation and design of the rehabilitation concept. For this purpose, data from the questionnaires and interviews will be compiled and presented to the rehabilitation clinic staff involved in workshops and discussed with regard to potential changes and improvements.

2.6.2.2 Evaluation of results

The effectiveness of the rehabilitation concept will be assessed in a pre-post comparison by means of a self-created questionnaire survey with a pre-post comparison. A new, self-constructed questionnaire is being developed that combines validated measurement instruments with self-created questions. The development of the self-constructed questionnaire is based on literature research on the subject of media addiction and media-related disorders.

Questionnaire Survey: Outcomes such as media consumption and quality of life will be measured at three points in time: at the beginning and end of the rehabilitation program and six months after completion of the program. Additionally, drop-out rates from the clinic system will be recorded.

2.7 Outcomes

Primary outcome: The primary outcome will measure the degree of media addiction at three points in time: at the beginning and end of the rehabilitation program, and six months after its completion.

Secondary outcome: As a secondary outcome, the quality of life will be assessed at the same three points in time. The drop-out rate from the clinic system will also be recorded.

2.8 Data management

All data collected will be treated with strict confidentiality and used exclusively for the stated purposes. The data will be stored in a password-protected database accessible only to the study leader and designated staff.

Interviews and focus groups will be digitally recorded, anonymized, stored, and transcribed. The audio files will be deleted after transcription. The questionnaire survey conducted as part of the process evaluation will also be anonymized.

In the quantitative survey (pre-post comparison), study participants will each receive an ID linked to their name in a list that will be stored on a password-protected server at the participating rehabilitation clinic. Only the study nurse will have access to this list. Charité study staff will not be able to access the list at any time. Data analysis will be carried out using only pseudonymized data.

The drop-out data will be analyzed in an anonymized form.

2.9 Dissemination

As part of the intended long-term implementation, the results will be disseminated at various levels (service providers, users, payers, and researchers) in order to promote the spread of the rehabilitation concept and encourage its adoption in other rehabilitation clinics, with the ultimate goal of establishing it in standard care.

Networking among parents (e. g., through support group) and between different facilities will be promoted and supported in the sense of helping people to help themselves. Existing structures and bilateral networks of people, institutions and organizations will also be taken into account and used.

This ensure that the rehabilitation concept developed will be accessible to all.

3 Discussion

The various definitions of what we refer to here as "media addiction" make it complicated to find a common language (3–5), and the heterogeneous research field with differing concepts allows only limited comparisons (35). Although the inclusion of Internet Gaming Disorder (IGD) as an addictive disorder in the ICD-11 is a step forward in this context (3, other internet-related disorders (social media, streaming, pornography etc.) are missing.

Targeted, standardized definitions that include the spectrum of different forms of media would be a necessary first step towards

better scientific exchange and the establishment of more precisely tailored treatment concepts that can do justice to the complexity of the problem and individual life circumstances (36).

Children and adolescents, who have grown up as "digital natives", along with the constant access to media, face difficulties in maintaining appropriate and controlled usage patterns in their everyday lives (2, 7). Promoting healthy use of digital media is a key element in supporting and encouraging healthy development (35).

It goes without saying that the use of digital media does not only have negative effects. Positive aspects of digital media use for children and adolescents include the potential for interaction and networking as well as for self-organization, information gathering and further education. Additionally, the use of digital media can contribute to identity development and role-finding within society (37).

There is currently a lack of clinical treatment programs for children and adolescents with media addiction (26, 35). Cognitive-behavioral therapy programs have so far shown the most promising effects on symptom reduction (34), although the involvement of parents and families should also be considered (38) due to the parental and familial influence (26), this has not yet been fully implemented (39). Results from pilot studies, however, highlight the promising effects of parental involvement, showing reduced stress levels among parents, improved family functioning, and a reduction in symptoms among affected adolescents (39).

A multimodal rehabilitation model with integrated aftercare that includes parents and ensures the transfer of skills into everyday life could be an important element in the treatment of children and adolescents with media addiction.

3.1 Limitations

Since this is the initial trial of a newly developed concept, a control group was not included due to the complexity involved. On the one hand, our pilot study without a control group can provide valuable initial insights. However, without a control group, it is difficult to evaluate the results of the pilot study with regard to whether observed effects are actually attributable to the intervention or whether they were caused by other factors (e. g. external influences). Finally, the assessment of the effectiveness of the intervention must be treated with caution and should be re-examined in a controlled design if the results of a larger sample are positive.

As media addiction is still a relatively new and under-researched field in the care of children and adolescents, it is to be expected that there is still little knowledge on the part of pediatricians. This could possibly lead to a rather reluctant transfer to the equally new rehabilitation program.

Minor risks that may arise from participating in rehabilitation, such as being pulled out of everyday life, which may be associated with stress symptoms, can be mitigated by medical and psychotherapeutic support on site.

Ethics statement

An ethical approval of the preparation and development phase has been obtained from the Ethical Comission of Charité - Universitaetsmedizin, Berlin, Germany. Further ethics approval for the testing phase will be obtained once the rehabilitation program is finalized. The studies were conducted in accordance with the local legislation and institutional requirements. Written informed consent for participation in this study was provided by the participants' legal guardians/next of kin.

Author contributions

SF: Writing – review & editing. LR: Writing – review & editing. LK: Writing – review & editing. SD: Writing – review & editing. JS: Writing – original draft, Writing – review & editing.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Generative AI statement

The author(s) declare that no Generative AI was used in the creation of this manuscript.

Publisher's note

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