Digital media and mental health problems in children and adolescents: A research overview

English summary

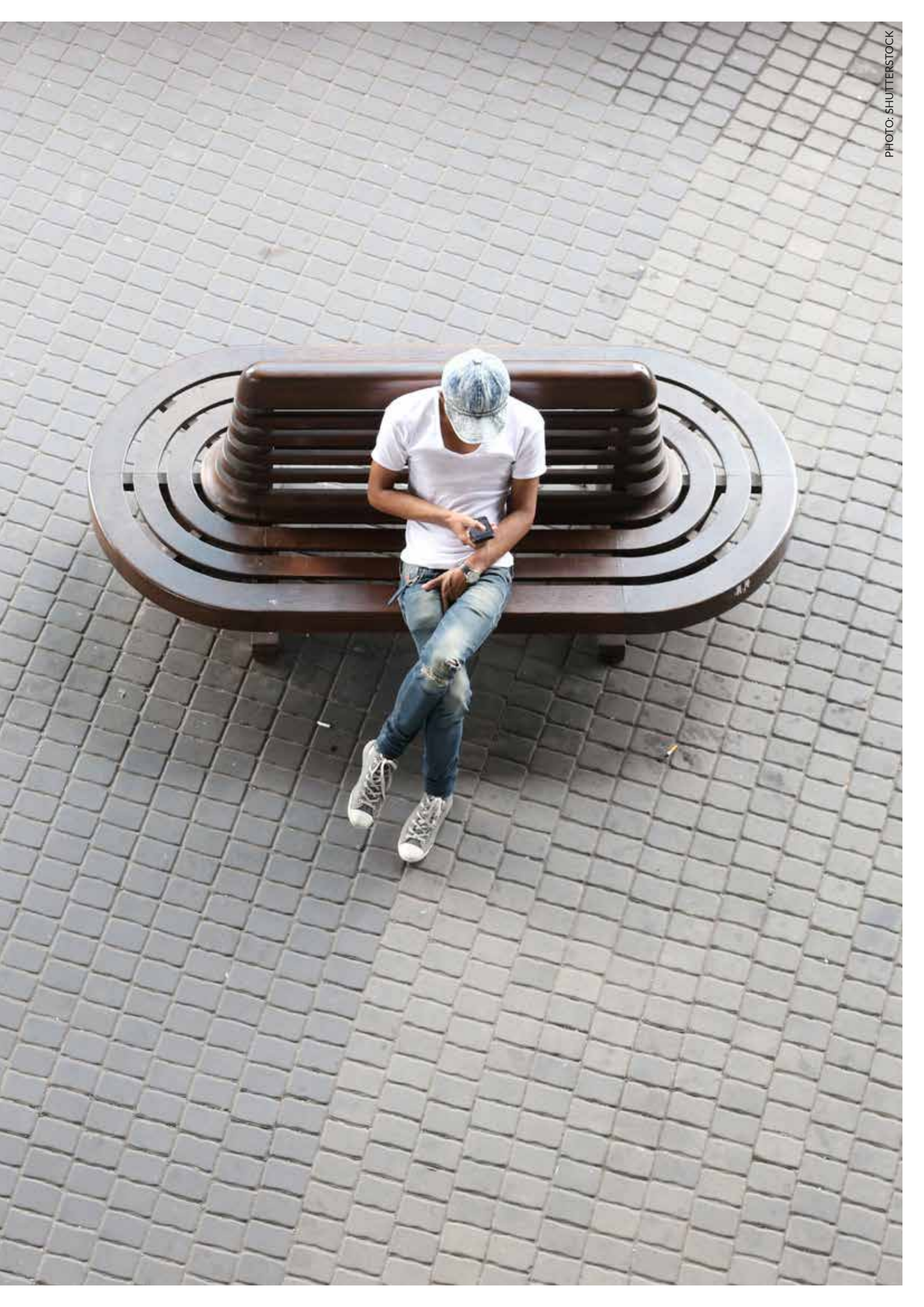**Sissela Nutley & Lisa Thorell**

Statens medieråd

The purpose of this report is to compile the scientific evidence on possible links between digital media and mental health problems in children and adolescents.

Table of contents

Foreword

In the autumn of 2020, the Swedish government assigned the Swedish Media Council, together with 24 other authorities, to provide a basis for an upcoming national strategy for mental health and suicide prevention. This research overview has been produced by the Swedish Media Council as a contribution to the ongoing work. The government assignment is led by the Public Health Agency of Sweden and the National Board of Health and Welfare, and the final report to the Ministry of Social Affairs will take place on 1 September 2023.

> **The Swedish Media Council is a government agency whose primary task is to promote the empowering of minors as conscious media users and to protect them from harmful media influences**

The Swedish Media Council is a government agency whose primary task is to promote the empowering of minors as conscious media users and to protect them from harmful media influences. There are no specific assignments on mental health or suicide prevention in the agency's instruction, but there are nevertheless links between the agency's task and mental health.

According to the Public Health Agency of Sweden, mental problems such as irritation, depression, stress and sleeping difficulties have risen among Swedish adolescents during the last decades, making it an increasing societal concern. The expanding media landscape, the digitalisation and the ubiquity of social media and smartphones in everyday life have been suggested as possible main causes (e.g. Twenge, 2017) and lately, an abundance of studies on the relationship between media use and psychological ill-being have been published. For the Swedish Media Council, this means that the concept of 'harmful media influence' must be reconsidered and developed in accordance with the research, and with the continually changing media landscape that young people are navigating through in their daily life. This report will add to this process by bringing an overview of international research on the associations between mental health problems in children and adolescents and the use of social media, and between the use of social media, gaming, and neuropsychiatric disorders.

The report is authored by Sissela Nutley and Lisa Thorell at the Department of Clinical Neuroscience, Division of Psychology, Karolinska Institutet (Sweden's single largest Centre of medical academic research). An extended version of this research overview is published in Swedish on www.statens-medierad.se

Stockholm, June 2022

Introduction

Background

Recent statistics from the Swedish Media Council (2019) have shown that almost all Swedish adolescents (99%) and a large majority of children aged 9-12 (91%) have their own digital device such as a smart phone, a computer, or a tablet. In addition to increased access to digital media devices, there are several aspects that are different from today's use of digital media compared to previous general use of TV and radio. First, there has been a shift from passive consumption to active interaction. Second, the content has changed from general and static to individualized and dynamic. Third, there has been a shift in terms of the time spent on digital media, with the use of digital devices starting at a younger age and being much more extensive than before. For example, recent statistics (Swedish Media Council, 2019) show that 16% of 1-year-olds watch videoclips on for example Youtube for at least one hour/day and the previous definition of high usage (i.e., 3 hours/day) has lost its purpose as a majority of adolescents now reach these high levels.

Because the content is now more individualized and interactive, it is likely to lead to higher levels of consumption, which does not necessarily need to be problematic but could be a risk factor for mental health problems. Interestingly, the increased use of digital media has shown a similar pattern as that of mental health problems (Folkhälsomyndigheten [the Public Health Agency of Sweden], 2018; Socialstyrelsen [the National Board of Health and Welfare], 2017). The Swedish Media Council (2019) has also shown that there is an association between time spent on digital media and discontent with digital media use as reported by adolescents themselves. As many as 73% of adolescents aged 17–18 reported that their use of digital media leads them to neglect activities shown to have positive effects on mental health such as sleep, exercise, and schoolwork on a weekly basis. The same study also showed that almost half of adolescents aged 13–18 years think they spend too much time using their mobile phone. Finally, the study reports that "13 is the new 16", meaning that digital media use now peaks at age 13, whereas this peak was earlier found at age 16.

Aim of this research overview

As described above, there is reason to believe that there is a link between digital media use and mental health problems. However, the conditions around this association are still unclear. In the present report, we therefore aim to provide an overview of international research related to the following questions:

- What is the association between mental health problems in children and adolescents and the use of social media? In this part of the review, we focus specifically on depression, anxiety, eating disorders/negative body image and internet bullying. We also include specific associations for youth identifying as LGBTQ.

- What is the association between the use of digital media (i.e., gaming and social media) and neuropsychiatric disorders? In this part of the review, we focus both on to what extent children with these disorders are at increased risk of developing a problematic use of digital media and to what extent extensive digital media use can lead to an increase in symptoms of ADHD and autism over time.

PHOTO: SHUTTERSTOCK

Definitions

Gaming and social media

This research overview focuses on two different categories of digital media: gaming and social media. Gaming includes all types of games that are played online, regardless of whether the person use a game console, a computer, a phone, or a tablet. Social media can be defined as digital channels combining technology, social interaction, and user-generated content through virtual networks. It can be used for consumption, production, as well as for distribution of text, pictures, or video material. The most common social media platforms researched thus far are Snapchat, Youtube, Instagram, Facebook and Twitter.

When presenting the results of this research overview, we divide the studies between those investigating screen time (i.e., the time spent using digital media) and problematic use of digital media. What aspects that should be classified as problematic has been debated. However, problematic usage is often defined as experiencing some type of negative consequences on daily life functioning because of one's use of digital media.

In the latest, fifth version of the Diagnostical and Statistical manual for Mental Disorders (DSM-5; American Psychiatric Association, 2013) the disorder "Internet gaming Disorder (IGD)" was introduced. The 11th version of the International Classification of Disease (ICD-11; World Health Organization, 2018) includes a similar diagnosis referred to as "Gaming Disorder". The criteria for IGD includes both aspects related to excessive use (e.g., being preoccupied with gaming, experiencing withdrawal symptoms, having to play more and more to feel satisfied) and negative consequences of gaming (e.g., prioritizing gaming over hobbies, lying about the extent of one's gaming, jeopardizing important relations, studies or work because of gaming). Thus, excessive gaming can now be classified as a psychiatric disorder. Excessive social media use has so far not been recognized in any manual, but it has been argued (e.g., Burén et al., 2021; van der Eijnden et al., 2016) that the criteria presented above for IGD can also be used to classify individuals with Social Media Disorder (SMD).

Mental health problems

Mental health is an umbrella term for behaviors that can vary greatly in terms of both severity and duration. This includes both psychiatric symptoms (e.g., inattention, worry, anxiety, sleeping problems, hyperactivity, suicidal thoughts) and psychiatric disorders (e.g., ADHD, depression, schizophrenia, and anxiety disorder). For psychiatric disorders, a distinction is sometimes also made between psychiatric disorders/syndromes and neurodevelopmental disorders (Begrepp inom psykisk hälsa, 2020). The studies included in this review seldom focus on to what extent an individual meets the diagnostic criteria for a psychiatric disorder, but rather to what extent digital media leads to an increase in symptom levels.

Previous research has identified several mental health promoting factors. This includes for example sleep (Qwens & Weiss, 2017), exercise (Kremer et al.,

2014), social relations (Mushtaq, 2014) and academic achievement (Bücker et al., 2018). Unfortunately, research has also shown a decrease in these factors during the past years. There are for example studies showing that children sleep less and go to bed later now compared to 30 years ago (Norell-Clarke & Hagquist, 2017). There has also been a large increase in sedentary behavior and a corresponding decrease in physical fitness among both adults and adolescents (Ekblom-Bak et al., 2019; Raustorp & Fröberg, 2019).

Possible links between digital media and mental health

Previous studies have presented several different hypotheses for why digital media could be associated with mental health problems. Some of these focus on mental health in general whereas others try to explain why some individuals might have higher risk of developing a problematic use of digital media compared to others. It is important to note that these different hypotheses are not mutually exclusive – all of them could be correct. In addition, the same type of digital media use can have different effects on different individuals. These associations are very complex and a model for how different factors might be associated with one another are presented in Figure 1. The different factors included in the model are also explained in more detail below.
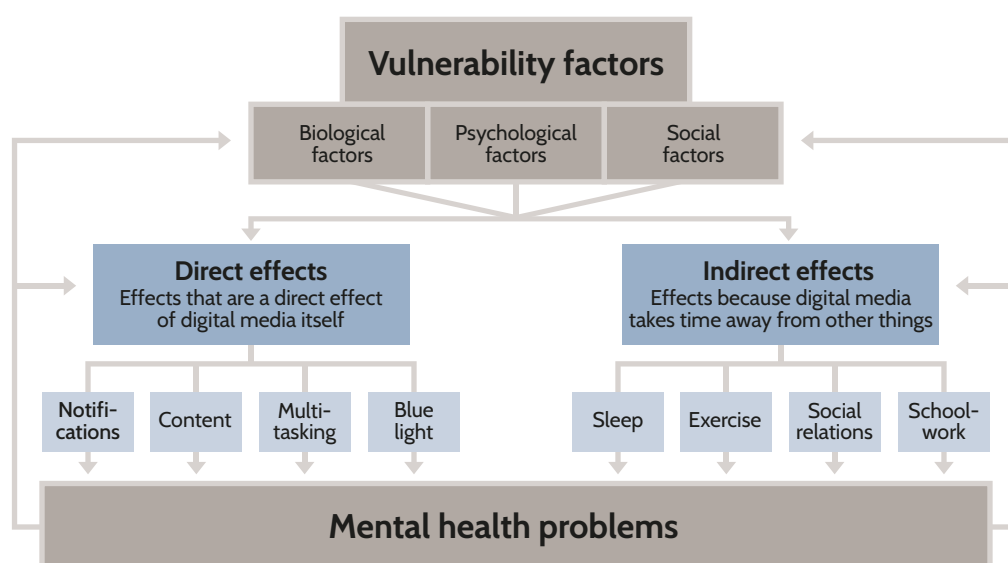

Figure 1. Overview of how digital media might influence mental health

Direct and indirect effects

Direct effects of digital media refer to effects because of the media technology, digital interaction, or the content that the individual is exposed to. Examples of this could be that violent content presented in computer games could possibly make an individual more aggressive, or that exposure to bullying or unrealistic beauty ideals could lead to low self-esteem or an unhealthy body image.

Indirect effects are sometimes also referred to as the "displacement hypothesis" (Neuman, 1988) as these effects are a result of the fact that digital media takes time from health promoting activities such as sleep, exercise, and social relationships. It is important to note that both direct and indirect effects can also be positive, such as when learning a new language because of social contacts, getting help from an online chatgroup or avoiding engagement in criminal behavior by staying at home and playing computer games.

Differential susceptibility

When investigating direct and indirect effects of digital media, the effects are often relatively small when studying mean values for a group. However, effects could be large for certain individuals. According to the "differential susceptibility to media effects model" (DSMM; Valkenburg & Peter, 2013), this can be explained by the fact that different people have different vulnerabilities. This can include biological vulnerability (e.g., genetics), psychological vulnerability (e.g., working memory deficits, emotion dysregulation), and social vulnerability (e.g., parenting, peers). Some individuals are more susceptible to developing problematic digital media use because these media offer something that is in line with their personal preferences. Factors contributing to starting to use digital media can also make it easier for an individual to become addicted to digital media. Thus, reinforcing negative spirals can develop in which vulnerable individuals start using digital media early or excessively, which in turn leads to increased vulnerability to mental health problems. Previous research (e.g., Beyens et al., 2018; Engelhard & Kollins, 2019) has for example shown that children with neurodevelopmental disorders such as ADHD are more attracted to computer games because these games offer fast tempo, regular reinforcements, and switches between different activities. These characteristics makes it easier for them to sustain their attention. However, using these games can also make it more difficult to sustain one's attention during more monotonous activities such as doing homework. Similarly, children with peer problems might seek social connections via the Internet, which could lead to less social practice, possibly exaggerating social difficulties over time.

Challenges in this research field

There are several challenges that are necessary to take into consideration when evaluating research related to digital media. First, huge technical advancements have been made within this area, making it difficult for researchers to keep up with this development. This is especially evident in longitudinal research in which children are studied over time, but when the follow-up is conducted several years later, the games available on the market are likely to be totally different compared to those available at the start of the study.

Another challenge is that many different definitions and measures are used within this field of research, making comparisons between studies difficult. Third, the statistical models used often assume linear relations (i.e., that a certain change in our digital media use leads to the same change in mental health regardless of whether the individual has a low or a high level at the start of the study). However, a more likely scenario is that a small increase from very low levels is not necessarily problematic, whereas a small increase when you already have high levels can cause relatively large effects. Previous research has even shown that low social media use is associated with less depression compared to no use, whereas high use is associated with high depression (Liu et al., 2016). Thus, associations are most likely non-linear.

A final challenge relates to the difficulty of conducting randomized controlled trials (RCT) in this area of research. This type of study design is considered necessary for determining causal interferences, but it requires that the participants are randomly assigned to a certain condition (e.g., some individuals would be allowed to use social media, and some would not be allowed to do so). Recruiting participants who are willing to abstain from using social media for even a shorter period of time is not possible today, which means that the RCT-design cannot be used in this area of research. An alternative to RCT:s is to use a longitudinal design. By investigating the association between digital media at time point 1 and an outcome (e.g., loneliness) at time point 2, while controlling for loneliness at time point 1, we can determine whether a change in the digital media activity is having a long-term effect on loneliness. If this type of association can be found, it provides a better support for a causal relation compared to cross-sectional studies. However, it has been emphasized that controlling for symptom levels at time point 1 constitutes a very strict control, especially if controlling for symptoms of neurodevelopmental disorders as they are very stable across time. It has therefore been argued (e.g., Adachi & Willoughby, 2015) that even a small effect of digital media on for example symptoms of ADHD should be considered clinically important if controlling for ADHD symptoms at time point 1.

Method

This research overview aims to investigate two different aspects: 1) associations between social media and mental health and 2) associations between digital media (i.e., both gaming and social media) and symptoms of ADHD and autism. The search terms are found below (Table 1).

Table 1. Search criteria for the review. The first research question includes all of the categories except "online games" and "neuropsychiatry". The second question included all categories except "mental health" and "LGBTQ".

Category	Search terms
Social media	"social media" OR "social network*" OR "digital media" OR "social platform*" OR facebook OR snapchat OR Instagram OR tiktok OR likes OR "screen time" OR "media exposure" OR "screen-based" OR "passive use" OR "active use" OR "likes"
Online games	gaming OR gamer OR gamification OR "computer game*" OR "video game*" OR "mobile game*" OR "internet game*" OR "online game*" OR IGD OR "first person shooter" OR "strategy game*" OR "multiplayer game*" OR "violent media" OR "screen-based"
Mental health	Emotional distress OR well-being OR mental well-being OR mental health OR life satisfaction OR depression OR anxiety OR clinical OR internalizing OR externalizing OR eating disorder OR eating disorders OR anorexia OR bulimia OR psychological OR symptoms OR addiction OR compulsive OR body image OR body image concerns OR body image disturbance OR body dissatisfaction OR body satisfaction weight dissatisfaction OR body shape dissatisfaction OR body shame OR body esteem
LGBTQ	HBTQ OR LGBTQ OR Gay OR Lesbian OR Transsexual OR Queer OR Bisexual OR Homosexual
Neuropsychiatry	neuropsychiatric OR adhd* OR "attention deficit*" OR "attention problem*" OR inattention OR hyperactiv* OR repetitive behavior*
Design	longitudinal OR predict* OR follow-up OR prospective OR subsequent OR directionality OR review OR meta-analysis OR longitudinal studies OR randomized controlled trials OR experimental OR association OR follow up
Age	adolescen* OR teen* OR youth* OR child* OR girl* OR boy* OR kid*

Inclusion and exclusion criteria

We searched for literature within two databases: Web of Science and PsychINFO. More specifically, the following inclusion criteria were used:

- Reviews, meta-analyses, longitudinal and experimental studies
- Publication year: January 2011 until March 2021
- Age of participants: 0–18 years
- Language: English
- Studies in international peer-review journals

PHOTO: SHUTTERSTOCK

Included articles

The searches done according to the above-mentioned criteria resulted in 998 studies, but many of these studies were shown to not meet the full inclusion criteria. The most common reasons for excluding a study were the following: 1) not including the correct outcome measure, 2) not including the correct age group and 3) having the wrong design (i.e., not being a longitudinal study, a meta-analysis, a review, or an experimental study).

Even after excluding the articles not meeting the full inclusion criteria, the number of articles for the first research question was still as high as 55 and a decision was therefore made to only include meta-analyses (n = 16). For the second research question, both reviews and meta-analyses (n = 18) were included. In addition, we included a total of 88 longitudinal and experimental studies. An overview of the number of articles for each theme is presented in Figure 2.

Total number of articles
found in the search
998

Excluded articles
876

Total number of included articles
Reviews = 34
Longitudinal/experimental
studies = 88

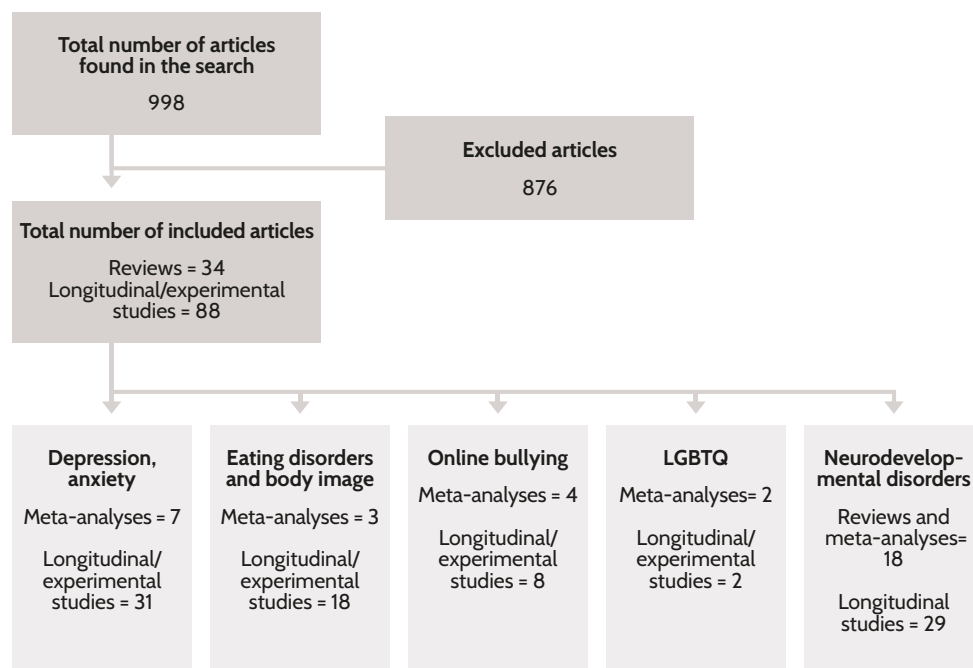| Depression, anxiety	Eating disorders and body image	Online bullying	LGBTQ	Neurodevelopmental disorders
Meta-analyses = 7	Meta-analyses = 3	Meta-analyses = 4	Meta-analyses= 2	Reviews and meta-analyses= 18
Longitudinal/experimental studies = 31	Longitudinal/experimental studies = 18	Longitudinal/experimental studies = 8	Longitudinal/experimental studies = 2	Longitudinal studies = 29

Figure 2. Overview of the studies included in this research overview

Results

Social media in relation to mental health problems

Meta-analyses

The overarching conclusion from several meta-analyses is a negative association between the time spent on social media and mental health issues such as depression, loneliness, low self-esteem, or poor wellbeing (Huang, 2017; Ivie et al. 2020; Appel et al. 2020; McCrae et al., 2017). The size of the effect is small (around r = 0.1) and the studies generally exhibit a large heterogeneity. Larger negative effects are observed in studies of individuals that use social media in a problematic or addictive manner (r = 0.34) (Marino et al., 2018). In addition, the association to mental health issues is significantly greater for problematic use (r = 0.29) compared with other measures of use, such as time (r = 0.11) or intensity (r = 0.09) (Cunningham et al., 2021). Together this highlights that it is not primarily the time spent on social media that is the best indicator of an elevated risk for mental health problems, but rather the degree of addictive characteristics when using social media. A meta-analysis reported that psychiatric conditions were present in 8 out of the 9 studies investigating problematic social media use, with the most common problems being depression and anxiety disorders (Hussain & Griffiths, 2018). In other words, problematic use of social media seems to be related to mental health issues, but whether social media use is a manifestation of poor mental health or the cause of it is not possible to conclude from these cross-sectional studies.

> **It is not primarily the time spent on social media that is the best indicator of an elevated risk for mental health problems, but rather the degree of addictive characteristics when using social media**

Longitudinal and experimental studies

The search resulted in 26 longitudinal and five experimental studies that matched the inclusion criteria. The main findings from the meta-analyses of a small association between time spent on social media and mental health issues were replicated in the majority of the studies. However, a few of the longitudinal studies drew different conclusions possibly due to different analyses, number of covariates included, or outcome measures used. Several studies reported that the time spent or frequency of social media use at the first measurement point predicted a decline in mental wellbeing at a later time point (Boers et al., 2019; Frison & Eggermont, 2017; Kross et al., 2013; Orben et al., 2019, Riehm et al., 2019; Thorisdottir et al., 2020; Twigg et al., 2020; Viner et al., 2019). However, a few other studies did not report such a relation (Beeres et al., 2021; Coyne et al., 2019a; Jensen et al., 2019; Keresteš & Štulhofer, 2020). A possible explanation for differences between studies

could be that the relation is often assumed to be linear, but it is more likely that negative effects occur only after a certain threshold of use. In support of this reasoning, Twigg et al (2020) reported no relation to life satisfaction for active interaction on social media when used for less than three hours/day. However, use exceeding this threshold was related to lower life satisfaction over time. Studies using ecological momentary assessments, where the user responds to a few questions at random intervals throughout the day (six times/day for two weeks), reported that social media use predicted lower wellbeing and was mediated by either social comparison, self-esteem, and rumination (Faelens et al., 2021) or feelings of loneliness (Kross et al., 2013).

Specific activities on social media

Several studies support the notion that active interaction with friends on social media using for example direct messaging can improve mood (Yau et al. 2021), self-esteem (Valkenburg et al. 2017) and is associated with fewer depression symptoms (George et al., 2018; Jensen et al., 2019). On the contrary, passive use has been shown the be associated with more negative emotions (Fardouly et al., 2015) and loneliness (Frison & Eggermont, 2020). In a series of experimental studies, receiving fewer "likes" than others was shown to cause more negative feelings, self-critical thoughts about social worth, and more feelings of being excluded (Lee et al. 2020; Timeo et al., 2020).

Other factors of importance

With regards to indirect effects, a few studies support the hypothesis that effects from social media on mental health can be explained by displacement from health promoting activities. More specifically, two longitudinal studies found that being tired of school was related to more problematic use of social media and risk of depression and that the effect was reciprocal (Li et al. 2018; Salmela-Aro et al., 2017). Other studies have reported that time spent on social media predicted worse school performance and more school related anxiety (van den Eijnden et al., 2018, Vannucci & Ohannessian, 2019). A study by Viner et al (2019) reported that the relation between social media and symptoms of depression in girls could at least partly be explained by lack of sleep, sedentary behavior and being victimized online. However, Boers et al (2019) did not find support for lack of exercise to explain the relation between social media and depression, but rather concluded that their findings can be explained in terms of social comparison and reinforcing spirals. Further support that social media can reinforce existing mental health issues are presented in several studies (Boers et al 2019; Li et al., 2018), for instance by poor emotional regulation leading to more problematic social media use and mental health issues (Chiang et al., 2019; Coyne et al., 2019b; George et al., 2018). Another study showed that for introvert individuals, social media is used to compensate for the lack of offline social contacts, which reinforces symptoms of depression (Zhou et al., 2020). Another explanatory path between problematic use of social media and depression includes social media fatigue (Dhir et al., 2018).

Sex and age

Most, but not all studies (Riehm et al., 2019) investigating sex differences have reported a stronger relation between time spent on social media and mental health issues for girls than boys (Booker et al., 2018; Orben et al., 2019; Thorisdottir et al., 2020; Twigg et al., 2020; Viner et al., 2019). A few studies have reported a stronger relation between mental health issues and problematic use of social media in boys (Nesi et al., 2017; van den Eijnden et al., 2018). Regarding evidence of specific effects of age, some studies find support for a stronger effect in 14-year-olds (Thorisdottir et al. 2020), while others in 16–18-year-olds (Salmela-Aro et al., 2017), and other studies not detecting any effect of age (Vannuccci & Ohannessian, 2019; Twigg et al., 2020).

In summary, the literature points to a small negative relation between time spent on social media and the development of mental health issues in youth. Studies investigating problematic use of social media generally report stronger effects compared to those investigating time spent on social media. These effects seem to interact with other factors in life such as school performance, sleep, personality, existing mental health problems, sex, and possibly age. Using social media actively with close friends seems to have a positive effect on mental health, whereas passive use seems to be associated with negative effects.

> **Using social media actively with close friends seems to have a positive effect on mental health, whereas passive use seems to be associated with negative effects.**

Social media in relation to eating disorders and negative body image

Meta-analyses

Given that a large portion of the images shared on social media are enhanced and do not necessarily depict people in a realistic manner, there has been a substantial amount of research on the topic of how social media affects body image and eating disorders.

Results point to a relation between time spent on social media and internalization of a thin beauty ideal for girls in one meta-analysis (Mingoia et al. 2017) and for a more negative body image in both sexes in another (Saiphoo & Vahedi, 2019). Both reviews highlight activities focusing on appearance, editing images, and taking selfies as especially related to negative effects. A meta-analysis of experimental studies that has investigated exposure to images depicting thin beauty ideals in healthy controls and individuals with an eating disorder report effects on symptoms of depression, negative body image and negative affect in both groups (Hausenblas et al., 2013). The effects were larger in the eating disordered group and in individuals at risk for developing eating disorders.

Longitudinal and experimental studies

All of the longitudinal (n = 8) and experimental (n = 10) studies report a relation between social media and body image. Specifically, the longitudinal studies report that for both boys and girls, time spent on social media predicts more internalizing of the thin beauty ideals, self-objectification (Vandenbosch & Eggermont, 2016), scrutiny of other people's bodies (Skowronski et al., 2021), body dissatisfaction (Vries et al., 2016) and willingness to undergo plastic surgery (Vries et al., 2014). Initial reports from the American ABCD study showed that for every extra hour spent on social media for 9–10-year-olds there is a 1.6 times increased risk for developing binge-eating disorder (Nagata et al. 2021). For experimental studies of girls and young women, upward social comparison (i.e., comparing oneself to people with desirable looks) is a central aspect (Fardouly et al., 2015; Hogue & Mills, 2019; Kleemans et al., 2018; Tiggemann & Zaccardo, 2015). Studies also show that exposure to one's own feed, or even a few beauty ideal images in an otherwise mixed social media feed, leads to worse mood and body concern and dissatisfaction compared to a feed without such images (Cohen et al., 2019; Mabe et al., 2014; Rounds & Stutts, 2021). Simply taking a "selfie" led to increased anxiety, lower self-confidence and feeling less attractive compared with a control group who instead read an article (Mills et al., 2018).

Body positive images on the other hand were shown to increase mood and body satisfaction, although this still increased self-objectification compared with looking at nature images (Cohen et al., 2019). A group being exposed to enhanced images experienced more negative effects on body image compared with a group exposed to the same original images (Kleemans et al., 2018). Labeling images as enhanced or not, did not make a difference in the effects on body image between conditions (Tiggemann et al. 2014). However, critically reflecting on beauty ideals was shown to partially mitigate the negative effects from viewing beauty images in another study (Kiefner-Burmeister et al., 2018).

All the studies investigating both sexes reported that girls both used social media more and had a more negative body image than boys (Vries et al., 2014, 2016; Skowronski et al., 2021; Vandenbosch & Eggermont, 2016), but only one study found a significant interaction of sex (Vandenbosch & Eggermont, 2016). In a study of young women with an eating disorder, exposure to beauty ideals (as measured with ecological momentary assessments for two weeks) was related to more disordered eating behaviors (i.e., vomiting, binge eating), which was mediated by the stress response evoked from the images (White et al., 2016). Similar findings were reported in a study of women without eating disorders where exposure to images with thin beauty ideals predicted a worse body image and more eating disordered behaviors at the follow-up assessment (Wyssen et al., 2020).

In summary there is relatively strong evidence for a negative causal effect of exposure to thin beauty ideals on social media and body dissatisfaction, negative affect and eating disordered behaviors.

Social media in relation to online bullying

Meta-analyses
Another aspect regarding direct effects of social media on mental health problems concerns cyberbullying. Meta-analyses report a clear negative association between being victimized online and both internalizing and externalizing problems (Fisher et al., 2016). Risk factors for being subjected to online bullying include using the internet in a risky manner (e.g. posting private information, images or accepting friend requests from strangers) and being bullied in school (Chen et al., 2017). There is a larger overlap between being exposed to bullying online and exposing others in comparison to being physically bullied (Aboujaoude et al., 2015; Selkie et al., 2016).

Longitudinal and experimental studies
Eight longitudinal or experimental studies were identified investigating associations between being subjected to online bullying and mental health. Consistent findings support a relation between previous victimization online and the development of a more negative self-image (Cole et al., 2016) and depression (Cole et al., 2016; Rosenthal et al., 2016). In one study the relation applied specifically to girls (Viner et al. 2019). Several other studies also report this association but also a reciprocal relation where mental health problems also predict being subjected to more bullying over time (Frison et al., 2016; Gámez-Gaudix et al., 2013; Rose & Tynes, 2015). In terms of investigating explanations for bullying others, one study found an association with insufficient sleep via increased anger (Erreygers et al., 2019). One study reported that girls and older adolescents get more negatively affected by physical bullying, which is then manifested as increased appearance anxiety and body concern online (Zimmer-Gembeck et al., 2021). However, another study of online bullying did not find any sex or age differences (Cole et al. 2016). An experimental study found that those previously subjected to online bullying were more negatively affected by receiving fewer likes than others (Lee et al., 2020).

Social media and LGBTQ

Meta-analyses
Studies on individuals identifying as lesbian, gay, bisexual, trans- and queer (LGBTQ) show that depression is twice as common compared with heterosexual peers which signifies that this is a vulnerable group. While social media can both be a platform on which to receive social support, it can also be a place where one is subjected to online bullying. Meta-analyses report that online bullying via social media is related to increased risk of depression and suicide (Escobar-Viera et al., 2018) but also a more negative body image, isolation, and worse school performance in LGBTQ-individuals (Abreu & Kenny, 2018).

Longitudinal studies

Only two longitudinal studies investigated LGBTQ-individuals. One of them reported fewer symptoms of depression at the end of a mobile free camp for those who had used social media excessively two months prior compared to those who did not use social media as much (Gillig, 2020). The other study reported that support on social media partially mitigated the development of depression two months later (Pellicane et al., 2021).

In summary, there is a great need for further studies investigating the role of social media in the mental health of LGBTQ-individuals. The current literature shows that social media can be both an important platform for social support and an arena for online bullying, which can be detrimental for this already vulnerable group.

Digital media and neurodevelopmental disorders

Digital media and ADHD: Reviews and meta-analyses

All included reviews and meta-analyses showed a significant association between digital media and ADHD. For example, several reviews (e.g., Carli et al., Ho et al., 2014; Karaca et al., 2017; Wang et al., 2017) showed a higher prevalence of ADHD among individuals who meet the criteria for some form of problematic use of digital media (most often defined as Internet Gaming Disorder but links have also been found to digital media more in general). When investigating ADHD symptoms rather than ADHD diagnosis, results are less clear. Ferguson and Ceranoglu (2014) found that effects were significant, but small, whereas another study (Suchert et al., 2015) found strong associations. Nikkelen et al. (2014) concluded that associations are small but that this is a result of the fact that most studies have statistically controlled for relevant variables such as sex, age, and upbringing (thus eliminating their influence on the relation) rather than used these variables as moderators (which would have determined their influence on the relation). This means that effects could be small in general, but large for certain subgroups. Similar conclusions are drawn in the two most recent reviews within this area of research (Beyens et al., 2018; Engelhard & Kollins, 2019).

> **Effects could be small in general, but large for certain subgroups**

Digital media and ADHD: Longitudinal studies

There are still only a limited number of studies examining the link between digital media and ADHD or vice versa. Altogether, we were only able to locate 27 studies published during the last ten years and all of them examined ADHD symptom levels in non-clinical samples rather than ADHD diagnosis. However, this is an increasingly expanding research area, which is demonstrated by the fact that almost half of the studies were published during 2020 or the first three months of 2021. The results vary substantially

depending on the direction of effects that is studied (i.e., digital media in relation to later ADHD symptom levels or the opposite) and the type of digital media (i.e., screen time or problematic use).

Digital media in relation to later ADHD symptom levels
Regarding the link between digital media and later ADHD symptoms, nine studies investigating screen time in general found a significant association (Allen et al., 2015; Barlett et al., 2012; Beyens et al., 2020; Gentile et al., 2012; Hetherington et al., 2020; Liu et al, 2021; Parkes et al., 2013; Poulain et al., 2018; Ra et al., 2018). However, four studies failed to find significant associations and these results could possibly be attributed to the fact that at least some of these studies (e.g., Niranen et al., 2020) included very young children with a limited number of children using digital media more than a few minutes per day. Studies investigating screen time for violent media content usually did not find relations to later ADHD symptom levels (e.g., Ferguson & Wang, 2021; Gentile et al., 2012).

In addition to time spent on digital media, there are longitudinal studies investigating problematic use of digital media in relation to later ADHD symptom levels. Generally, these studies show stronger associations compared to those investigating screen time and ADHD. However, there are some mixed findings. For example, Hygen et al. (2020), found that symptoms of IGD at age 10 were related to ADHD symptoms at age 12 but not age 14. One study (Boer et al., 2020) also found a significant association between problematic use of social media and later symptoms of inattention, but not hyperactivity/impulsivity.

ADHD symptom levels in relation to later digital media
ADHD symptom levels have been shown to be related to both screen time in general (Gentile et al., 2012; Männikkö et al., 2020) and screen time for violent media (Beyens et al., 2020; Rydell et al., 2021). However, there are also studies failing to find significant associations between ADHD symptoms and later digital media use (Baumgarten et al., 2020; Boer et al., 2019; Chen et al., 2015; Gentile et al., 2012; Poulain et al., 2018, 2019).

Regarding studies investigating ADHD symptoms in relation to later problematic use of digital media, all longitudinal studies published during the last decade have found significant associations. However, some of these studies only found effects for "between-subject analyses" and not for "within-subject analyses" (Hygen et al., 2020).

Digital media and autism
The results of reviews and meta-analyses show that children with autism spectrum disorders (ASD) watch TV/movies and play games more than children without this disorder, but they use social media less often (Lane & Radsky, 2019; Slobodin et al., 2019, Stiller & Mößle, 2018). These findings are likely explained by the fact that games and TV demand less of executive function skills and social interactions, which children with ASD often have problems with. In addition, games can be repetitive and predictable, which is also especially attractive for children with ASD. One study (Stiller

& Mößle, 2018) also showed that children with ASD more often use digital media in a more passive way (e.g., do not play games with others, scroll social media sites without posting material themselves). This could be regarded as problematic as there is research showing that passive social media use has more negative consequences compared to more active use (Thorisdottir et al., 2019). One study also showed that children with ASD who use social media have better peer relations compared to those who do not use social media (Kuo et al., 2014). It has also been shown that children with ASD have an increased risk of being victims of online sexual harassment (Maïano et al., 2016). Finally, one study showed that compared to children without ASD, children with this disorder more often watch media content that is not appropriate for their age, more often watch digital media without an adult, and start using digital media at an earlier age compared to children without ASD (Slobodin et al., 2019). We were only able to locate three longitudinal studies investigating links in either direction between ASD and digital media use (Chen et al., 2015; Heffler et al., 2020; Liu et al., 2017). These studies showed contradicting findings, making it impossible to draw any conclusions.

Discussion

The results of this research overview show that time spent using digital media can explain a small part of the increase in mental health problems. However, mental health problems are more strongly related to how digital media is used and to what extent the use can be considered problematic (i.e., addictive). We also found support for the notion that individuals already suffering from mental health problems will be more negatively affected by increasing their time spent on digital media use compared to others (e.g., Boers et al., 2019; Li et al, 2018). Thus, the use of digital media can lead to negative reinforcing spirals. This may be particularly important to prevent in groups exhibiting a higher vulnerability to mental health issues, such as LGBTQ individuals and children with neuropsychiatric disorders such as ADHD and ASD. With regard to social media, effects appear to be stronger for girls compared to boys and possibly also for older compared to younger children (e.g., Salmela-Aro et al, 2017; Thorisdottir et al., 2020, Twigg et al., 2020) although more studies are needed to specify any particularly sensitive ages. In one study, later cohorts who had been using digital media during most of their upbringing showed larger effects compared to earlier cohorts, possibly suggesting that effects accumulate over time (Twigg et al., 2020).

The results that stand out in this review are those from experimental studies of young women (e.g., Cohen et al., 2019; Mabe et al., 2014; Rounds & Stutts, 2021) showing how thin beauty ideals reproduced via social media platforms consistently show negative causal effects on outcomes related to body dissatisfaction, mood, and weight/shape concerns. Longitudinal studies extend these findings to show that time spent on social media was related to body dissatisfaction in both sexes (e.g., Vries et al., 2016) as well as more eating disordered behavior (e.g., Nagata et al., 2021). The effects were generally larger in girls, possibly due both to their more extensive use of social media and the societal pressure to be viewed as attractive being more prominent for girls than for boys.

We have found support both for direct negative effects of digital media on mental health through for example online-bullying and exposure to beauty ideals and also support for indirect effects via challenges with academic performance (e.g., Salmela-Aro et al., 2017), insufficient sleep (e.g., Viner et al., 2019) possibly further explaining the apparent reinforcing spirals of social media on individuals already suffering from mental health problems. As for specific aspects of use, social media platforms can be a positive arena when used for sending text message to close friends and family (see table 2). On the other hand, passively viewing, socially comparing, body objectifying and interacting through low quality interactions (e.g., likes) generally seems to have a net negative effect on youth mental health. Unfortunately, as social media companies do not share their data for objective academic research, there is no publicly available data to inform of the ratios between these types of usages in youth.

Table 2. Summary of specific social media use and their associations with mental health outcomes.

Interaction on sociala media	Effect	Reference
Direct messaging	+ (-)	George, 2018; Jensen, 2019; Yau, 2021; Nagata, 2021 (-)
Interaction with friends and family	+	Valkenburg 2017, Hogue 2019
Interaction with connections in the social periphery	-	Valkenburg 2017, Hogue 2019
More than 2–3 hours/day	-	Twigg 2020, Liu 2016
Receiving social support	+	Pellicane, 2021, Frison 2016
Exposure to beauty/thin/fitspiration ideals	-	Cohen, 2019; Kiefner-Burmeister, 2018; Tiggeman, 2014; Tiggeman, 2015; Vandenbosch, 2016; White, 2016; Wyssen, 2020, etc
Exposure to sexualized characters in games and on Instagram	-	Skowronski, 2021; Vandenbosch 2016
Body positive images	+ (-)	Cohen, 2019 (- = objectification)
Nature images	+	Tiggemann, 2015; Cohen, 2019
Receiving likes and seeing the number of likes others got	-	Lee 2020; Timeo, 2020; Wallace, 2021
Passive scrolling	-	Frison, 2017; Frison, 2020
Online bullying/harassment	-	Rose, 2015; Rosenthal, 2016; Viner, 2019
Coping strategies		
Reflecting on body ideals	+	Kiefner-Burmeisiter, 2018
Think about a close relationship after a negative experience on social media	+	Timeo, 2020
Moral reflection or pause before posting something negative on social media	+	Van Royen, 2017
Parental engagement	+	Chen, 2017; Keresteš, 2020; Thorisdottir, 2020; Twigg, 2020

With regard to neurodevelopmental disorders there is a clear association between digital media use and both symptoms of ADHD and ASD. However, the results are mixed regarding the direction of effects. The longitudinal studies with ADHD symptoms investigating both directions suggest possible reciprocal effects. That is, individuals with high levels of ADHD symptoms tend to use digital media more excessively which over time tends to increase symptom levels in a manner of reinforcing negative spirals. The characteristics of individuals with ADHD (e.g., difficulties inhibiting impulses, sustaining attention, and building social connections) in combination with the design principles used in digital games make them more vulnerable to developing a problematic or even addictive use. It is therefore of utmost importance that families with children that are diagnosed with ADHD receive preventive additional support in how to manage digital media use in a balanced way. Studies investigating children with ASD show greater use of computer games but lower use of social media than for children without ASD. However, there is a great need for further studies investigating longitudinal effects. While many families report digital media to be an important positive activity for their children, research shows that the risk of excessive or addictive use is considerable and the key to healthy use is balance, which warrants preventive support for families with children diagnosed with ADHD and ASD.

> **The key to healthy use is balance, which warrants preventive support for families with children diagnosed with ADHD and ASD.**

Future research

As mentioned in the introduction, this research field has many challenges, and this research overview further emphasizes that there are a number of factors that need to be addressed in future studies in order to better understand the complex associations between digital media and mental health problems. First, we need to know more about underlying mechanisms. Second, we need to investigate non-linear associations and moderators in order to identify both threshold effects and subgroups of individuals that are most at risk. This should be considered crucial as many psychiatric disorders are highly heterogeneous (i.e., individuals with the same disorder show a wide range of challenges and strengths) and may thus need individualized support. Third, in this overview, we have limited our search to only include the most common effects of digital media. However, we would like to acknowledge findings from University of Gothenburg (i.e., the PRISE study) showing that 46 % of children in grade 4 had been sexually harassed by peers via digital media. This is an area of research that needs to be investigated further. Finally, we feel that it should be considered important

to conduct more research focusing on how infants and toddlers are influenced by digital media, both in terms of their own and their parents' use of digital media. We need to know more about how to best create healthy digital habits at an early age. This is of utmost importance as available research points to digital media having a negative effect on young children in terms of for example language development, emotion regulation and parent–child attachment (e.g., Kildare & Middlemiss 2017; Madigan et al., 2020), which are important predictors for future mental health.

Concluding comments

This research overview clearly shows that there is evidence of associations between digital media and mental health problems. However, effects vary between individuals, with some being at much higher risk compared to others. We need more research concerning the underlying mechanisms of digital media addiction to better identify individuals at risk of developing a problematic use and to develop better prevention and intervention options. As associations between digital media are complex, we need to involve many different stake holders that are important in children's lives (i.e., parents, schools, authorities, and the health care sector). Firstly, we need to minimize the negative impact caused by direct effects of being subjected to bullying and exposed to unhealthy beauty ideals. Secondly, we need to ensure that digital media are used in balance with – rather than at the expense of – other health promoting factors such as sleep, exercise, schoolwork, and social relationships. Finally, we think that it is important for relevant authorities to develop evidence-based guidelines for parents and schools to strengthen child- and adolescent mental health and this should include recommendations on how to develop healthy digital media habits.

> **We need more research concerning the underlying mechanisms of digital media addiction to better identify individuals at risk of developing a problematic use and to develop better prevention and intervention options.**

References

Aboujaoude, E., Savage, M. W., Starcevic, V., & Salame, W. O. (2015). Cyberbullying: Review of an Old Problem Gone Viral. *The Journal of Adolescent Health, 57*(1), 10–18.

Abreu, R. L., & Kenny, M. C. (2018). Cyberbullying and LGBTQ Youth: A Systematic Literature Review and Recommendations for Prevention and Intervention. *Journal of Child & Adolescent Trauma, 11*(1), 81–97.

Adachi, P., Willoughby T (2015). Interpreting effect sizes when controlling for stability effects in longitudinal autoregressive models: Implications for psychological science. *European Journal of Developmental Psychology 12*(1):116-128.

Allen, M. S., & Vella, S. A. (2015). Screen-based sedentary behaviour and psychosocial well-being in childhood: Cross-sectional and longitudinal associations. *Mental Health and Physical Activity, 9*, 41–47.

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Author.

Appel, M., Marker, C., & Gnambs, T. (2020). Are Social Media Ruining Our Lives? A Review of Meta-Analytic Evidence. *Review of General Psychology, 24* (1), 60–74.

Barlett, N. D., Gentile, D. A., Barlett, C. P., Eisenmann, J. C., & Walsh, D. A. (2012). Sleep as a mediator of screen time effects on US children's health outcomes: *A prospective study. Journal of Children and Media, 6* (1), 37–50.

Beeres, D. T., Andersson, F., Vossen, H. G. M., & Galanti, M. R. (2021). Social Media and Mental Health Among Early Adolescents in Sweden: A Longitudinal Study With 2-Year Follow-Up (KUPOL Study). *The Journal of Adolescent Health, 68*(5), 953–960.

Begrepp inom området psykisk hälsa (2020) Socialstyrelsen, Folkhälsomyndigheten & SKR https://skr.se/download/18.4d3d64e3177db55b1663b360/1615533855867/PM_Begrepp-inom-omradet-psykisk-halsa.pdf

Beyens, I., Piotrowski, J. T., & Valkenburg, P. M. (2020). Which Came First? Assessing Transactional Relationships Between Children's Violent Media Use and ADHD-Related Behaviors *Communication Research, 47*(8), 1228-1245.

Beyens I., Valkenburg PM., Piotrowski JT. (2018) Screen media use and ADHD-related behaviors: Four decades of research. *Proceedings of the National Academy of Sciences, 115*, 9875-9881.

Boer, M., Stevens, G., Finkenauer, C. and van den Eijnden, R. (2020), Attention Deficit Hyperactivity Disorder-Symptoms, Social Media Use Intensity, and Social Media Use Problems in Adolescents: Investigating Directionality. *Child Development, 91*: e853-e865.

Boers, E., Afzali, M. H., Newton, N., & Conrod, P. (2019). Association of screen time and depression in adolescence. *JAMA pediatrics, 173*(9), 853-859.

Booker, C. L., Kelly, Y. J., & Sacker, A. (2018). Gender differences in the associations between age trends of social media interaction and well-being among 10-15 year olds in the UK. *BMC Public Health, 18*(1), 321.

Burén J, Nutley SB, Sandberg D, Ström Wiman J, Thorell LB (2021). Gaming and Social Media Addiction in University Students: Sex Differences, Suitability of Symptoms, and Association With Psychosocial Difficulties. *Frontiers in Psychiatry 12*:740867.

Bücker, S., Nuraydin S, Simonsmeier BA, Schneider M, Luhmann M (2018). Subjective well-being and academic achievement: A meta-analysis. *Journal of Research in Personality, 74*, 83-94.

Carli, V., Durkee T, Wasserman D, et al. (2013). The association between pathological internet use and comorbid psychopathology: a systematic review. *Psychopathology, 46*, 1-13.

Chen, Y. L., Chen, S. H., & Gau, S. S. (2015). ADHD and autistic traits, family function, parenting style, and social adjustment for Internet addiction among children and adolescents in Taiwan: a longitudinal study. *Research in developmental disabilities, 39*, 20–31.

Chen, L., Ho, S. S., & Lwin, M. O. (2017). A meta-analysis of factors predicting cyberbullying perpetration and victimization: From the social cognitive and media effects approach. *New Media & Society, 19*(8), 1194–1213.

Chiang, J.-T., Chang, F.-C., Lee, K.-W., & Hsu, S.-Y. (2019). Transitions in smartphone addiction proneness among children: The effect of gender and use patterns. *PloS One, 14*(5), e0217235.

Cohen, R., Fardouly, J., Newton-John, T., & Slater, A. (2019). #BoPo on Instagram: An experimental investigation of the effects of viewing body positive content on young women's mood and body image. *New Media & Society, 21* (7), 1546–1564.

Cole, D. A., Zelkowitz, R. L., Nick, E., Martin, N. C., Roeder, K. M., Sinclair-McBride, K., & Spinelli, T. (2016). Longitudinal and Incremental Relation of Cybervictimization to Negative Self-Cognitions and Depressive Symptoms in Young Adolescents. *Journal of Abnormal Child Psychology, 44*(7), 1321–1332.

Coyne, S. M., Rogers, A. A., Zurcher, J. D., Stockdale, L., & Booth, M. (2019a). Does time spent using social media impact mental health?: An eight year longitudinal study. *Computers in Human Behavior, 106160.*

Coyne, S. M., Padilla-Walker, L. M., Holmgren, H. G., & Stockdale, L. A. (2019b). Instagrowth: A Longitudinal Growth Mixture Model of Social Media Time Use Across Adolescence. *Journal of Research on Adolescence, 29*(4), 897–907.

Cunningham, S., Hudson, C. C., & Harkness, K. (2021). Social Media and Depression Symptoms: a Meta-Analysis. *Research on Child and Adolescent Psychopathology, 49*(2), 241–253.

Dhir, A., Yossatorn, Y., Kaur, P., & Chen, S. (2018). Online social media fatigue and psychological wellbeing—A study of compulsive use, fear of missing out, fatigue, anxiety and depression. *International Journal of Information Management, 40*, 141–152.

Engelhard MM., Kollins SH. (2019) The Many Channels of Screen Media Technology in ADHD: a Paradigm for Quantifying Distinct Risks and Potential Benefits. *Current Psychiatry Reports, 21*, 90.

Ekblom-Bak, E., Ekblom, Ö., Andersson, G., Wallin, P., Söderling, J., Hemmingsson, E., & Ekblom, B. (2019). Decline in cardiorespiratory fitness in the Swedish working force between 1995 and 2017. Scandinavian Journal of Medicine & Science in Sports, 29(2), 232–239.

Erreygers, S., Vandebosch, H., Vranjes, I., Baillien, E., & De Witte, H. (2019). The Longitudinal Association Between Poor Sleep Quality and Cyberbullying, Mediated by Anger. *Health Communication, 34*(5), 560–566.

Escobar-Viera, C. G., Whitfield, D. L., Wessel, C. B., Shensa, A., Sidani, J. E., Brown, A. L., … & Primack, B. A. (2018). For better or for worse? A systematic review of the evidence on social media use and depression among lesbian, gay, and bisexual minorities. *JMIR mental health, 5*(3), e10496.

Faelens, L., Hoorelbeke, K., Soenens, B., Van Gaeveren, K., De Marez, L., De Raedt, R., & Koster, E. H. W. (2021). Social media use and well-being: A prospective experience-sampling study. *Computers in Human Behavior, 114,* 106510).

Fardouly, J., Diedrichs, P. C., Vartanian, L. R., & Halliwell, E. (2015). Social comparisons on social media: The impact of Facebook on young women's body image concerns and mood. *Body Image, 13*, 38–45.

Ferguson, C. J., & Ceranoglu, T. A. (2014). Attention problems and pathological gaming: resolving the 'chicken and egg' in a prospective analysis. *The Psychiatric quarterly, 85*(1), 103–110.

Ferguson, C. J., & Wang, C. (2021). Aggressive Video Games Are Not a Risk Factor for Mental Health Problems in Youth: A Longitudinal Study. *Cyberpsychology, behavior and social networking, 24*(1), 70–73.

Fisher, B. W., Gardella, J. H., & Teurbe-Tolon, A. R. (2016). Peer Cybervictimization Among Adolescents and the Associated Internalizing and Externalizing Problems: A Meta-Analysis. *Journal of Youth and Adolescence, 45*(9), 1727–1743.

Folkhälsomyndigheten [the Public Health Agency of Sweden] (2018) Skolbarns hälsovanor i Sverige 2017/18 Grundrapport. https://www.folkhalsomyndigheten.se/contentassets/53d5282892014e0fbfb3144d25b49728/skolbarnshalsovanor-2017-18-18065.pdf

Frison, E., & Eggermont, S. (2017). Browsing, Posting, and Liking on Instagram: The Reciprocal Relationships Between Different Types of Instagram Use and Adolescents' Depressed Mood. Cyberpsychology, *Behavior and Social Networking, 20*(10), 603–609.

Frison, E., & Eggermont, S. (2020). Toward an Integrated and Differential Approach to the Relationships Between Loneliness, Different Types of Facebook Use, and Adolescents' Depressed Mood. *Communication Research, 47* (5), 701–728.

Frison, E., Subrahmanyam, K., & Eggermont, S. (2016). The Short-Term Longitudinal and Reciprocal Relations Between Peer Victimization on Facebook and Adolescents' Well-Being. *Journal of Youth and Adolescence, 45*(9), 1755–1771.

Gentile, D. A., Swing, E. L., Lim, C. G., & Khoo, A. (2012). Video game playing, attention problems, and impulsiveness: Evidence of bidirectional causality. *Psychology of Popular Media Culture, 1* (1), 62–70.

George, M. J., Russell, M. A., Piontak, J. R., & Odgers, C. L. (2018). Concurrent and Subsequent Associations Between Daily Digital Technology Use and High-Risk Adolescents' Mental Health Symptoms. *Child development, 89*(1), 78–88.

Gillig, T. K. (2020). Longitudinal analysis of depressive symptoms among LGBTQ youth at a social media-free camp. *Journal of Gay & Lesbian Mental Health, 24* (4), 360–374.

Hausenblas, H. A., Campbell, A., Menzel, J. E., Doughty, J., Levine, M., & Thompson, J. K. (2013). Media effects of experimental presentation of the ideal physique on eating disorder symptoms: a meta-analysis of laboratory studies. *Clinical psychology review, 33*(1), 168–181. https://doi.org/10.1016/j.cpr.2012.10.011

Heffler, K. F., Sienko, D. M., Subedi, K., McCann, K. A., & Bennett, D. S. (2020). Association of Early-Life Social and Digital Media Experiences With Development of Autism Spectrum Disorder–Like Symptoms. *JAMA Pediatrics, 174* (7), 690. https://doi.org/10.1001/jamapediatrics.2020.0230

Hetherington, E., McDonald, S., Racine, N., & Tough, S. (2020). Longitudinal Predictors of Self-Regulation at School Entry: Findings from the All Our Families Cohort. *Children (Basel, Switzerland), 7*(10), 186.

Ho, RC., Zhang MWB., Tsang TY., et al. (2014). The association between internet addiction and psychiatric co-morbidity: a meta-analysis. *BMC Psychiatry, 14*:183.

Hogue, J. V., & Mills, J. S. (2019). The effects of active social media engagement with peers on body image in young women. *Body Image, 28*, 1–5.

Huang, C. (2017). Time Spent on Social Network Sites and Psychological Well-Being: A Meta-Analysis. Cyberpsychology, *Behavior and Social Networking, 20*(6), 346–354.

Hussain, Z., & Griffiths, M. D. (2018). Problematic Social Networking Site Use and Comorbid Psychiatric Disorders: A Systematic Review of Recent Large-Scale Studies. *Frontiers in Psychiatry, 9*, 686.

Hygen, B. W., Skalická, V., Stenseng, F., Belsky, J., Steinsbekk, S., & Wichstrøm, L. (2020). The co-occurrence between symptoms of internet gaming disorder and psychiatric disorders in childhood and adolescence: prospective relations or common causes? *Journal of child psychology and psychiatry, and allied disciplines, 6*1(8), 890–898.

Ivie, E. J., Pettitt, A., Moses, L. J., & Allen, N. B. (2020). A meta-analysis of the association between adolescent social media use and depressive symptoms. *Journal of Affective Disorders, 275*, 165–174.

Jensen, M., George, M. J., Russell, M. R., & Odgers, C. L. (2019). Young Adolescents' Digital Technology Use and Mental Health Symptoms: Little Evidence of Longitudinal or Daily Linkages. Clinical Psychological Science, 7 (6), 1416–1433.

Karaca S., Saleh A., Canan F., & Potenza MN. (2017) Comorbidity between behavioral addictions and attention deficit/hyperactivity disorder: A systematic review. *International Journal of Mental Health and Addiction, 15*, 701-724.

Kereteš, G., & Štulhofer, A. (2020). Adolescents' online social network use and life satisfaction: A latent growth curve modeling approach, *Computers in Human Behavior, 104*: 106187

Kiefner-Burmeister, A., & Musher-Eizenman, D. (2018). The Benefits and Trajectory of Digital Editing-Based Media Literacy Among Girls, *Mass Communication and Society, 21* (5), 631–656.

Kildare, C., & Middlemiss, W. (2017). Impact of parents mobile device use on parent-child interaction: A literature review. *Computers in Human Behavior, 75*, 579–593.

Kleemans, M., Daalmans, S., Carbaat, I., & Anschütz, D. (2018). Picture Perfect: The Direct Effect of Manipulated Instagram Photos on Body Image in Adolescent Girls. *Media Psychology, 21* (1), 93–110.

Kremer, P., Elshaug, C., Leslie, E., Toumbourou, J. W., Patton, G. C., & Williams, J. (2014). Physical activity, leisure-time screen use and depression among children and young adolescents. *Journal of Science and Medicine in Sport, 17*(2), 183–187.

Kuo MH., Orsmond GI., Coster WJ., Cohn ES. (2014) Media use among adolescents with autism spectrum disorder. *Autism, 18*(8):914-923.

Kross, E., Verduyn, P., Demiralp, E., Park, J., Lee, D. S., Lin, N., Shablack, H., Jonides, J., & Ybarra, O. (2013). Facebook use predicts declines in subjective well-being in young adults. *PloS One, 8*(8), e69841.

Lane, R., & Radesky, J. (2019). Digital Media and Autism Spectrum Disorders: Review of Evidence, Theoretical Concerns, and Opportunities for Intervention. *Journal of developmental and behavioral pediatrics, 40*(5), 364–368.

Lee, H. Y., Jamieson, J. P., Reis, H. T., Beevers, C. G., Josephs, R. A., Mullarkey, M. C., O'Brien, J. M., & Yeager, D. S. (2020). Getting Fewer "Likes" Than Others on Social Media Elicits Emotional Distress Among Victimized Adolescents. *Child Development, 91*(6), 2141–2159.

Li, J.-B., Mo, P. K. H., Lau, J. T. F., Su, X.-F., Zhang, X., Wu, A. M. S., Mai, J.-C., & Chen, Y.-X. (2018). Online social networking addiction and depression: The results from a large-scale prospective cohort study in Chinese adolescents. *Journal of Behavioral Addictions, 7*(3), 686–696.

Liu, W., Wu, X., Huang, K., Yan, S., Ma, L., Cao, H., Gan, H., & Tao, F. (2021). Early childhood screen time as a predictor of emotional and behavioral problems in children at 4 years: a birth cohort study in China. *Environmental health and preventive medicine, 26*(1), 3.

Liu, M., Wu, L., & Yao, S. (2016). Dose-response association of screen time-based sedentary behaviour in children and adolescents and depression: a meta-analysis of observational studies. *British Journal of Sports Medicine, 50*(20), 1252–1258.

Liu, S., Yu, C., Conner, B. T., Wang, S., Lai, W., & Zhang, W. (2017). Autistic traits and internet gaming addiction in Chinese children: The mediating effect of emotion regulation and school connectedness. *Research in developmental disabilities, 68*, 122–130.

Mabe, A. G., Jean Forney, K., & Keel, P. K. (2014). Do you "like" my photo? Facebook use maintains eating disorder risk. *International Journal of Eating Disorders, 47* (5), 516–523.

Madigan, S., McArthur, B. A., Anhorn, C., Eirich, R., & Christakis, D. A. (2020). Associations Between Screen Use and Child Language Skills: A Systematic Review and Meta-analysis. *JAMA Pediatrics, 174*(7), 665–675.

Maïano, C., Normand, C. L., Salvas, M. C., Moullec, G., & Aimé, A. (2016). Prevalence of School Bullying Among Youth with Autism Spectrum Disorders: A Systematic Review and Meta-Analysis. *Autism research: official journal of the International Society for Autism Research, 9*(6), 601–615.

Marino, C., Gini, G., Vieno, A., & Spada, M. M. (2018). The associations between problematic Facebook use, psychological distress and well-being among adolescents and young adults: A systematic review and meta-analysis. *Journal of Affective Disorders, 226,* 274–281.

McCrae, N., Gettings, S., & Purssell, E. (2017). Social Media and Depressive Symptoms in Childhood and Adolescence: *A Systematic Review. Adolescent Research Review, 2* (4), 315–330.

Mills, J. S., Musto, S., Williams, L., & Tiggemann, M. (2018). "Selfie" harm: Effects on mood and body image in young women. Body Image, 27, 86–92.

Mingoia, J., Hutchinson, A. D., Wilson, C., & Gleaves, D. H. (2017). The Relationship between Social Networking Site Use and the Internalization of a Thin Ideal in Females: A Meta-Analytic Review. *Frontiers in Psychology, 8*, 1351.

Mushtaq, R. (2014). Relationship Between Loneliness, Psychiatric Disorders and Physical Health? A Review on the Psychological Aspects of Loneliness. *Journal of Clinical and Diagnostics Research 8*(9), WE01–WE4.

Männikkö, N., Ruotsalainen, H., Miettunen, J., & Kääriäinen, M. (2020). Associations between Childhood and Adolescent Emotional and Behavioral Characteristics and Screen Time of Adolescents. *Issues in mental health nursing, 41*(8), 700–712.

Nagata, J. M., Iyer, P., Chu, J., Baker, F. C., Pettee Gabriel, K., Garber, A. K., Murray, S. B., Bibbins-Domingo, K., & Ganson, K. T. (2021). Contemporary screen time modalities among children 9-10 years old and binge-eating disorder at one-year follow-up: A prospective cohort study. *International Journal of Eating Disorders, 54*(5), 887–892

Nesi, J., Miller, A. B., & Prinstein, M. J. (2017). Adolescents' Depressive Symptoms and Subsequent Technology-Based Interpersonal Behaviors: A Multi-Wave Study. *Journal of Applied Developmental Psychology, 51*, 12–19.

Neuman, S. B. (1988). The displacement effect: Assessing the relation between television viewing and reading performance. *Reading Research Quarterly, 23,* (4), 414-440.

Nikkelen, SWC, Valkenburg PM, Huizinga M, Bushman BJ. (2014) Media use and ADHD-related behaviors in children and adolescents: A meta-analysis. *Developmental Psychology, 50*, 2228-2241.

Norell-Clarke, A., & Hagquist, C. (2017). Changes in sleep habits between 1985 and 2013 among children and adolescents in Sweden. *Scandinavian Journal of Public Health, 45*(8), 869–877.

Orben, A., Dienlin, T., & Przybylski, A. K. (2019). Social media's enduring effect on adolescent life satisfaction, *Proceedings of the National Academy of Sciences, 116* (21), 10226–10228.

Owens, J. A., & Weiss, M. R. (2017). Insufficient sleep in adolescents: causes and consequences. *Minerva Pediatrica, 69*(4), 326–336.

Parkes A, Sweeting H, Wight D, & Henderson, M. (2013). Do television and electronic games predict children's psychosocial adjustment? Longitudinal research using the UK Millennium Cohort Study *Archives of Disease in Childhood, 98*, 341-348.

Pellicane, M. J., Cooks, J. A., & Ciesla, J. A. (2021). Longitudinal effects of social media experiences on depression and anxiety in LGB and heterosexual young adults. *Journal of Gay & Lesbian Mental Health, 25* (1), 68–93.

Poulain, T., Vogel, M., Ludwig, J., Grafe, N., Körner, A., & Kiess, W. (2019). Reciprocal Longitudinal Associations Between Adolescents' Media Consumption and Psychological Health. *Academic pediatrics, 19*(1), 109–117.

Poulain, T., Vogel, M., Neef, M., Abicht, F., Hilbert, A., Genuneit, J., Körner, A., & Kiess, W. (2018). Reciprocal Associations between Electronic Media Use and Behavioral Difficulties in Preschoolers. *International journal of environmental research and public health, 15*(4), 814.

Ra, C. K., Cho, J., Stone, M. D., De La Cerda, J., Goldenson, N. I., Moroney, E., Tung, I., Lee, S. S., & Leventhal, A. M. (2018). Association of Digital Media Use With Subsequent Symptoms of Attention-Deficit/Hyperactivity Disorder Among Adolescents. *JAMA, 320*(3), 255–263.

Raustorp, A., & Fröberg, A. (2019). Comparisons of pedometer-determined weekday physical activity among Swedish school children and adolescents in 2000 and 2017 showed the highest reductions in adolescents. *Acta Paediatrica, 108* (7),1303–1310.

Riehm, K. E., Feder, K. A., Tormohlen, K. N., Crum, R. M., Young, A. S., Green, K. M., Pacek, L. R., La Flair, L. N., & Mojtabai, R. (2019). Associations Between Time Spent Using Social Media and Internalizing and Externalizing Problems Among US Youth. *JAMA Psychiatry, 76*(12), 1266–1273.

Rose, C. A., & Tynes, B. M. (2015). Longitudinal Associations Between Cybervictimization and Mental Health Among U.S. Adolescents. *Journal of Adolescent Health, 57*(3), 305–312.

Rosenthal, S. R., Buka, S. L., Marshall, B. D. L., Carey, K. B., & Clark, M. A. (2016). Negative Experiences on Facebook and Depressive Symptoms Among Young Adults. *Journal of Adolescent Health, 59*(5), 510–516.

Rounds, E. G., & Stutts, L. A. (2021). The impact of fitspiration content on body satisfaction and negative mood: An experimental study. *Psychology of Popular Media, 10* (2), 267–274.

Rydell, A. M., & Brocki, K. C. (2021). ADHD symptoms and callous-unemotional traits as predictors of violent media use in adolescence. *Scandinavian journal of psychology, 62*(1), 25–33.

Saiphoo, A. N., & Vahedi, Z. (2019). A meta-analytic review of the relationship between social media use and body image disturbance. *Computers in Human Behavior, 101*, 259–275.

Salmela-Aro, K., Upadyaya, K., Hakkarainen, K., Lonka, K., & Alho, K. (2017). The Dark Side of Internet Use: Two Longitudinal Studies of Excessive Internet Use, Depressive Symptoms, School Burnout and Engagement Among Finnish Early and Late Adolescents. *Journal of Youth and Adolescence, 46*(2), 343–357.

Selkie, E. M., Fales, J. L., & Moreno, M. A. (2016). Cyberbullying Prevalence Among US Middle and High School-Aged Adolescents: A Systematic Review and Quality Assessment. *Journal of Adolescent Health, 58*(2), 125–133.

Slobodin, O., Heffler, K. F., & Davidovitch, M. (2019). Screen Media and Autism Spectrum Disorder: A Systematic Literature Review. *Journal of developmental and behavioral pediatrics, 40*(4), 303–311.

Skoog, T., Holmqvist Gattario, K., & Lunde, C. (2019). Study protocol for PRISE: a longitudinal study of sexual harassment during the transition from childhood to adolescence. *BMC Psychology, 7*(1), 71.

Skowronski, M., Busching, R., & Krahé, B. (2021). Predicting Adolescents' Self-Objectification from Sexualized Video Game and Instagram Use: A Longitudinal Study. *Sex Roles, 84* (9-10), 584–598.

Socialstyrelsen [the National Board of Health and Welfare] (2017). Utvecklingen av psykisk ohälsa bland barn och unga vuxna. https://www.socialstyrelsen.se/globalassets/ sharepoint-dokument/artikelkatalog/statistik/2017-12-29.pdf

Swedish Media Council (2019). Ungar & Medier. https://statensmedierad.se/publikationer / ungarochmedier/ungarochmedier2019.3347.html

Stiller, A., Mößle, T. (2018) Media Use Among Children and Adolescents with Autism Spectrum Disorder: a Systematic Review. *Review Journal of Autism and Developmental Disorders, 5*, 227–246

Suchert, V., Hanewinkel R., Isensee B. (2015) Sedentary behavior and indicators of mental health in school-aged children and adolescents: A systematic review. *Preventive Medicine, 76*, 48-57.

Thorisdottir, I. E., Sigurvinsdottir, R., Asgeirsdottir, B. B., Allegrante, J. P., & Sigfusdottir, I. D. (2019). Active and Passive Social Media Use and Symptoms of Anxiety and Depressed Mood Among Icelandic Adolescents. Cyberpsychology, *Behavior and Social Networking, 22*(8), 535–542.

Thorisdottir, I. E., Sigurvinsdottir, R., Kristjansson, A. L., Allegrante, J. P., Lilly, C. L., & Sigfusdottir, I. D. (2020). Longitudinal association between social media use and psychological distress among adolescents. *Preventive Medicine, 141*, 106270.

Tiggemann, M., Slater, A., & Smyth, V. (2014). "Retouch free": The effect of labelling media images as not digitally altered on women's body dissatisfaction. *Body Image, 11*(1), 85–88.

Tiggemann, M., & Zaccardo, M. (2015). "Exercise to be fit, not skinny": The effect of

fitspiration imagery on women's body image. *Body image, 15*, 61-67.

Timeo, S., Riva, P., & Paladino, M. P. (2020). Being liked or not being liked: A study on social-media exclusion in a preadolescent population. *Journal of Adolescence, 80*, 173–181.

Twigg, L., Duncan, C., & Weich, S. (2020). Is social media use associated with children's well-being? Results from the UK Household Longitudinal Study. *Journal of Adolescence, 80*, 73–83.

Valkenburg, P. M., Koutamanis, M., & Vossen, H. G. M. (2017). The concurrent and longitudinal relationships between adolescents' use of social network sites and their social self-esteem. *Computers in Human Behavior, 76*, 35–41.

Valkenburg PM., & Peter J. (2013). The differential susceptibility to media effects model: Differential susceptibility to media effects model. *Journal of Communication, 63*(2):221-243.

van den Eijnden, R., Koning, I., Doornwaard, S., van Gurp, F., & Ter Bogt, T. (2018). The impact of heavy and disordered use of games and social media on adolescents' psychological, social, and school functioning. *Journal of behavioral addictions, 7*(3), 697–706.

van den Eijnden RJJM, Lemmens JS, Valkenburg PM (2016). The social media disorder scale. *Comput Human Behav 61*:478-487.

Vandenbosch L. & Eggermont S. (2016). The Interrelated Roles of Mass Media and Social Media in Adolescents' Development of an Objectified Self-Concept: A Longitudinal Study. *Communication Research, 43*, 8, 1116-1140.

Vannucci, A., & Ohannessian, C. M. (2019). Social media use subgroups differentially predict psychosocial well-being during early adolescence. *Journal of youth and adolescence, 48*(8), 1469-1493.

Viner, R. M., Aswathikutty-Gireesh, A., Stiglic, N., Hudson, L. D., Goddings, A.-L., Ward, J. L., & Nicholls, D. E. (2019). Roles of cyberbullying, sleep, and physical activity in mediating the effects of social media use on mental health and wellbeing among young people in England: a secondary analysis of longitudinal data. *The Lancet. Child & Adolescent Health.*

Vries, D. A. de, de Vries, D. A., Peter, J., de Graaf, H., & Nikken, P. (2016). Adolescents' Social Network Site Use, Peer Appearance-Related Feedback, and Body Dissatisfaction: Testing a Mediation Model. *Journal of Youth and Adolescence, 45* (1), 211–224.

Vries, D. A. de, de Vries, D. A., Peter, J., Nikken, P., & de Graaf, H. (2014). The Effect of Social Network Site Use on Appearance Investment and Desire for Cosmetic Surgery Among Adolescent Boys and Girls. *Sex Roles, 71* (9-10), 283–295.

Wang, B. Q., Yao, N. Q., Zhou, X., Liu, J., & Lv, Z. T. (2017). The association between attention deficit/hyperactivity disorder and internet addiction: a systematic review and meta-analysis. *BMC psychiatry, 17*(1), 260.

White, E. K., Warren, C. S., Cao, L., Crosby, R. D., Engel, S. G., Wonderlich, S. A., Mitchell, J. E., Peterson, C. B., Crow, S. J., & Le Grange, D. (2016). Media exposure and associated stress contribute to eating pathology in women with Anorexia Nervosa: Daily and momentary associations. *International Journal of Eating Disorders, 49*(6), 617–621.

World Health Organization WHO (2018). International statistical classification of diseases and related health problems (11th Revision).

Wyssen, A., Leins, J., Reichenberger, J., Blechert, J., Munsch, S., & Steins-Loeber, S. (2020). Body-related cognitive distortions (thought–shape fusion body) associated with thin-ideal exposure in female students—An ecological momentary assessment study. *Clinical Psychology & Psychotherapy, 27* (2), 220–227.

Yau, J. C., Reich, S. M., & Lee, T.-Y. (2021). Coping With Stress Through Texting: An Experimental Study. *Journal of Adolescent Health, 68*(3), 565–571.

Zhou, M., Li, F., Wang, Y., Chen, S., & Wang, K. (2020). Compensatory Social Networking Site Use, Family Support, and Depression Among College Freshman: Three-Wave Panel Study. *Journal of Medical Internet Research, 22*(9), e18458.

Zimmer-Gembeck, M. J., Rudolph, J., Webb, H. J., Henderson, L., & Hawes, T. (2021). Face-to-Face and Cyber-Victimization: A Longitudinal Study of Offline Appearance Anxiety and Online Appearance Preoccupation. *Journal of Youth and Adolescence.*

About the Swedish Media Council

The Swedish Media Council is a government agency whose primary task is to promote the empowering of minors as conscious media users and to protect them from harmful media influences. The agency also coordinates the national effort for a strengthened media and information literacy in the general population.

Statens medieråd