UiA University of Agder

Master

Trends in Screen Time and Mental Health among Icelandic Children and Adolecents

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Acknowledgements

This is a 60 ECTS master thesis to complete my master's degree in public health science in the Faculty of Health and Sport Sciences at the University of Agder. It was an enjoyable project to work on, especially as I got the change to use data from my home country, Iceland. I think this project will be useful for future studies, for parents and guardians as well as others that work with children.

First and foremost, I want to start thanking the Icelandic Centre for Social Research and Analysis for allowing me to use their data, without them this project would not have been possible. I also want to thank my supervisor Dr Bjørge Herman Hansen for guidance, support and encouragement during the writing of the thesis. My dear friends that I made during my studies and last but not least my family and friends back home in Iceland for always being there for me and supporting me.

Guðný Erna Bjarnadóttir, 2021

Sammendrag

Bakgrunn: Barn med høy skjermtid har blitt assosiert med økt odds for redusert mental helse score sammenlignet med barn med lav eller moderat skjermtid. Det er uklart hvordan skjermtid påvirker mental helse og hvorfor det er kjønnsforskjell. Sammenhengen mellom skjermtid og mental helse ble undersøkt i denne studien.

Hensikt og problemstillinger: Studiens formål var å undersøke vis det var forskjell med skjermtid og mental helse med Islandske barn og ungdom, hva sekulære trender i forhold til skjermtid og mental helse, vis det var sammenheng mellom tid brukt på sosiale medier og mental helse, og vis det var sammenheng mellom skjermtid og mental helse.

Metode: Repetert tverrsnittstudie.

Resultater: Gutter rapporterte mer skjermtid enn jenter ($p<0.01$), og begge kjønn viste økning i skjermtid gjennom årene. Jenter brukte mer tid på sosiale medier plattformer enn gutter, men det var en signifikant økning av bruk av sosiale medier for begge kjønn gjennom årene. Ingen av gruppene hos guttene hadde mental helse score over den satte cut-off når en så på bruk av skjermtid, mental helse og fysisk aktivitet. Jenter hadde mental helse score over to i alle grupper med høy skjermtid, uavhengig av lav eller høy fysisk aktivitet.

Konklusjon: Gutter rapporterte mer skjermtid enn jenter, men samtidig rapporterte jenter dårligere mental helse score enn guttene. Det er noe som må undersøkes.

Nøkkelord: Skjermtid, Mental Helse, Barn, Ungdom, Sosiale Medier, Folkehelse

Abstract

Background: High screen time usage has been associated with children's increased odds of negative mental health score. However, it is unclear why high screen time use have negative effect on children's mental health and why there are differences between sexes. Association between screen time usage and mental health was examined in this study.

Objectives: The aim of this study was to find if there were differences in screen time and mental health in Icelandic children and adolescence, what the secular trends regarding screen time and mental health, if there was an association between time spent on social media and mental health, and last to find if there was association between time screen time and mental health.

Methods: Repeated cross-sectional cohort study.

Results: Boys reported more screen time then girls ($P<0.01$), and both sexes showed increased in screen time between the years. Girls used more screen time on social media platforms than boys, but both sexes showed significant increase in social media use through the years. None of the boys' strata had a mental health score over the cut-off point when looking at screen time use, mental health, and physical activity. Girls did have a cut-off

scored over two in all the strata with high screen time use regardless of, they had low or high physical activity.

Conclusion: Boys report more screen time usage than girls, yet the results showed that girls worse mental health score than the boys. That is something that needs to be looked at further.

Keyword: Screen Time, Mental Health, Children, Adolescents, Social Media, Public Health

Table of contents

Table and figures contents

1. Introduction

While using screen time, people are more often than not sedentary. Pearson and her colleagues did a systematic review where they looked at researches and studies about daily sedentary, the review showed that daily sedentary increased by 10-20 minutes between the years, in regards to children, between nine and 11 years old (Pearson et al. 2017). Children that spend lot of their time after school at home tended to spend it with screen time activities (Haycraft et al. 2020). Nowadays screen time is not only a problem at home or outside school, but screen time is also increasing at schools as well. In 2015, Icelandic children in 8th to 10th grade got their own tablet from their municipality and through the years children down to 5th grade have also gotten their own tablet to use in school and are allowed to take it home with them (Gíslason 2017).

Results from a meta-analyses study showed that those who have more than two hours a day on average with sedentary screen time are more likely to suffer from depression (Wang, Li, and Fan 2019). A cross sectional and longitudinal Australian study with children in the age eight to 12 showed that children who reported high levels of screen time, also had greater reports of psychosocial difficulties. Such a prosocial behaviour, peer problems and high levels of conduct problems (Allen and Vella 2015). A significant association was found between changes in total screen time and, device-specific recreational screen time and a range of mental health outcome in a longitudinal study. In that study they examined the association between changes in screen time and mental health outcome among adolescence (Babic et al. 2017).

A Norwegian longitudinal study on children aged four, six and eight, showed that girls with high television (TV) screen time use had lower ability of emotional understanding at the age of six, than those who had modern or low TV screen time. The same applied to boys who had high screen time use on gaming when they were four years old, had lower ability of emotional understanding. Those children that had TV in their bedroom at age six had lower emotional understanding at age of eight than children who did not have TV in their bedroom (Skalická et al. 2019). A systematic review study found out that there are increasing rates of mental health problems and psychiatric disorder from childhood to young adults and about one in five adolescents have a psychiatric disorder (Costello, Copeland, and Angold 2011). A

survey that looked at young adults from the United states of America (USA) showed that those who have high experience of negative social media experience are 49% more likely to have high levels of disturbed sleep (Rzewnicki et al. 2020). A systematic review of girls in the age 12 to 18, showed a positive association between screen time and sleep problems, musculoskeletal pain and depression (Costigan et al. 2013). Furthermore, in a developmental behavioural study, children and young adults in the age ten to 23 year old was expected to be accepted more than adolescents on social media (Rodman, Powers, and Somerville 2017). Girls tended to have lower appearance and self-esteem than boy as well as they display more other-oriented social media behaviour than boys (Steinsbekk et al. 2021). In 2016, screen time and well-being population study with over 40 thousand children in the age two to 17 years old was conducted. The result showed that one hour a day or more of screen time use was associated with lower psychological well-being, less curiosity, lower self-control, more distractibility, more difficulty making friends, less emotional stability, difficult to care for and inability to finish tasks. The participants aged between 14 to 17 that spent seven or more hours with screen time each day were twice as more likely to have ever been diagnosed with depression (RR 3.39, 95% CI: 1.54, 3.70) and to have ever been diagnosed with anxiety (RR 2.26, 95% CI: 1.59, 3.22) in the last 12 months. Those who had a modern use of screen time (4h/day) in the same age group were also associated with lower psychological well-being (Twenge and Campbell 2018).

Technology is something that is always improving, and new things are being invented. Fast revolution and updates on things are part of our everyday life. For many it can be hard keeping up with all the new technology. The oldest living generations have experienced many things relative to technological development. For example, telephones, televisions, computers, smartphones. For the youngest generation, generation Alpha, they are born into all this technology and do not know life without it. That is why it is importing to make research and studies about these things to see how people are cooperating with them, how it effects their life and if there are any changing between years and generations.

In this study the main goal is to find out: *“Are there gender differences in screen time and mental health in Icelandic children and adolescence?”, “What are the secular trends regarding screen time and mental health in Icelandic children and adolescents?”*, *“Is there an association between time spent on social media and mental health?”* and *“Is the association between screen time and mental health independent of physical activity?”*.

2. Theory

2.1 Development in Icelandic culture

Western culture is a term used very broadly. It is not used to describe a specific group but rather to describe a society and its culture. For example to refer to a heritage of social norms, ethical values, traditional customs, belief systems, political systems, and specific artifacts and technologies that have some association with Europe (Lyon 2020; ScienceDaily 2020).

Before WWII occurred, Iceland was one of the poorest countries in Northern Europe. When the military from Britain and the US stayed in Iceland during WWII, they helped the Icelandic finances and living conditions of the Icelandic population. It was not until after the WWII when Iceland accepted the Marshall contract, that the US saw the benefit of strengthening Europe's democracies and markets (Árnason 2003; Árnastofnun 2018; Ingimundarson 1996).

In 1860, around 83% of the Icelandic population were farmers but in the year 2000 this figure was down to only 3%. The industrialization had quite an impact on the Icelandic society as mechanization of the fishing fleet began, and trawlers were being imported. It was not until the military from the United Kingdom (UK) and the US came, that airports and better roads were laid, and the people were introduced to jobs that were well paid. After all that, the people of Iceland migrated in big numbers from more rural areas to Reykjavik (Árnastofnun 2018). It was not only the Icelandic society that was changing, but the whole world was also changing too. The first photograph was made in the 1830's the telephone was invented in 1876, electric light in 1879, automobile 1885, radio in 1901, airplane was invented in 1903, television in 1924, computer in 1937 and the internet in 1974 (Gregersen n.d.). These things are still to this day improving, getting upgraded and getting better and better. In today's society, the technology mentioned above, is considered a necessity where most of us use it every single day, and children in this day and age will never know how life is without it, like the generations before them.

2.2 Television

The first television came to Iceland during the WWII with the US military in 1953/1954 but it was only broadcasted in English. It was not until 1966 that the first Icelandic broadcast was aired, about ten years later then other Nordic countries (Friðriksson 2000; Petersson and Pettersson 2000; Ríkissjónvarpið n.d.). For example, Denmark had their first TV program in 1954, Sweden in 1956 and Norway in 1958 (Stette 2020). From a rare phenomenon in the 1950', prevalence of time spent watching TV has seen a marked increase, and screen time is now a very common domain where children and adolescence spend a lot of time. In today's modern world, screens are omnipresent, and children can watch TV shows, films, news, live broadcast whenever they want, on television, computers and their smartphones. A longitudinal study from the UK showed that in 2019, 80% of the children aged between five and 15 watch video on demand (VoD) instead of live broadcast on television (Ofcom 2020).

2.3 Computers

The first substantial computer was invented early in 1940 by John W. Mauchly and J. Presper Eckert. Since then, new and improved computers are introduced year after year. However when Apple launched the iPad in 2010 it took the computer technology to another level (The Univerity of Rhode Island n.d.; Zimmermann 2020). Research show that 24% of children aged between three and four years old have their own tablet, 37% in the age five to seven, 49% of children in the age eight to 11 and 59% in the age 12 to 15 (Ofcom 2020).

2.4 Smartphones

The first smart phone was invented in 1992 and released two years later in 1994, almost 100 years after the first telephone was invented. Smartphones were big and expensive. The next smartphone that came to the market had already improved from the first one. The same thing have happened with the smartphones as the computers, rapid evolution and lot of improvements (Andrew 2018; Jackson 2018). In 2007 Apple lunched the first iPhone and merged a few devices into one, now it was possible to call, videocall, send messages, e-mail, browse the internet and play games on one device (Sverrisson 2017).

In Europe children in the age nine to 16 are getting younger and younger when they are given their first smartphone. At the same time most of the children have been borrowing smartphone and tablets from a very young age from parents and/or older siblings (Mascheroni and Ólafsson 2013).

Five percent of children in the UK from five to seven years old own a smartphone, 37% in the age eight to eleven years old and 83% in the age of twelve to fifteen years old (Ofcom 2020).

2.5 Internet

In the early 1900s Nicola Tesla had the idea of a "wireless system" however it was not until early 1960s that J.C.R. Licklider had the idea about "Intergalactic Network", as a matter of fact the internet as we know it today is not far from Licklider's original idea (Andrews 2019; Leiner et al. 1997). Today the main purpose of the internet is sharing and communicating with others, globally, whether it is work or family and friends - plays a big part in the modern life. The internet gives us the opportunity to access tablets and messaging apps. Western Europe has the highest active social networking penetration (Tankovska 2021; Writer 2020). In a report from UNICEF, it is stated that young people, aged between 15 to 24 years old, have the highest connection rate in the world or 71%. Children aged under 18 are estimated to account for 1/3 of the internet users in the world as only 4% of young people in Europe are not connected to the internet compared to 60% in Africa (UNICEF 2017). Children and adolescents can be contacted by strangers, becoming victims of cyberbullying, provide personal information that could be used in product marketing. At the same time children can engaging in cyberbullying and other risky behaviour (Álvarez et al. 2013).

2.6 Screen time

Screen time is the how much time you spend looking at an electronic device that have a digital screen such as TVs, computers and smartphones (Cambridge Dictionary 2021; George and Odgers 2015). George and Odgers quoted "*The question is no longer if adolescents are using mobile technologies, but how, why, and with what effects*" (2015). It is hard to find recommendation or criteria when it comes to screen time for children. World Health Organisation (WHO) do not recommend sedentary screen time for children under one year old and children under the age of four should not have more than one hour of daily sedentary screen time (World Health Organization 2019). Parents association in schools in Reykjavik, Iceland, made a guideline for children in 1st to 10th grade about screen time as well as for toddlers up to young adults. It was recommended that screen time for two to five years old should not be more than 60 minutes a day, for children in 1st to 4th grade the screen time recommendation were 90 minutes a day and in 5th to 7th grade the time was 120 minutes a

day. Furthermore children in 8th to 10th grade have the recommended time as 180 minutes a day and for the young adults it was 240 minutes a day (Samfok 2019). Previous studies show that girls tend to have more screen time compared to boys, both on weekdays and weekend days when it comes to watching TV, using computers and smartphones but boys reported more gaming compared girls (Houghton et al. 2015; Przybylski and Weinstein 2017).

In 2015, Houghton and his colleague published a study where they had examined screen-based media use (SBMU) on Australian children and adolescents in 3rd, 5th, 7th and 9th grade. The result showed that 80% of children in 9th grade used more than two hours of SBMU on a typical weekday, than the other children. Most of the screen time were spent on watching TV (90%), computers (59%), iPads (58%) and smart phones (57%). Girls were more likely to spend more than two hours of SBMU than boys from 5th grade and up to 9th grade. Boys were more likely to game more than two hours on averages than the girls. Girls in 5th to 9th grade were more likely to spent more than two hours on Social Networking than boys, and the time spent on Social Network increased with older age for both boys and girls, however it increased much more rapidly for the girls (Houghton et al. 2015). Another Australian study found that with every additional hour of physical activity, screen time decreased by 32 minutes (Olds et al. 2012).

The United Nations Convention on the Rights of the Child state that electronic information and communication should be part of children's lives but at the same time concerned about harmful effects of high screen time usage that evidence show. The internet, including social media, make the children vulnerable to cyberbullying, pornography and unwanted communication. It is hard for parents, guardians, and others to keep track of all the apps and devices that children use. They seem to be one step ahead which make it harder to keep them save from the harmful effects that come with use of the internet. It is stated that boys that play violent games can be affected in their response to violence and empathy to others, including the understanding of others suffering. Furthermore it is stated that increased screen time may adversely affect children's exercising and sleeping (The United Nations 2019). Screen time has changed a lot through the years as the technology improves, first TV, then computers, smartphones, iPads, smartwatch etc. Nowadays new TV shows, movies, games, and apps appear, and our children are the consumers.

It is not only about how much screen time people use every day but also what people, and especially children experience when they are using social media or searching and browsing throw the world wide web. About 50% of children that are aged between 12 and 15 in the UK reported that they have seen something hateful about a particular group of people over the last year. Parents concerns of their children seeing something that would encourage to harm themselves went from 39% to 50% from the years 2018 to 2019 (Ofcom 2020). Przybylski and Weinstein (2017) stated in their study that too little screen time can have negative effect on children since they will miss out on important social information's, since lot of communication happens online. However, it can be discussed at which timepoint screen time becomes too much and starts to affect the mental health negatively. A systematic review that had over 115 thousand participants looked at studies with children and adolescents in the age five to 17 years old. The results showed that high screen time and less sleep had a strong association with mental health than too little physical activity (≥ 60 minutes of moderate-to-vigorous physical activity) (Sampasa-Kanyinga et al. 2020).

2.9 Social media

One of the biggest parts of the internet is social media. In 2020 the global social penetration rate reached 49% with Northern Europe at 67%. Monthly active social media users are expected to be 3.43 billion in 2023, about one third of the entire global population, whereas 800 million will be from China. The biggest social networkers are Facebook with over 2.6 billion monthly active users, other big social apps and networks that are leading are Instagram, WhatsApp, YouTube, Messenger and TikTok (Anon 2021; Tankovska 2021). The time people are spending on social media have increase from average of 90 minutes a day in 2012 to 145 minutes on average in 2020 (GlobalWebIndex and DataReportal 2021). Those who are active on social media are those who post something for others to see, for example a status or a photo. Passive users on social media are the users that look at what other have been posting on social media and react on the posts by liking it and/or commenting (Deters and Mehl 2013).

When adolescents are passive on social media there are more likely to have greater symptoms of anxiety, depressed mood, and feel lonelier. Those who are active on social media are less likely to have those symptoms of anxiety and depressed mood and feel less lonely (Burke, Marlow, and Lento 2010; Eva et al. 2019; Frison and Eggermont 2016). With each increased

hour adolescence spent on social media and computers, the mental health gets worse, it affects their sleep and they are more likely not to reach the criteria for physical activity, 60 minutes per day (Bizouerne 2015; Boers et al. 2019; Erlingsdóttir, Sigfúsdóttir, and Elsudóttir 2016; Eyþórsson and Árnason 2016). Researches show that physical activity decreases as the children get older and it only gets worse and worse between years (Hansen, Kolle, et al. 2018; Raustorp and Fröberg 2019; Steene-Johannessen et al. 2019). If we look at how much effect family, friends and school have on children's mentally health from 11 to 16 years old can we see that the children that feel good mentally are those who have the best relationship whit their parents. Those who had parents that were financially stable, their children had better relationship with their parents and the children had good relationship with the school and their friends as well. The children that did not have a good relationship with the school were more likely to use alcohol or tobacco of any kind. Those children had worse mental health, where more likely to have a bad relationship whit their parents and friends than the children that had a good relationship with the school (Arnarsson, Daníelsdóttir, and Jónsson 2020).

Increased screen time showed that it affected sleep in children and adolescents, and that connected to behaviour problem of youth internalizing, externalizing, and peer problems. With the youngest, the sleep-disturbing appeared after six hours with daily screen time, middle age and adolescents, sleep disturbing showed after ten or more hours with screen time (Parent, Sanders, and Forehand 2016). Another study showed that those with the highest social media use were almost 50% more likely to have disturbed sleep than those with medium or low social media use (Rzewnicki et al. 2020).

In 2009 social media survey of young adults showed that 97.1% of the participants were active users of Facebook. Girls were more likely to post picture of family, friends and occurrence while boys were more likely to share and post sport pictures and information about sports. Girls were more likely to report higher levels of self-disclosure than boys ($p<0.5$) (Bond 2009). In 2019 the most popular social media platforms for children in the UK were Facebook, Snapchat, Instagram, WhatsApp and TikTok (Ofcom 2020).
A cross-sectional study that examined screen time and mental health in Icelandic children in the age ten to 12 years old. The results showed that those with high screen time use in the past seven days, had experienced negative mental well-being with both sexes. The more screen time they had, the worse their mental health was (Yang et al. 2013).

2.9 Sedentary time

Sedentary time is define as stationary behaviour, sedentary behaviour, standing, screen time, non-screen-based sedentary time, sitting, reclining, lying and sedentary behaviour pattern (Tremblay et al. 2017). A meta-analysis study that looked at over 21 studies with total over 6000 thousand children and adolescents. What they found out that 10 minutes increase in moderate-to-vigorous intensity physical activity and vigorous-intensity physical activity were associated with metabolic syndrome (OR 0.88, 95% CI: 0.82-0.94, OR 0.80, 95% CI: 0.70-0.92). One hour increase in sedentary time was positively associated with the metabolic syndrome (OR 1.28, 95% CI: 1.13-1.45) (Renninger et al. 2019).

World Health Organisation (WHO) made a guideline about the benefits of physical activity for children and adolescents in their Guidelines on physical activity and sedentary behaviour. For the first time they talk about sedentary behaviour and the risk of it. The risk about sedentary is associated with poor health outcomes such as increased adiposity; poorer cardiometabolic health, fitness, behavioural conduct/ pro- social behaviour; and reduced sleep duration. They recommend that children and adolescents should limit the amount of recreational screen time (Organisation mondiale de la santé 2020).

A cross sectional study was made with over 18 thousand children and adolescents in the years 4 to 18 old from the International Children's Accelerometery Database (ICAD). The study looks at association of reallocating time between sedentary and active behaviours on cardiometabolic risk factors in young people. The results showed that to achieve health benefit for activity the intensity need to be at least moderate intensity to influence cardiometabolic risk factors for children and adolescents (Hansen, Anderssen, et al. 2018). A two-year longitudinal study that examined relationship between changes in time spent watching television and playing video games with frequency of leisure-time physical activity in adolescents. The results showed association with decreasing time spent watching TV with increasing time spending on physical activity. This result was not modified between sexes, nor confounded by socioeconomic status, smoking or the value participants placed on their health, appearance, and achievement (Motl et al. 2006). An US cross-sectional population study examined trends sedentary behaviour from 2001 to 2016 among adolescents and adults. The results of total sitting time showed that total sitting time increased from seven to over

eight hours a day among adolescents (difference, 1.1 [95% CI, 0.7 to 1.5]) from the years of 2007 to 2016 (Yang et al. 2019).

2.9 Mental health

Health is not only physical, mental health is integral and essential component of health as well (World Health Organization 2018). Mental health affects how we think, feel and act, how we handle stress, relate to others and make choices (Anon 2020). WHO describe mental health as a state of well-being in which an individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and is able to make a contribution to his or her community (World Health Organization 2018).

Hopkins Symptom Checklist (HSCL) is a self-reported symptom inventory with instruments designed to measure psychological distress, or, more specifically, mainly symptoms of anxiety and depression in population surveys (Strand et al. 2003). HSCL started as a 58-item question list. Two separate yet coincident approaches have been used to determine the essential symptom structures underlying the HSCL; clinical rational clustering and empirical-analytic factor analysis (Derogatis et al. 1974). Today the most common SCL checklists are SCL-25, SCL-10, and SCL-5. Each and every checklists have their own cut-off point to measure that are the average item score calculated by dividing the total score of the number and items answered. A valid cut-off point for SCL-5 is 2 for SCL-10 the cut-off point is 1.85 and 1.75 for SCL-25. (Strand et al. 2003). A study examined SCL-5 and SCL-10 in comparison of SCL-25. The results showed that both SCL-5 and SCL-10 were strongly invariant across sex and groups and recommend SCL-5 and SCL-10 for clinical and research-oriented application (Schmalbach et al. 2019).

A comparison of different mental health checklists used on the Norwegian population was done in 2002. Five different mental health checklists were compared, it was the Hopkins Symptom Checklist (SCL) -25, SCL-10, SCL-5 and MHI-5. What they found was that all the checklists were equally good with high correlation (0.91 SCL-10/SCL5) between the different SCL-instruments, even if some of the questions were missing for example one out of five questions in SCL-5. Women scored higher on all SCL than man ($p<0.001$), and the women in the aged between 16-24 years and 75 and older scored the highest (Strand et al. 2003).

In 2010 the estimation of European people suffering from mental disorder is 38.2% each year or 164.8 million people. Those disorders that were most recent at that timepoint were anxiety (14%), insomnia (7%), major depression (6.9%), somatoform (6.3%), alcohol and drug dependence (>4%), ADHD (5%) in the young and dementia (1-30%, depending in age) (Wittchen et al. 2011).

Researchers have shown that adultescent that have high screen time usage and low physical activity had worse mental health compared to those who had vigorous physical activity and less screen time (Hamer, Stamatakis, and Mishra 2009; Hrafnkelsdóttir et al. 2018; Wu et al. 2015). Children in 10th grade in Iceland, were examine on how screen time and physical activity affected their mental health. The study showed that children with screen time over 5,3 hours a day and had physical activity less than four times a week had worse mental health than those who had less screen time and more physical activity. Direct association between worse mental health status and physical activity were not found (Hrafnkelsdóttir et al. 2018). Furthermore, another study found that parents who use parental social media comparison have scored higher on the depression scale than those who do not compare themselves to others on social media (Sidani et al. 2020).

Association between computer use and psychological, and computer use and difficulty in falling to sleep was among found adolescents (Marino et al. 2017). Phycological symptoms and sleep difficulties are increased with every minute that children and adolescents spend on their computers and watching TV (Hinkley et al. 2014; Marino et al. 2017).

Russ and his colleagues examined if there was an association between TV and computer usage, separately and combined with children ranging from 6 to 17 years old. Their findings showed that each additional hour of combined media or watching TV increased the odds of overweight and obesity, social- emotional problems and concerns about their self-esteem (Russ et al. 2009). A longitudinal cohort study showed the same results in regard to young adolescence watching TV. With each additional hour of watching TV daily the young adolescence showed significant greater risk of developing depression (OR: 1.08, 95% CI: 1.01-1.16) (Primack et al. 2009).

Icelandic children that have parents that do not have high education, such as college or university degree, tend watch more television than children with more educated parents. In

9th grade 74% of children that have parents with low education, watch TV for two hours or more compared to 38% of those who have parents with higher education. Children in 3rd and 6th grade showed similar results. Parent's education did however not affect how much time the children spent on the computers. About 90% of boys in 9th grade used the computer for a minimum of two hours each day and 81% of the girls. Eleven percent of the boys in 9th grade spent seven hour or more on their computer each day (Björnsdóttir, Kristjánsson, and Hansen 2009). A survey with almost 300 thousand participants, 15-year-old children from England showed that the more screen time they used their mental wellbeing got worse but was not harmful. No matter if it was a screen time of watching TV, using computer or gaming (Przybylski and Weinstein 2017).

One of the most recent studies about social media use and mental health, Primack and his collage did a six month follow up study the result showed those with the highest quartile of social media use were 3,41 times the odds (95% CI: 1.76, 6.60) for development of depression then those in the lowest quartile. The association between baseline social media use and depression showed a significant linear trend with each increased quartile of social media use ($p<0.001$). There were no association between participants that were depressed at the time the study took place and increased social media use (Primack et al. 2021).
A longitudinal study with over one million US adolescents conducted in the years 1991 to 2016 showed that examined psychological well-being and screen time usage. Results showed psychological well-being dropped between 2012 and 2016, as well as the average levels of self-esteem, self- satisfaction, domain satisfaction, life satisfaction and happiness (Twenge, Martin, and Campbell 2018).

2. Methods and design

2.1 Study design, sample and procedures

The data used in this study comes from a national repeated cross-sectional cohort study of Icelandic adolescents called *Youth in Iceland*. The study is carried out by the *Icelandic Centre for Social Research and Analysis* (ICSRA). Every second year the ICRA submit a self-reported survey for every child in 8th to 10th grade in Iceland with 80-90 self-reported questions. Parents were informed about the survey and were given the opportunity to withdraw their children from participation. The questions were formed by professionals in social sciences following strict criteria that will lead to reliable results. Scales are often used as response rate to questions to increase the validity of the questions, in these questionnaires the so-called Likert scale1 is most prominent. The study has carried out data collections from years 2012, 2014, 2016, 2018.

When we were granted permission to use the ICSRA study, we were provided with dataset consisting of randomly selected 20% of the full data set, as is common practise when using the ISCRA study.sd. Participants answers were chosen randomly from all the years the study has been conducted and cannot be traced back to individuals. The variables were sorted by years and those who had missing data were kept in the dataset.

The surveys are disturbed to all the schools in Iceland in the same day. The participants in the studies were students in all 8^{ths}, 9^{ths} and 10^{ths} and grades in that were present in school during the days of data collection. Anonymous questionnaires were distributed to students in sealed envelopes by teachers and research assistants and students answered on paper. To make sure that each and every questionnaire are untraceable to whomever answers the participants are asked repeatedly not to write names or identity numbers on any of the questionnaire's papers.

2.3 Variables

Questions that were used in this study were questions about mental health status, screen time and physical activity, total of 11 questions.

2.3.1 Screen time and physical activity

Table 1. Questions about screen time and physical activity used in this project

Item no	Question	Response scale	Recoding
Screen time	How much time on average do you spend each day on the following activities? *Watching shows, movies or videos*	1-8*	Made continuous**
	How much time on average do you spend each day on the following activities? *Playing video games online?*	1-8*	Made continuous**
	How much time on average do you spend each day on the following activities? *Playing video games not online?*	1-8*	Made continuous**
	How much time on average do you spent each day on the following activity? *On social media*	1-8*	Made continuous**
	How much time on average do you spend each day on the following activities? *Using the internet for other than being on social media or playing videogames*	1-8*	Made continuous**
	How much time on average do you spend each day on the following actives? *Using computers for other than being on the internet or playing videogames such as homework, writing text, working with photographs*	1-8*	Made continuous**
Physical activity	How often do you exert yourself physically, so you exhaust yourself or sweat?	1-4***	

*1= Almost no time, 2= half to one hour, 3= around one hour, 4= around two hours, 5= around three hours, 6= around four hours, 7= around five hours, 8= six hours or more; **Categorical values made continuous by deriving median value from original scale: 1=0 minutes, 2= 45 minutes, 3=60 minutes, 4= 120 minutes, 5= 180 minutes, 6= 240 minutes; ***1= almost never, 2= rarely, 3= sometimes, 4=often.

2.3.2 Mental health

Table 2. Questions about mental health that wear used in this project

Item no	Question	Response scale
Mental health	I felt nervous	1-4*
	Sudden fear for no apparent reason	1-4*
	I felt sad or blue	1-4*
	I thought the future seemed hopeless	1-4*

*1= Almost never, 2= rarely, 3= sometimes, 4= often

To calculate the mental health status of all the participants relative to screen time, social media use and physical activity the Hopkins Symptom Checklist (HSCL) were used. The validated cut off point for mental health is two when SCL-5 is used.

2.4 Statistical analyses

The dataset was analysed with the program IMB SPSS Statistics version 25. It was decided was to sort the dataset by year to see trends between years.
Descriptive summaries are presented as means and standard deviations for continuous variables and as frequencies and percentages for categorical variables. Descriptive data was used to find number of participants within sexes and grade and reported screen time through the years. Gender differences were evaluated by t-test and chi-square test for categorical variables. When analysing differences between two means, a t-test is used (Polit and Beck 2018). Trends in screen time were assisted using linear regression. To predict the value of a variable based on the value of another variable a linear regression is used (Lund and Lund 2018). One-way ANOVA was used to find trends in mental health between sexes and years. Joint association between screen time, physical activity and mental health was assessed with logistic regression. The sample was divided into three groups for the analysing: High physical activity, medium physical activity, and low activity. Then each group of physical activity was split with low screen time use, medium screen time use and high screen time use. Then each and every group was compared to the mental health. A logistic regression is used to analyse relationship between multiple independent variables and a nominal-level outcome (Polit and Beck 2018). Significant differences or relations were accepted at $\alpha<0.05$. All the figures were made in the program Prism for macOS, version 8.2.1 and all the tables were made in Microsoft Word for Mac version 16.48.

3. Results

3.1 Descriptive data.

Table 3. Descriptive data on number of participants within and between sexes and grades.

	2012		2014		2016		2018		
Grade	Boy	Girl	Boy	Girl	Boy	Girl	Boy	Girl	Total
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	
8th	363 (52.2)	333 (47.8)	340 (49.2)	351 (50.8)	341 (49.3)	349 (50.6)	344 (49.3)	354 (50.7)	2775
9th	340 (46.8)	387 (53.2)	348 (48.3)	373 (51.7)	356 (53.5)	309 (46.5)	355 (49.9)	356 (50.5)	2824
10th	362 (50.8)	351 (49.2)	338 (49.3)	348 (50.7)	340 (46.1)	398 (53.9)	296 (46.5)	341 (53.5)	2774
Total	1065	1071	1026	1072	1037	1037	995	1051	

Table 1 show number of participants across sex and grade. A total of 8373 participants were included, of which 4151 (48.6%) were boys and 4280 (50.1%) were girls. The participants were evenly distributed across grades 8th through 10th, reflecting an age span of the participants from 14 to 16 years (year of turning 14 to the year of turning 16).

Table 4. Total screen time reported as minutes per day through the years.

	2012 min/day (SD)	2014 min/day (SD)	2016 min/day (SD)	2018 min/day (SD)
Boys	455.8 (311.7)	444 (298.4)	524 (353.4)	548.6 (329.6)
Girls	282.6 (225.4)	345.8 (250)	405.8 (259.7)	430.6 (240.8)

Table 2 shows the total screen time per day between and within sexes. Overall, boys reported more screen time compared to girls ($p<0.01$). The differences between boys and girls were consistent across timepoints, and the absolute differences was largest in 2012 (difference 173 min/day, 95% CI: 149, 196) and smallest in 2014 (difference 98 min/day, 95% CI: 74, 122). At the most recent timepoint (2018) the boys reported 118 mins/day more screen time compared to girls (95% CI: 92, 143). Both girls and boys showed a significant trend in increased screen time across timepoints, and the increase in screen time between timepoints were somewhat larger among girls (b: 25.2 min/day, 95% CI: 21.9, 28.6) compared to boys (b: 17.9 min/day, 95% CI: 13.3, 22.4).

3.2 Trends in screen time activities

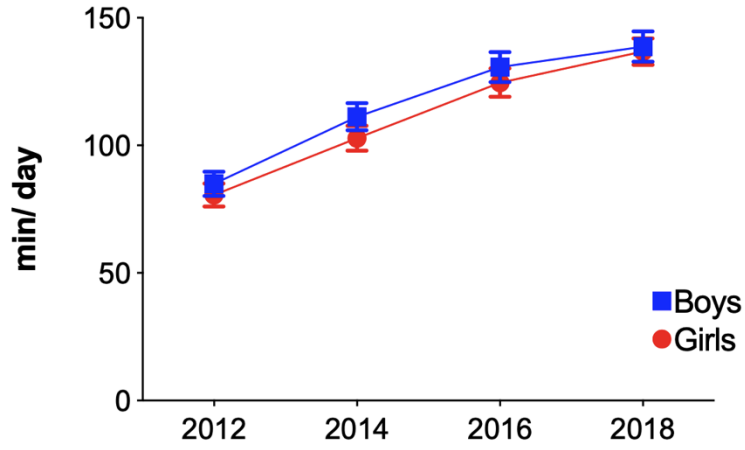

Fig. 1 Averages minutes per day spent watching TV shows, movies or videos.

Figure 1 shows the average screen time used watching tv shows, movies or videos between sexes. The time increased with the average of 9.09 minutes every two year for the boys. As for the girls the average screen time increased on the average of 9.52 minutes.
Boys only reported more screen time compared to girls in 2014 ($p<0.01$).
The differences between boys and girls in 2014 (difference 8 min/day, 95% CI: 1, 16).
Both girls and boys showed a significant trend in increased screen time across timepoints, and the increase in screen time between timepoints were somewhat larger among girls (b: 9.5 min/day, 95% CI: 8.4, 10.6) compared to boys (b: 9.1 min/day, 95% CI: 7.9, 10,3).

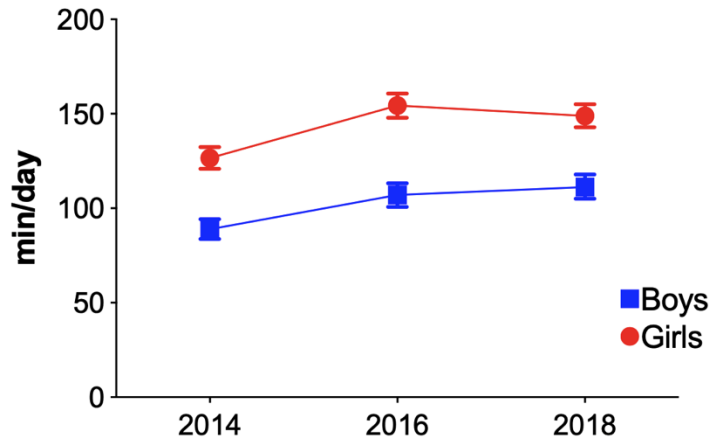

Fig. 2 Averages minutes per day spent on social media.

Figure 2 shows the averages minutes per day spent on social media between sexes. The average time between years when looking at time spent on social media increased on average of 5.65 minutes with the boys and 5.63 minutes with the girls. Overall, girls reported more screen time compared to boys ($p<0.01$). The differences between boys and girls were largest in 2016 (difference 47 min/day, 95% CI: 56, 39), with little difference between the years of 2014 and 2018 the smallest difference happened 2018 (difference 37 min/day, 95% CI: 46, 29). At the most recent timepoint (2018) the girls reported 37.5 min/week more screen time compared to boys (95% CI: 46, 29). Both girls and boys showed a significant trend in increased screen time across timepoints, and the increase in screen time between timepoints were the same with both sexes (b: 5.6 min/day, 95% CI: 3.5, 7.8).

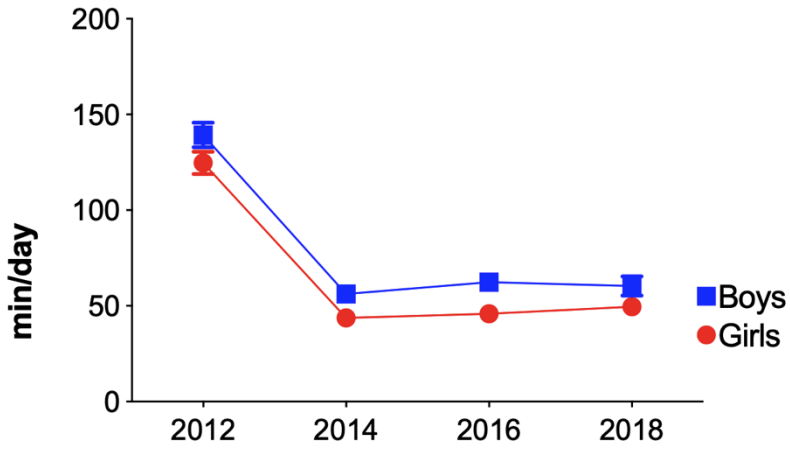

Fig. 3 Average minutes per day spent on the internet, not social media or videogames.

Figure 3 shows the average screen time used on the internet other than social media or playing videogames. Overall, boys reported more screen time compared to girls ($p<0.01$). The average screen time between the years decreased by 11.74 minutes on average to boys and decreased with the girls by the averages time 11.17 minutes. The differences between boys and girls were consistent across timepoints, and the absolve difference was largest in 2016 (difference 16 min/day, 95% CI: 10, 23) and smallest at most recent timepoint 2018 (difference (11 min/day, 95% CI: 5, 17). Both girls and boys showed a significant trend in decreased screen time across timepoints, and the decrease in screen time between timepoints were with little different between boys (b: -11.7 min/day, 95% CI: -12.99) and girls (b: -11.2 min/day, 95% CI: -12.2, -10.5).

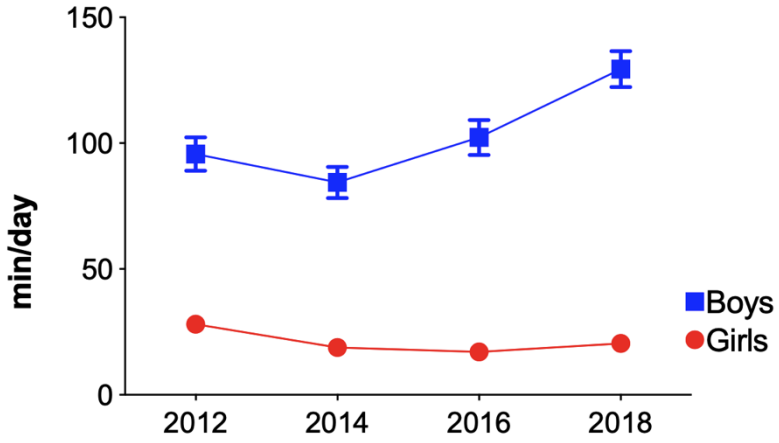

Fig. 4 Average minutes per day spent on playing games online.

Figure 4 shows the average screen time used on playing games online. The average time spent on playing games online increased by 5.86 minutes with the boys between the years but with the girls the average time decreased by 1.23 minutes. Overall, boys reported more screen time compared to girls ($p<0.01$). The differences between boys and girls were consistent across timepoints, and the absolve difference were largest at the most recent timepoint, 2018 (difference 109 min/day, 95% CI: 102, 116) and smallest in 2014 (difference 66 min/day, 95% CI: 59, 72). Boys showed a significant trend in increasing time spent on playing games online across timepoints, and the increased in screen time between timepoints were somewhat larger among boys (b: 5.9 min/day, 95% CI: 4.3, 7.4) compared to girls that decreased their time (-1.2 min/day, 95% CI: -1.9, -0.5).

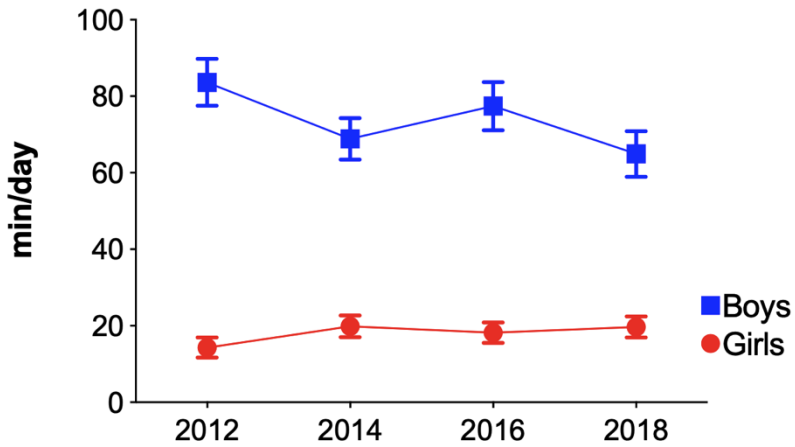

Fig. 5 Average minutes per day spent on playing video games not online.

Figure 5 shows the total screen time spent on playing videogames not online between sexes. The average time the boys spent on playing games that were not online, decreased by 2.38 minutes between the years and with the girls the time increased on average by 0.73 minutes. Overall, boys reported more screen time compared to girls ($p<0.01$). The differences between boys and girls were consistent across timepoints, and the absolve difference were largest in 2012 (difference 69 min/day, 95% CI: 63, 76) and smallest in 2018, also the most recent timepoint (difference 45 min/day, 95% CI: 39, 52).
Both girls and boys showed a significant trend in increased screen time across timepoints, and the increase in screen time between timepoints were somewhat larger among girls (b: 0.7 min/day, 95% CI: 0.1, 1.3) compared to boys (b: -2.4 min/day, 95% CI: -3.7, -1.1).

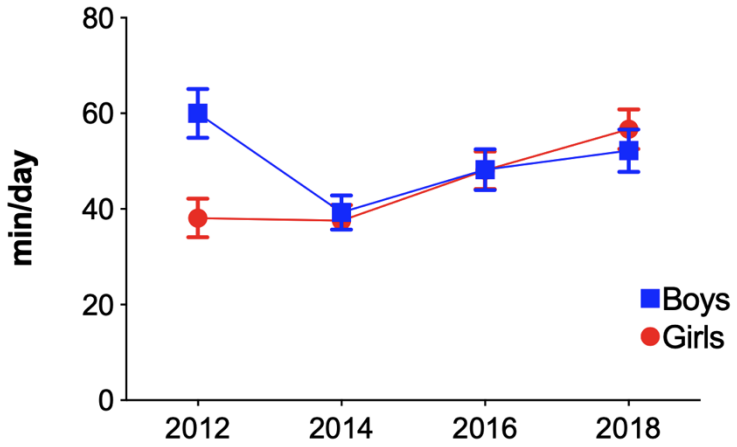

Fig. 6 Average minutes per day spent on the computer for other things then being on the internet or playing videogames.

Figure 6 shows average screen time spent on computer for other things then being on the internet or playing videogames per day between sexes. Boys only reported more screen time compared to girls in 2012 ($p<0.01$). The average time the boys spent on their computers on other things then social media and gaming decreased by 0.78 minutes between the years on average but with the girls the average time increased by 3.32 minutes.
The differences between boys and girls were consistent across timepoints, and the absolve difference were largest in 2012 (difference 22 min/day, 95% CI: 15, 28), with smallest in

2016 (difference (0.1 min/day, 95% CI: -6, 6). At the most recent timepoint (2018) the boys reported 4.5 mins/day less screen time compared to girls (95% CI: -10.6, 1.5).
Only girls showed significant trend in increased screen time across timepoints, and the increase in screen time spent on the internet other than social media or videogames (b: 3.3. min/day, 95% CI: 0.1, 11) compared to boys (b: -0.8 min/day, 95% CI: -1.8, 0.2).

3.3 Trends in mental health

Table 5. Trends in mental health score over the years

	2012 (SD)	2014 (SD)	2016 (SD)	2018 (SD)
Boys	1.38 (0.57	1.43 (0.64)	1.45 (0.61)	1.50 (0.62)
Girls	1.76 (0.78)	1.89 (0.89)	1.92 (0.85)	1.94 (0.85)
Total	1.58 (0.70)	1.67 (0.81)	1.69 (0.78)	1.73 (0.78)

Table five shows trends in mental health score beween the years, 2012 to 2018. Both boys and girls showed a significant trend in increasing mental health score across timepoints ($p<0.01$).

The mental health score did not change on average for the boys between the years when looking at social media use. With the girls the mental health score increase on average by 0.04 between the years with social media use. Time spent on the internet, other than social media the average mental health score increasd by 0.1 for the boys at the same time the average metnal health score increasd by 0.02 for the girls. The mental health score for the boys increased by 0.01 on average between the years but increased with the girls on average of 0.01 when looking at time spent on watching TV. For the boys the mental health score increased by the average of 0.01 between the years but for the girls the mental health score increased by 0.08 when looking at the time spent on online gaming. The mental health scorder decreased for the boys on average of 0.02 between the years but increased by 0.02 for the girls when looking at the time spent on gaming that is not online. The mental health increased by 0.01 on averages for the boys between the years and 0.04 for the girls on average when spending time on the computer other than using social media or gaming.

When looked if there was any statistically significant difference between the years in mental health and screen time. The resaults showed that the were statistically significant difference between the years in every group with the girls but in the boys group there where only statistically significant difference in the group not online gaming.

3.4 Joint association between mental health, screen time and physical activiy

Figures 7 and 8 show the relationship between physical activity and screen time relative to mental health for both boys and girls in 8_{th}, 9_{th} and 10_{th} grade. None of the boys group had a mental health score over two, but the girls scored over two in all groups with high screen time.

None of the physical activity-screen stratas for boys showed a Hopkins score higher that the cut off for anxiety. Within each strata of physical activity, indications of a dose-response relationship between screen time and mental health was apparent. For boys in the high physical activity strata, mental health differed between those with low 1.27 (95% CI: 1.2, 1.35) and high 1.38 (95% CI:1.21, 1.56) screen time. Similar tendencies were observed in the medium and high physical activity strata. Differences in reported mental health was most pronounced when comparing boys in the hight physical activity and low screen time 1.27 (95% CI: 1.2, 1.35) with boys in the low physical activity and high screen time 1.60 (95% CI: 1.45, 1.76).

Only three groups in each of the physical activity-screen stratas for the girls showed a Hopkins score higher than the cut off for anxiety, those were the groups with high screen time. Within each strata of physical activity, indication a dose-response relationship between screen time and mental health was apparent. For the girls in the high physical activity strata, mental health differed between those with low 1.46 (95% CI: 1.34, 1.58) and high screen time 1.88 (95% CI: 1.61, 2.16). In the medium physical activity strata, mental health differed between those with low 1.47 (95% CI: 1.24, 1.71) and high 1.95 (95% CI: 1.7, 2.19) screen time. In the low physical activity strata, mental health differed between those with low 1.51 (95% CI: 1.26, 1.77) and high 2.11 (95% CI: 1.87, 2.36) screen time. Differences in reported mental health was most pronounced when comparing girls in the high physical activity and

low screen time 1.46 (95% CI: 1.34, 1.58) with girls in the low physical activity and high screen time 2.11 (95% CI: 1.87, 2.36).

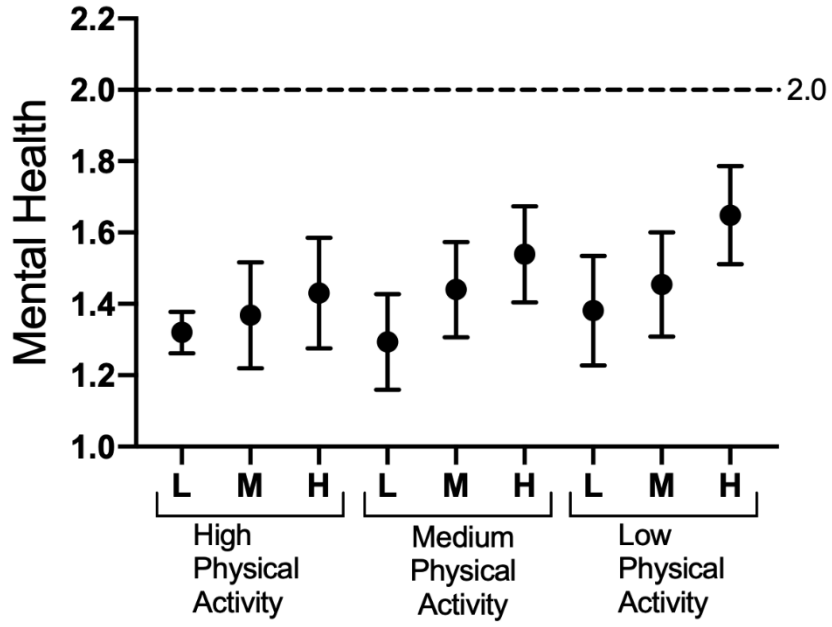

Fig. 7 Analyses of the joint associations of screen time, physical activity with mental health for boys.

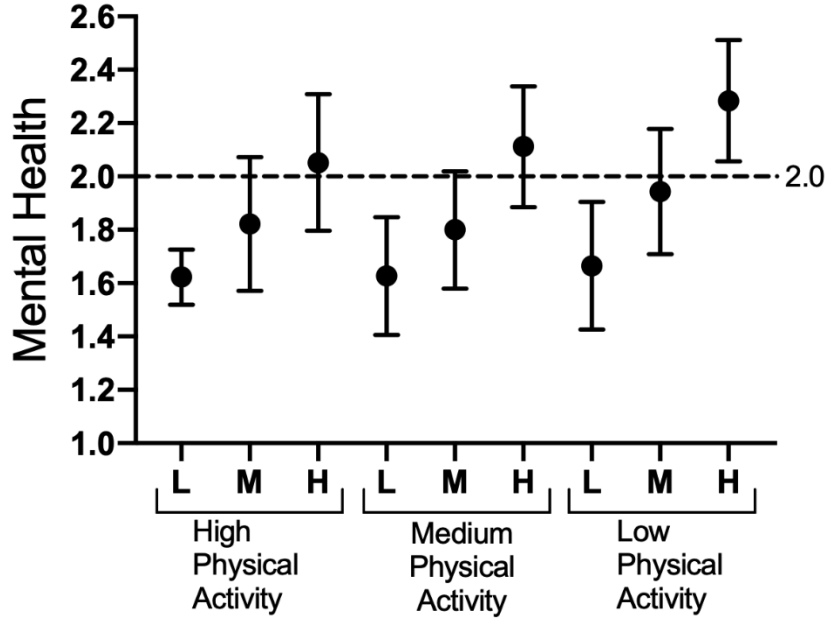

Fig. 8 Analyses of the joint associations of screen time, physical activity with mental health for girls.

4. Discussion

In this chapter the results from the repeated cross-sectional cohort study will be discussed. First, there is a short summary of the main results. Then the results will be discussed and finally a conclusion is drawn for future research.

In summary, boys have higher total screen time than girls, yet the girls tend to have worse mental health score. Nevertheless, girls do use more time on social media than boys. The results of this study showed that there is an association between screen time and mental health status for the girls within each age.

The main finding of this present study was that boys reported more screen time than girls ($P<0.01$) and both sexes showed increase in screen time between 2012 and 2018. Screen time increased quite evenly throughout the years for both boys and girls.
There was a significant increase in screen time when it comes to watching TV shows, movies, and videos with both sexes, as well in the years 2012 to 2018. Girls used more screen time on social media platforms than boys although both sexes did show a significant increase in social media use through those years. Boys had a significant increase in gaming online, but the time spent on gaming not online, decreased for them and interestingly increased for the girls at the same time through the years. In 2020, average time used on social media did increase from 90 minutes on a daily average to 145 minutes each day on average (GlobalWebIndex and DataReportal 2021). This is quite an increase time used on social media and one can ask itself if the global pandemic influences how much time spent on social media. In comparison, the recommendation from the Icelandic parents associations, is 180 minutes per day for children in 8th to 10th grade (Samfok 2019). In this present study the boys had more than triple the recommended screen time on average, and the girls had more than double screen the time usage. Result from other studies have shown that girls tend to have higher screen time use than boys when it comes to watching TV, using computers and smartphones but the boys have higher screen time usage then girls when it comes to gaming (Houghton et al. 2015; Przybylski and Weinstein 2017). This does not correspond to the findings in this study as the boys had higher screen time usage than girls in every category except from social media, or there was no significant difference between the sexes in the years this study covers.

The abovementioned findings are in agreement with previous research reporting negative mental health symptoms with more screen time regardless of the gender (Hamer et al. 2009; Hinkley et al. 2014; Hrafnkelsdóttir et al. 2018; Marino et al. 2017; Primack et al. 2009; Przybylski and Weinstein 2017; Russ et al. 2009; Wu et al. 2015). High screen time use does not only have negative impact on mental health but also on physical activity. WHO wants to limit the amount of recreational screen time to get children and adolescents more active (World Health Organization 2019). Negative mental health score with each added hour increased by average of 0.04 between years when looking at screen time use of social media for girls. However, no changes were found in mental health score between years regarding the boys. On the other hand, mental health score decreased on average between the years for the boys when it comes to gaming online. Those who reported a combination of less screen time and high physical activity had the lowest risk of reporting negative mental health score.

It is an important public health issue to prevent mental health problems in adolescents, especially since sedentary is increasing (Yang et al. 2019). The results from this study showed a significant increase in mental health score across timepoints for both sexes ($p<0.01$). Increased screen time use is associated with increased mental health score for both sexes, at the same time it must be noted that difference in screen time activity has different effects on mental health score. Closer examination revealed that the differences were between different screen time activities, for example social media and watching TV. Girls showed in general an increase in mental health score when it came to social media use, although for the boys there were no change on the mental health score over the years. The results show us that social media can be associated with increased mental health score for girls but not for boys. Previous studies and researches show that girls that have high screen time use tend to have more mental health problems than boys (Bond 2009; Costigan et al. 2013). These findings should raise a concern in the public health sector.

In this study, none of the boys had a mental health score over the cut-off point two, when looking at screen time use, mental health and physical activity. No matter if they had high screen time use and low physical activity their score was not higher than two. The girls scored over two in all the groups with high screen time use regardless of the amount of physical activity, if it was high or low. The biggest mental health score difference was between high physical activity and low screen time use 1.27 (95% CI: 1,2, 1.35) versus little

physical activity and high screen time use 1.6 (95% CI: 1.45, 1.76) for the boys. Furthermore, for the girls the biggest difference was also with the high physical activity and low screen time use 1.46 (95% CI: 1.34, 1.58) versus little physical activity and high screen time use 2.11 (95% CI: 1.87, 2.36). Within each strata of physical activity, indications of a dose-response relationship between screen time and mental health was apparent for both sexes. Those who were most physical active scored lower on the mental health scale then those who were moderate and low physical active. As the most of screen time based activities are sedentary it have effect on children's and adolescents activity and the WHO does recommend that recreational screen time should be limited for those groups (Organisation mondiale de la santé 2020; The United Nations 2019)

The findings in this present study suggest that limiting screen time does have a beneficial effect on mental health in children and adolescents, at least up to the age of 16. More detailed studies and research is needed to confirm causality and recommendations for limiting screen time-based activities to optimize mental health for children and adolescences.

4.2 Strength and limitations

The study's main strengths were how big response rate were with over 8000 participants, from all the surveys through the years that survey has been conducted. As well having 20% of participants answers to analyse in this study gave us almost 3000 participants every second year. The same base of questions is used every year with few extra questions added through the years if there is a specific subject, they want to examen a specificity subject that year. One of the biggest limitations in this study were self-reported answer from the children, especially when they answered diverse questions about screen time, they could have reported more screen time than they actually used. The cross-sectional study does not allow us to determine causal relationships between the study variables. Reverse causality cannot be ruled out. Participants reporting mental health problems might tend to be socially isolated and spend more time with screen time-based activities. Longitudinal studies are needed for further clarify causality between screen time, physical activity and mental health outcomes. With 80-90 questions to answer recall bias is a limitation when some questions have recall 30 days or more. Furthermore, another limitation is that some of the answers are social bias. Only four of five questions in SCL-5 were used since there were only four questions of the

mental health score questions that could be used. The decision to use four instead of five questions was made after a research showed SCL-5 with four to five questions was as good as SCL 25 (Strand et al. 2003). It is important to know that the questionnaire-based assessment of mental health in this study is not equivalent to clinical diagnosis.

4.3 Future recommendation

The technology is improving and changing fast, always new updates, new apps and so on. It can be hard to keep up with it and knowing what is trending with younger generation. It is important for parents to know how their child is using their screen time, what are they watching, posting, gaming and so on. Communities and schools should offer parents guiding so that they know how to keep up with their children or at least have the tools to do it. Parents, guardians and other that work with children should as well talk to them about the side effects on screen time, they must act as role models as well. Today's generation is born now are born into all the newest technology, computers, smartphones, tablets and all the social media. That is a big difference from the earlier generation that were born without most of the technology that we have today. I think it is important to examen these children both when they are young and when they get older and compare them with the generation that live now and see if there will be any difference on how their mental health will be, physical activity, education level and sleep.

After reading and working with the results of the study used in the thesis, I have some thoughts on how I would have done this study differently. I would have included a question that looks at how much screen time children use in schools as computers and tablets are common in schools teaching today and since most of children in Iceland do get a computer or tablet from the municipality. Further, I would have added a question on how much children understand ads or if they are aware of the, for example influencers on social media and how much that can affect them. E-sports seems to become more and more popular, further studies needs to examine if that will affect the children's mental health status. It is important to do further research on screen time in relation too mental health, especially why girls that tend to have worse mental health than the boys even though they spend equal time on screen devices.

5. Conclusion

The aim of this study was to find out if there were any differences between sexes in screen time and mental health in Icelandic children and adolescents. As the results show, there was a connection between screen time use and mental health when it came to girls, no connection was found between those for the boys. The second goal was to find the secular trends regarding to screen time and mental health in Icelandic children and adolescents. Both girls and boys showed a significant trend in increased screen time across timepoints. Secular trends in mental health results shows that the were significant increace in mental health score over the years with both sexes. However, there was difference in mental health score associated with difference screen time usage. Negative mental health score with each addition hour by average of 0.04 between the years when looking at screen time use of social media for the girls. However, no changes were found between years in regarding to the boys, regardless of their age. In other words, association were found between screen time spent in social media and mental health with girls but not with boys. The last goal was to find if there was association between screen time and mental health independent of physical activity. Increased screen time was associated with higher mental health score regardless of physical activity. Within each strata of physical activity, indications of a dose-response relationship between screen time and mental health was apparent for both sexes.

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Annex

Approval

PROTOKOLL FRA FORSKNINGSETISK KOMITÈ

Dato: 16/12/2020

Arkivsak: 20/11148

Protkollfører: Anne Valen-Sendstad Skisland

Trender i barns skjermtid, mental helse og fysisk aktivitet. - master - Gudny Erna Bjarnadottir

Søknad godkjennes

Table 6. Average screen time for boys in minuets

Boys	2012 (n)	2014 (n)	2016 (n)	2018 (n)	Total
Watching TV	84.97 (988)	111.24 (966)	130.73 (956)	138.7 (908)	465.64
Online Gaming	95.70 (982)	84.43 (965)	102.25 (954)	129.43 (915)	411.81
Not Online Gaming	83.65 (981)	68.89 (962)	77.42 (944)	64.92 (908)	294.88
Social Media		88.96 (950)	107.05 (952)	111.28 (908)	307.29
Not Social Media	139.28 (981)	56.30 (960)	62.43 (951)	60.41 (907)	318.42
Other Things	60.02 (970)	39.28 (962)	48.23 (947)	52.20 (902)	199.73
Total	463.62	449.1	528.11	556.94	1997.77

Table 7. Average screen time for girls in minuets

Girls	2012 (n)	2014 (n)	2016 (n)	2018 (n)	Total
Watching TV	80.55 (1036)	102.83 (1060)	124.60 (1007)	136.76 (1015)	444.74
Online Gaming	28.03 (1035)	18.75 (1060)	17.01 (1014)	20.46 (1014)	84.25
Not Online Gaming	14.31 (1031)	19.88 (1054)	18.2 (1014)	19.72 (1016)	72.11
Social Media		126.64 (1048)	154.39 (1012)	148.99 (1013)	430.02
Not Social Media	124.81 (1030)	43.79 (1053)	45.94 (1005)	49.58 (1015)	264.12
Other Things	38.11 (1023)	37.59 (1053)	48.09 (1005)	56.71 (1014)	180.5
Total	285.81	349.48	408.23	432.22	1475.74

Table six and seven show the average screen time for both boys and girls. These tables are annexed to figures 1 to 6.