Young consumers and social media

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Konkurrence- og Forbrugerstyrelsen

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Contents

Chapter 1
Executive Summary

Smartphones and social media have become an integral part of young consumers' daily lives, and Danish teens are among the world's most avid social media users. The prevalence and benefits of social media are obvious. However, their potential negative effects on the well-being and life satisfaction on their users, and particularly children, teens, and young adults, are causes for growing concern.

This report presents research by the Danish Competition and Consumer Authority on the relationship between young consumers' (ages 8–25 years) social media consumption and well-being. The research was based on survey responses from 3,445 Danish children, teens, and young adults and 2,381 parents. The analysis used a range of data, including the respondents' social media consumption, attitudes toward social media, and psychometric measurement data, including those on self-control, social media addiction, and well-being. The data collected in the survey were supplemented with socioeconomic data from Statistics Denmark and historical data on different measures of well-being in the school contexts.

Combining registry data with survey response data provides a novel perspective on how young consumers' well-being has evolved over time, both before and after the introduction of social media into their lives.

1.1 Young Consumers' Social Media Use and Well-Being

This report first examines the impacts of overuse and addiction in social media consumption and outlines how the amount of time spent on social media relates to young social media consumers' overall well-being.

Overuse of Social Media
Social media platforms often operate with business models focused on maximizing engagement (i.e., the time users spend on a platform), usually to sell adds and generate data. This has led to concerns over how platforms may use certain design features (e.g., autoplay) and content curation strategies to retain users.

Thus, this study performed an analysis to measure social media "overuse" using data from responses to a series of questions focused on the regret that users feel when using social media and the difficulty they experience when trying to limit their social media use.

The findings presented in this report reveal that many young social media users were familiar with the challenges of social media overuse. Ten percent of these users reported that they *often*, *very often*, or *always* regretted the time they spent on social media. In addition, 21 percent struggled to log off, and 29 percent spent more time on their favorite social media platform than they would prefer.

The analysis also finds that social media overuse is closely correlated with individual characteristics, particularly motivation, gender, and self-control. Users whose social media use is more externally motivated by, for example, the fear of missing out or peer pressure are also more likely to overuse social media. Girls are significantly more likely to overuse social media than boys, although the overall difference between the genders in terms of effect size is

relatively small. Finally, users with more self-control, who are better able to regulate their behaviors, overuse social media considerably less than those with lower levels of self-control.

Despite the importance of individual characteristics, overuse seemed to show a stronger relationship with the product than with the user. The analysis revealed that the tendency to overuse was far more prevalent among individuals who use social media mainly for viewing content (e.g., TikTok and Instagram) than among those who use social media mainly for chatting (e.g., Messenger and Discord).

Social Media Addiction

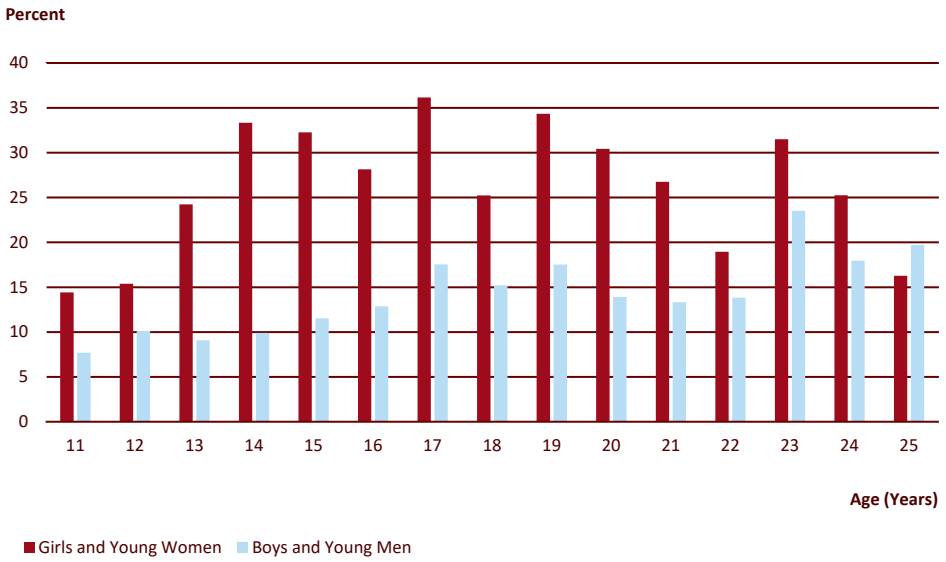
Addiction has long played a role in the regulation of other products such as gambling, alcohol, and nicotine, but no similar consensus has been reached as to the role of addiction in social media consumption.

For this research, social media addiction was measured similarly to other types of addictions such as gambling and gaming addictions through a series of questions about the individual's tendency to experience intrusive thoughts about social media, inability to reduce social media consumption despite wanting to, and so on. However, unlike other addictions, social media addiction is not yet officially accepted as a mental disorder.

At first glance, social media addiction scores appeared similar across all segments (age and gender), with average scores of 2–2.6 on a scale of 1–5. However, girls and young women consistently scored approximately 16 percent higher than boys and young men across all age groups.

The average difference in addiction scores between the genders has strong implications for the prevalence of addiction-related problems, as illustrated in Figure 1.1. The proportion of young consumers with moderate to severe signs of social media addiction (as measured with the widely adopted Bergen Social Media Addiction Scale; see Section 2.8) is two to three times higher among teenage girls than among teenage boys.

Figure 1.1 **Moderate to Severe Addiction Scores Across All Age Groups**



Note: The x-axis denotes the age in years of children and young people with addiction scores indicating moderate to severe addiction problems (i.e., ≥18 according to Cheng et al. 2021). The y-axis denotes the percentage of respondents in the age group who reached this threshold. The red bars represent girls and young women (n = 1460), while the blue bars represent boys and young men (n = 1321). The younger children aged 8–10 years in the survey were deemed too young to answer the addiction questionnaire.

Source: DCCA Survey, 2023

Social media addiction is strongly associated with individual characteristics, particularly gender and self-control. Individuals with less self-control are significantly more likely to experience social media addiction regardless of gender. However, in this study, girls exhibited notably higher addiction scores than boys, highlighting that addiction is more prevalent among girls.

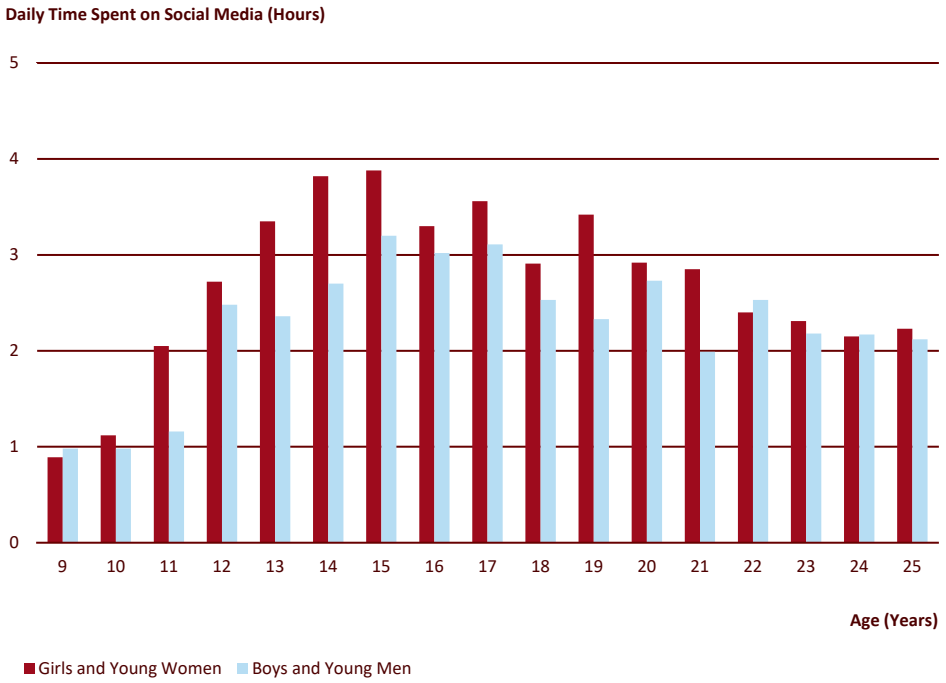
Time Spent on Social Media

The amount of time spent on social media is an important metric because of its role in media companies' business models and its association with concerns over potential addiction and misuse. Thus, this report presents two analyses of the amount of time users spend on social media. The first examined the time users spent on their preferred social media platform. The second examined the amount of time users spent across all social media platforms. Both analyses relied on actual time spent by sourcing activity data from users' smartphones rather than relying on self-reported estimates.

On average, young consumers spend 1 hour and 21 minutes daily on their preferred content media such as TikTok or Instagram. This average is significantly longer than the 43 minutes that these consumers spend on their preferred chat media such as Snapchat or Messenger.

The average time spent across all platforms was 2 hours and 40 minutes, with considerable variations according to gender and age. The time spent on social media was least in children (8–12 years old), most in teenagers (13–17 years old), and somewhere between the two in young adults (18–25 years old). Across these groups, girls and young women spent considerably more time on social media (between 13 and 23 percent) than boys and young men (see Figure 1.2). Hence, the highest activity level was found among teenage girls, who spent an average of 3 hours and 34 minutes on social media daily.

Figure 1.2 **Daily Time Spent (DTS) on Social Media by Age**



Note: This figure shows the daily time spent (in hours) on social media among girls and young women (red, n = 997) and boys and young men (blue, n = 669) of different ages. Only a few 8-year-olds had screenshot data and this age group was thus excluded from the figure.

Source: DCCA Survey, 2023

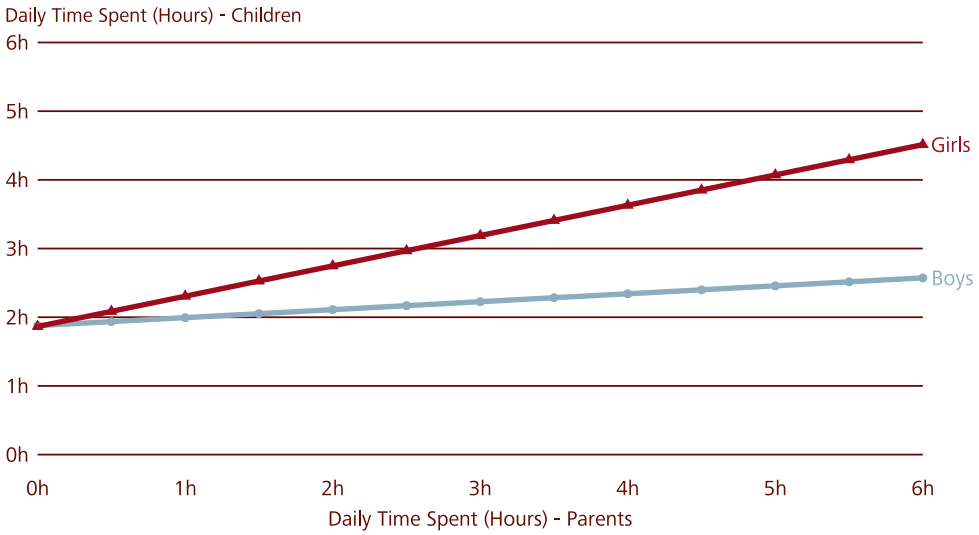
This difference is particularly pronounced at the highest level of social media consumption, as 12 percent of girls and young women spent more than 5 hours a day on social media, while this is the case only for 7 percent of boys and young men.

A model of time spent on social media reveals that consumers spend significantly more time on content media than on chat media (e.g., Snapchat and Messenger). In addition, the analysis performed in this study revealed a strong correlation between social media overuse and the amount of time spent on social media. Furthermore, users who derive enjoyment from a social media platform are more likely to spend increased time engaging with it.

Social media addiction is strongly associated with time spent on social media, although its effect is smaller in magnitude than that of age. While the impact of addiction on time spent on social media is similar for both genders, girls and young women tend to exhibit higher levels of addiction than boys and young men. This difference in addiction levels helps explain the notable gender disparity in time spent on social media.

Finally, the analysis results suggest a clear parental effect on girls' and young women's social media use, where the amount of time they spent on social media seemingly correlated with their parents' time on social media (see Figure 1.3).

Figure 1.3 **Relationship Between Parents' and Their Children's DTS on Social Media**



Note: This figure illustrates the predicted relationship between parental daily time (in hours) spent on social media (x-axis) and children's DTS on social media (y-axis), both measured in hours. The predictions are based on Model 4: DTS, extended to include parental screen habits as a predictor (see Technical Box 3.6). The red line represents girls, while the blue line represents boys.

Source: DCCA Survey, 2023

Social Media and Well-Being

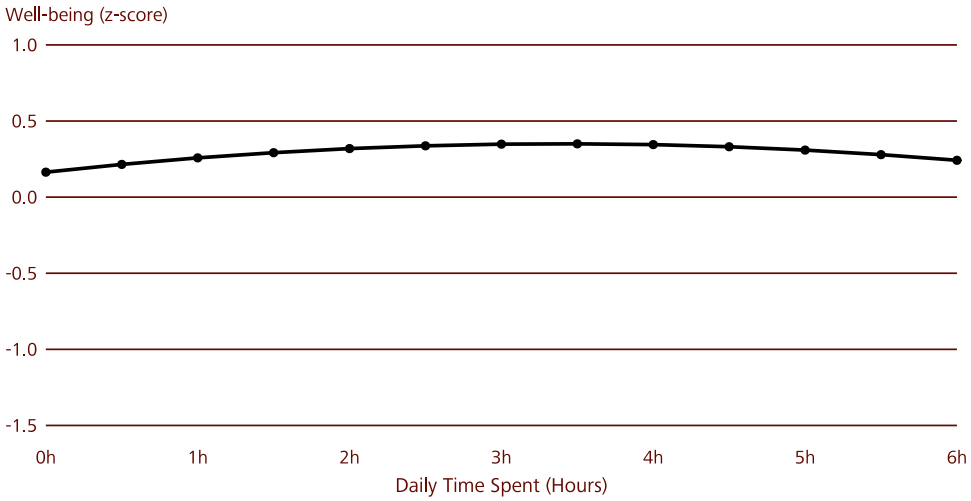
One central theme in public and academic debates on social media is whether it negatively influences young consumers' well-being, which represents a broad assessment of overall satisfaction with mental, physical, and social aspects of life.

In this report, well-being is measured with the psychometric instrument KIDSCREEN-10, which consists of 10 questions, including “Have you felt sad?” or “Have you felt fit and full of energy?” and returns a total “well-being” score ranging from 1 to 5 based on the answers.

Previous research has found that well-being tends to decline around puberty and flattens out during early adulthood. The analysis conducted for this report revealed a similar pattern, with children (8–12 years old) scoring higher than teens (13–17 years old) and teens scoring higher than young adults (18–25 years old). This age-related decline in well-being is noticeably different for boys and girls, with girls experiencing a steeper initial decline of 11 percent in the transition from childhood to adolescence and boys' well-being only decreasing by 4 percent over the same period.

At first glance, there seems to be a considerable overlap in terms of gender and age between those who experienced a decline in well-being and those who used social media the most. However, in a more formal model, no clear relationship was evident between the actual amount of time young consumers spent on social media and their well-being (see Figure 1.4).

Figure 1.4 **Predicted Well-Being Across Amounts of Daily Time Spent**



Note: This figure presents the predicted well-being (z-score) from the well-being model, with DTS (hours) on the x-axis. DTS is modeled as a quadratic effect to capture the nonlinear relationship between media use and well-being. The curve illustrates that well-being initially increases slightly from no time spent to moderate time spent before beginning to decline as media engagement becomes excessive. The graph is truncated at 6 hours, where 95.8 percent of the data falls, to ensure a more accurate representation of the observed pattern.

Source: DCCA Survey, 2023

However, the model revealed a significant negative relationship between social media addiction and well-being, which means that a considerable minority of young consumers who feel more addicted also tend to report lower levels of well-being on average. Another important result is that self-control seems to play an important role in young consumers' well-being. Higher levels of self-control are associated with a reduced tendency to display addictive behaviors but it also has a positive direct relationship with well-being.

1.2 Long-Term Exposure to Social Media

The second part of the report takes a long-term intertemporal perspective and examines how access to social media and smartphones (which allows for constant access to social media) affects young consumers' well-being in school (WIS).

Well-Being in School

Danish schools are legally obliged to assess their students' well-being annually through a standardized questionnaire that assesses various dimensions, including students' perceptions of the educational organization, their self-efficacy, social interactions, and overall well-being.

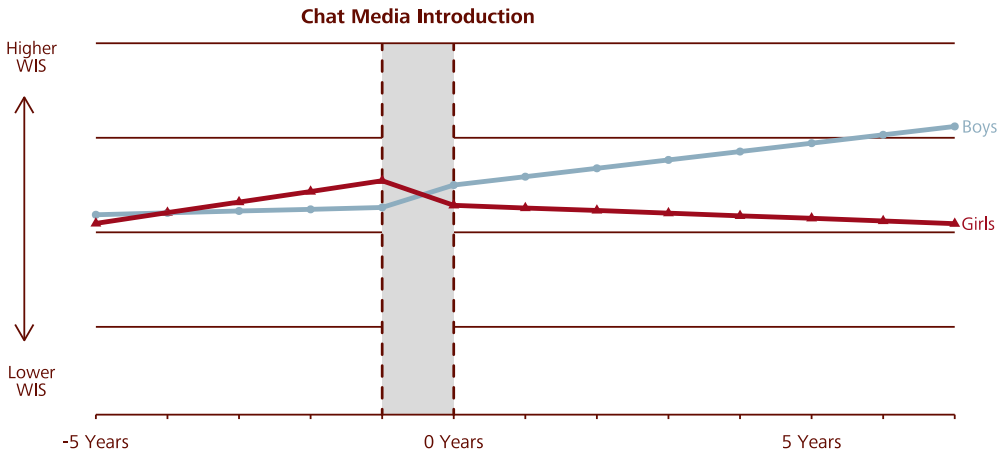
These questionnaires are collected annually, so the development of each student's well-being can be tracked over time. By integrating school data with data collected for the report, it is possible to determine whether the introduction of social media and smartphones impacts students' development at the time of acquisition and in subsequent years.

WIS and Long-Term Exposure to Chat Media

The introduction of preferred chat media affects boys and girls differently (cf. Figure 1.5). For boys, no immediate effects on educational well-being were observed. While a slight change in their trajectory was observed at the time of chat media acquisition, the difference from the preacquisition trend was not significant.

For girls and young women, chat media adoption was associated with an immediate and significant decline in WIS. While this short-term impact did not worsen over time, the girls' and young women's levels of well-being remained low even after prolonged exposure. These findings emphasize the gender-specific effects of chat media, with girls experiencing a more persistent negative impact on educational well-being.

Figure 1.5 **Predicted WIS Before and After Chat Media Introduction**



Note: This figure illustrates the predicted WIS (z-score) based on content media long-term exposure models. The x-axis represents the exposure duration (in years) to an individual's most frequently used content media, with values below zero indicating the years prior to content media exposure. Values higher than zero represent WIS after the onset of content media usage. The y-axis displays the predicted WIS. The graph highlights trends in school well-being for boys (blue line) and girls (red line), enabling gender-based comparisons before and after exposure to content media.

Source: DCCA Survey, 2023 and Statistics Denmark

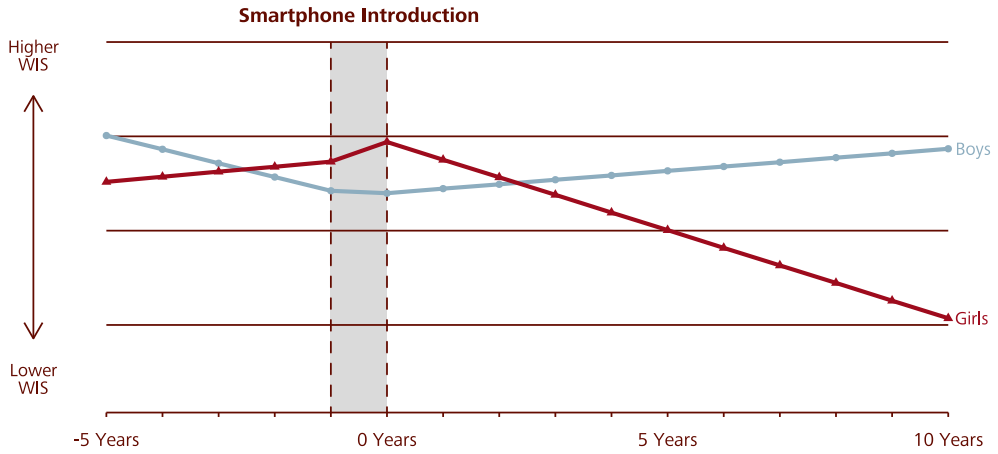
WIS and Long-Term Exposure to Content Media

A similar analysis for content-oriented social media did not reveal any measurable impact on well-being. It showed neither any immediate impact on well-being around the time the respondents started using their preferred content media nor any detectable changes to how their well-being in school developed over time in the subsequent years.

WIS and Long-Term Exposure to Smartphones

Finally, the analysis revealed how WIS developed before, after, and around the time the respondents first started using a smartphone. While this did not directly measure the impact of a specific social media, a smartphone fundamentally changes how users interact with social media by enabling (and exposing) kids to constantly access these.

Figure 1.6 **Predicted WIS Before and After Smartphone Introduction**



Note: The figure illustrates the predicted WIS (z-score) derived from the smartphone long-term exposure model. The x-axis shows the smartphone exposure duration in years, with values lower than zero representing years before engaging with chat media and reflecting pre-smartphone WIS. Values higher than zero indicate WIS after smartphone use begins. The y-axis represents the predicted well-being. The figure displays the trajectories of well-being for boys and young men, and girls and young women, enabling gender-based comparisons before and after smartphone acquisition.

Source: DCCA Survey, 2023 and Statistics Denmark

The results of the final analysis demonstrate the contrasting effects of smartphone use on WIS for boys and girls (see Figure 1.6). For boys, long-term exposure (LTE) to smartphones was associated with a small but significant improvement in well-being compared with the pre-smartphone period. The trajectory became more positive after smartphone acquisition, suggesting that prolonged smartphone use may provide benefits such as improved connectivity or access to information, which enhance their school well-being over time.

By contrast, girls experienced a different pattern. While no immediate change in their well-being was observed at the time of smartphone acquisition, their well-being steadily declined in the years that followed. This sustained decrease in well-being resulted in levels that were lower than the pre-smartphone levels approximately 2 to 3 years after acquisition. These findings highlight that while boys may experience modest benefits from prolonged smartphone use, girls face more pronounced challenges that negatively impact their WIS over time.

It is important to note that smartphone policies in Danish schools have tightened considerably from 2018 to 2023, but is has not been possible to account for individual school policies on smartphones in the analysis.

Conclusion

The results presented in this report indicate that the introduction and use of social media and the technology that enables them are associated with significant impacts on young consumers' lives. Although a large majority of young consumers generally enjoy the time they spend on social media, there still appears to be a misalignment between the amount of time they prefer to spend on social media and their actual social media consumption, that is, a tendency to "overuse" social media, which is particularly strong toward content-focused media.

Throughout the various analyses, teenage girls consequently stood out as heavier users of social media, with more addictive symptoms and lower levels of well-being than boys. Unlike boys, girls also seemed to experience both immediate and consistent declines in well-being once social media was introduced into their lives.

Another important group is young consumers, who, regardless of gender, had less available self-control and seemed to be more affected by social media addiction, with much higher media consumption and lower levels of well-being.

These findings are mainly correlational, which makes it hard to establish the causal relationship between outcomes with certainty. However, the combination of more extensive variables, unbiased time data and the use of historical data to perform time series analyses, represent methodological improvements that may indicate a more causal relationship between social media use and young consumers' well-being.

Chapter 2
Background and Survey Design

2.1 Increasing Focus on Adolescents' Social Media Consumption

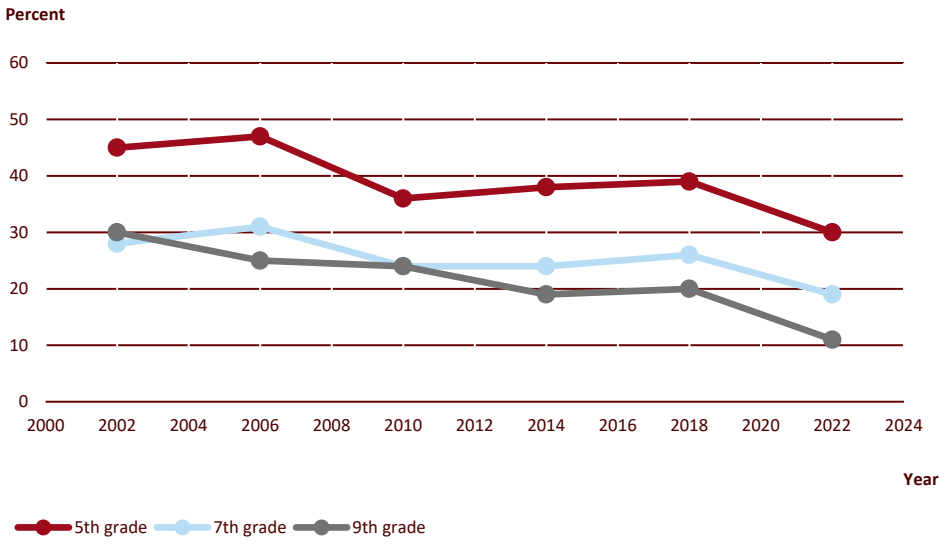
Previous research has shown that Danish teens and preteens are some of today's most avid social media consumers, and their social media use has increased steadily since social media platforms became widely available on smartphones back in 2012.[1] Surveys have estimated that teens between 16 and 17 years of age spend more than 5 hours of their day on various social media.[2] The proportion of Danish preteens and teens between the ages of 11 and 19 years who spend more than 4 hours daily on digital media has increased from 14 percent in 2017 to 41 percent in 2021.[3]

This increase in teenagers' social media consumption appears to coincide with declining mental health and general well-being among girls. A large-scale longitudinal study showed that between 1998 and 2022, the proportion of teenage girls who felt lonely tripled for 13-year-old girls (3–14 percent) and doubled for 15-year-old girls (from 6 to 13 percent).[4] Between 2002 and 2022, the proportion of girls with a high general life satisfaction decreased from 45 percent to 30 percent for 11-year-olds and from 30 percent to 11 percent for 15-year-olds[5] (see Figure 2.1).

No similar pattern is obvious when it comes to the well-being and mental health of boys' over this period (see Figure 2.2).

[1] DR Medieforskning, 2022: Medieudviklingen 2022.
[2] **https://markedsforing.dk/artikler/nyheder/danske-unge-bruger-dagligt-over-to-timer-paa-tiktok/**.
[3] Ottosen, et al. (2022). Børn og unge i Danmark: Velfærd og trivsel 2022. VIVE.
[4] Madsen, et al. (2023). Skolebørnsundersøgelsen 2022.
[5] Madsen, et al. (2023). Skolebørnsundersøgelsen 2022.

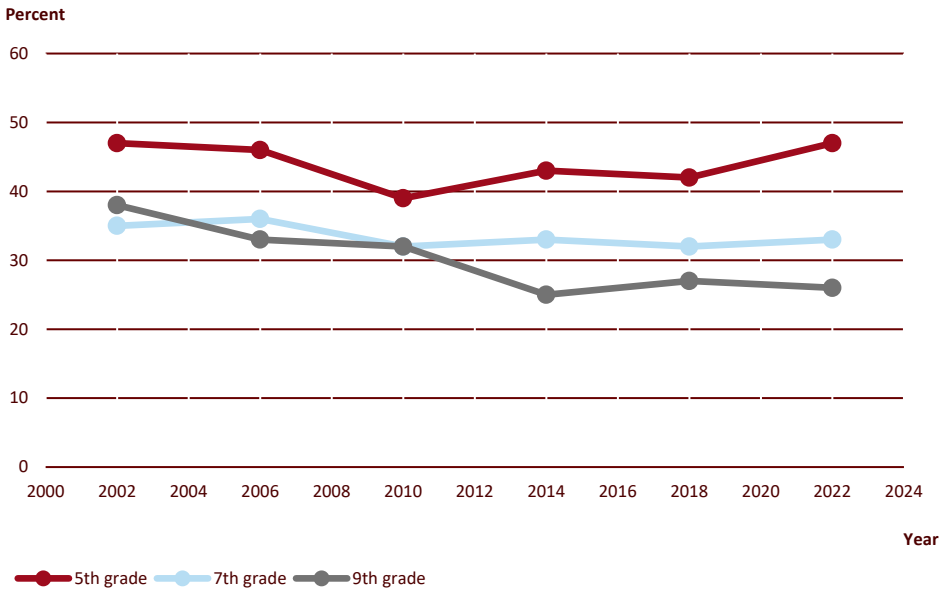
Figure 2.1 **Life Satisfaction of School-Age Girls**



Note: This figure shows the percentage of Danish school-age girls who reported high life satisfaction levels. Measurements were taken every 4 years over a 20-year period. The girls attended 5th (at around the age of 11 years; red line), 7th (at around the age of 13 years; blue line), and 9th grades (around the age of 15 years; gray line). The measure was Cantril's Life Satisfaction Scale, where children were asked, "How good do you think your life is? Answer using a scale from 0 to 10, where 10 represents the best possible life and 0 represents the worst possible life."

Source: Skolebørnsundersøgelsen 2022 (i.e., the Danish contributor to the international research project Health Behaviour in School-aged Children)

Figure 2.2 **Life Satisfaction of School-Age Boys**



Note: This figure shows the percentage of Danish school-age boys who reported having high life satisfaction levels. Measurements were taken every 4 years over a 20-year period. The boys attended 5th (around age 11 years; red line), 7th (around age 13 years; blue line), and 9th grades (around age 15 years; gray line). The measure was Cantril's Life Satisfaction Scale, where children were asked, "How good do you think your life is? Answer using a scale from 0 to 10, where 10 represents the best possible life and 0 represents the worst possible life."

Source: Skolebørnsundersøgelsen 2022 (i.e., the Danish contributor to the international research project Health Behaviour in School-aged Children)

These overlapping trends have been interpreted by researchers and organizations as a clear sign of the danger that social media poses to young consumers, particularly to their mental health and well-being.[6] [7] Other researchers disagree and point out fundamental problems with establishing clear and, more importantly, causal links between social media use and adverse effects on young consumers' mental health.[8] [9] Researchers have even considered the current debate as simply another iteration of "moral panic" whereby parents and society at large worry excessively whenever teenagers get access to new types of media such as radio, television, cartoons, video games, and, now, social media.[10] [11]

An integral part of the discussion is how the business models behind social media, which are mainly built on advertising, incentivize companies to maximize their customers' engagement.[12] Companies can boost engagement through various "retention mechanisms". One class of mechanisms uses content curation such as exposing users to posts that may engender arousal,

[6] **https://www.theatlantic.com/magazine/archive/2017/09/has-the-smartphone-destroyed-a-generation/534198/**.
[7] Haidt, J. (2024). The anxious generation: How the great rewiring of childhood is causing an epidemic of mental illness.
[8] **https://www.nature.com/articles/d41586-024-00902-2**.
[9] Vuorre, M., & Przybylski, A. K. (2023). Estimating the association between Facebook adoption and well-being in 72 countries.
[10] **https://www.theguardian.com/commentisfree/2017/aug/10/enough-with-the-moral-panic-over-smartphones-the-kids-are-alright**.
[11] **https://time.com/6958809/smartphones-screen-time-danger-pete-etchells/**.
[12] Aridor, et al., (2024). The Economics of Social Media.

which in turn increases engagement,[13] while another class uses design features such autoplay functions or notifications to reduce friction and increase engagement.[14]

While there is nothing new about companies working toward gaining and retaining their customers' attention, the nature of social media (and other similar digital market products) could mean that this pursuit is potentially harmful to users.[15] One potential for harm comes from the sheer volume of time users spend on social media, which reduces the time available for other pursuits and tasks. Another potential for harm comes from the amplification of negative social dynamics (e.g., peer comparison) and exposure to emotive content (e.g., conflict).

Previous research has indicated that potential harm from social media consumption is likely to be unevenly distributed, and estimating this is further complicated by the multiple proposed theories of harm, each of which could affect different user segments differently. Gender has been demonstrated to be an important source for heterogeneity, as a range of research studies have shown that girls appear to be more susceptible to experience negative outcomes from social media use than boys.[16] Age is another important feature, with pre-teens and teenagers being both more active on social media and susceptible to social information from peers than adults. Finally, individual differences in, for example, levels of self-control could be an additional important factor in determining potential harmful effects of overuse and addiction.[17]

2.2 Factors Contributing to Social Media Use and Well-Being

This report builds on and adds to previous research on social media and young consumers' well-being. The analyses used survey data from 2023 (see Section 2.11) that combines information on respondents' social media consumption with various psychometric instruments.[18] These data were supplemented with socioeconomic data and data on each respondents' WIS from public registries.

The survey used three constructs specifically chosen to capture how respondents felt about their social media use. These were *social media overuse*, *addiction*, and *motivation*. In addition, the survey included a randomization scheme to assign participants to two general social media types.

2.3 Subjective Well-Being

Subjective well-being represents a broad quality of life assessment, as judged by the respondents themselves, which is measured by two different metrics: “KIDSCREEN-10” and “Well-being in school.”

KIDSCREEN-10

KIDSCREEN-10[19] is a frequently used research tool for assessing mental and physical well-being in children. In this study, this tool was used to measure the respondents' general well-

[13] Beknazar-Yuzbashev, et al. (2024). A Model of Harmful Yet Engaging Content on Social Media.

[14] ICO & CMA. (2023). Harmful design in digital markets. How online choice architecture practices can undermine consumer choice and control over personal information.

[15] Ofcom (2024). Understanding Online Choices, Preferences, and Welfare.

[16] McDool, et al. (2020). The internet and children's psychological wellbeing.

[17] Allcott, et al. (2022). Digital addiction.

[18] Psychometric instruments are series of related questions that can be used to estimate individual psychological characteristics, such as motivation, intelligence or personality which cannot be directly observed.

[19] **https://www.kidscreen.org/english/questionnaires/kidscreen-10-index/**.

being. The scale contains 10 questions that assess subjective well-being, which includes aspects of the psychological, physical, and social domains. The questions are listed in Table 2.1.

Table 2.1 **General Well-Being Questions**

Here are general questions about how you have felt during the last week.
Have you felt fit and well?
Have you felt full of energy?
Have you felt sad?
Have you felt lonely?
Have you had enough time for yourself?
Have you done the things that you wanted to do in your free time?
Have your parents/others treated you fairly?
Have you had fun with your friends?
Have you gotten on well at school/education/work?
Have you paid attention during schoolwork/education/work?

Note: Responses to each question are scored on a graded Likert scale defined as follows: not at all (1), a little (2), moderately (3), very (4), and very much (5).

In the official scoring, the responses were summed to produce a total score ranging from 10 to 50, with higher scores indicating better well-being. In the present analyses, the average score of the responses (i.e., between 1 and 5) was used.

The scale was originally developed for children and young people aged 8 to 18 years. In this study, it was administered to children, teenagers, and young adults (ages 8–25 years). To better represent the different circumstances of children and young adults, the word "school" was replaced with "school/education/work" for the 16- to 25-year-olds. The scale has demonstrated good psychometric properties in previous research with a Cronbach's Alpha[20] of 0.82[21].

Well-Being in School

The second metric uses data from annual surveys of WIS, which all Danish students fill out every year from the ages of approximately 6 to 19 years (grades 0–12). WIS covers a broader set of domains than general well-being, as it also includes questions about the specific institution, such as the quality of the physical environment and teacher support. However, the school well-being survey also includes questions on physical and mental well-being, sociality, self-efficacy, and whether students experience symptoms of stress, which more or less correspond to the questions found in KIDSCREEN-10.

[20] Cronbach's Alpha represents the internal consistency of the scale, i.e., the extent to which all items in the scale measure the same underlying phenomenon. A Cronbach's Alpha value of over 0.70 is generally considered sufficiently consistent and reliable.

[21] Ravens-Sieberer, et al. (2010). Reliability, construct and criterion validity of the KIDSCREEN-10 score: A short measure for children and adolescents' well-being and health-related quality of life.

Data on WIS are collected yearly, making it possible to track how individuals' well-being evolve over time. The data are recorded in national registries and available to researchers and institutions with valid inquiries.

2.4 Self-Control

Self-control represents the ability to regulate personal behavior in the face of temptations and impulsive demands. Self-control plays an important role when consumers need to balance short- and long-term goals. It is an important cognitive process in a wide range of domains and is particularly important when balancing impulsive and addictive behaviors with long-term preferences.[22] [23]

Self-Control in the Survey: The Brief Self-Control Scale

Self-control is measured using the Brief Self-Control Scale,[24] which is designed to measure self-control and is not related to social media use per se. While this approach defines self-control as an individual characteristic, it is important to highlight that the ability to successfully regulate personal behavior also critically depends on environmental design. If an environment is designed to be tempting, it requires more individual self-control to counterbalance and vice versa.[25]

The scale is among the most frequently used in psychological research on self-control and has been shown to have good psychometric properties (Cronbach's alpha: 0.83–0.85).[26] The full scale has 13 statements, but only five were included in the survey to reduce its length.[27] The five statements (see Table 2.2) were selected for having the highest factor loadings (0.76–0.83),[28] according to Manapat et al. (2021), which indicate the degree to which each of the questions contributes to measuring self-control.

[22] Cao, et al. (2007). The relationship between impulsivity and Internet addiction in a sample of Chinese adolescents.

[23] LaBrie, et al. (2014). Impulsivity and Alcohol-Related Risk among College Students: Examining Urgency, Sensation Seeking and the Moderating Influence of Beliefs about Alcohol's Role in the College Experience.

[24] Tangney, et al. (2004). High Self-Control Predicts Good Adjustment, Less Pathology, Better Grades, and Interpersonal Success.

[25] Stacy & Wiers. (2010). Implicit Cognition and Addiction: A Tool for Explaining Paradoxical Behavior.

[26] Tangney, et al. (2004). High Self-Control Predicts Good Adjustment, Less Pathology, Better Grades, and Interpersonal Success.

[27] The eight items that are not included in the questionnaire are as follows: “I am lazy,” “I say inappropriate things,” “I avoid things that are bad for me,” “I wish I had more self-discipline,” “Other people would say that I have strong self-discipline,” “I have difficulty concentrating,” “I am able to work effectively towards long-term goals,” and “I often act without thinking about alternatives.”

[28] Manapat et al, (2021). A Psychometric Analysis of the Brief Self-Control Scale.

Table 2.2 **Self-Control Questions**

Below are situations that fit well with some people and less well with others. Think about how well they fit with you.
"I have difficulty breaking bad habits."
"I am good at resisting temptations."
"Sometimes, I can't stop myself from doing things even though I know they are wrong."
"Entertaining and fun things sometimes get in the way of completing what I need to do."
"I am sometimes willing to do things that are bad for me if they are fun."

Note: Responses to each statement are scored on a graded scale (points in parentheses) defined as follows: not at all (5), a little (4), moderately (3), very (2), and very much so (1).

Points are summed to provide a self-control total score ranging from 5 to 25, with higher scores indicating better self-control. In previous research, the scale has been administered to individuals as young as 10 years old. In this study, the scale was administered to children, teenagers, and young adults aged 11 to 25 years, while parents answered on behalf of their children aged 8 to 10 years (e.g., "My child has difficulty breaking bad habits"). In the analyses, the average score was used (i.e., 1–5).

2.5 Time Spent on Social Media

This study used data sourced from the respondents' phones to estimate the amount of time each respondent spent on specific social media and on social media in general. This approach allows for more objective measurements than self-reports, which is particularly important when studying consumption related to addiction and overuse, as personal estimates have been shown to be biased.[29] [30] [31]

Time Spent on Social Media According to the Survey

Most smartphones track the time users spend on social media and provide a detailed break-down of this per day or week. The report participants were instructed to upload screenshots of the time spent on social media from their smartphones.

All screenshots were reviewed, and those with usable data were included in the dataset. Usable timestamps were found for 39 percent of the respondents aged 8 to 12 years, 74 percent of those aged 13 to 17 years, and 68 percent of those aged 18 to 25 years.

[29] Coyne, et al. (2023). A comparison of self-report and objective measurements of smartphone and social media usage.
[30] Zhao, et al. (2022). Exploring the relations of subjective and objective Instagram use on young adults' mental health.
[31] Johannes, et al. (2021). Objective, Subjective, and Accurate Reporting of Social Media Use: No Evidence That Daily Social Media Use Correlates With Personality Traits, Motivational States, or Well-Being.

2.6 Social Media Type: Chat and Content

Social media can be categorized broadly according to their purpose, either for chat or content:

» **Social chat media** is mainly used for communication between users by, for example, sending messages, pictures, and group chats.
» **Social content media** is primarily used for viewing user-generated content such as *stories*, *reels*, or *shorts*.

Users interact differently with the two types, which leads to different potential theories of harm.

Content media provides access to content and allows users to interact with content creators and other users who engage with similar content. In theory, this means that consumption of content media is mostly passive and may be more time-consuming and addictive for consumers.

Chat media facilitates and encourages more direct communication between users or within groups. In theory, this requires active participation and demands more user attention, which lead to increased disruptions but less consumption overall.

In practice, it is difficult to neatly separate actual social media into just one of these two categories, as a media primarily designed to provide users with content typically also allows them to send direct messages. Conversely, media designed primarily to facilitate chat between users could also provide a feed function to present users with engaging content.

Social Media Type in the Survey
To avoid imposing the distinction onto specific social media, respondents were asked to choose their favorite content media (i.e., the social media they preferred to use for viewing content) and their favorite chat media (i.e., the social media they preferred to use for chat-based functions). See Appendix 6.2, questions 5 and 6, for the full wording of the questions and the response frequencies. This ensures that media are grouped according to the respondents' own assessments.

To test for differences in how users experience overuse of chat and content media, the respondents were randomly assigned to one of two groups. One group answered media-specific questions for their favorite content media (n = 1,635), and the other group answered media-specific questions for their favorite chat media (n = 1,495).

2.7 Social Media Overuse

Social media platforms can retain users by keeping them engaged for longer than they would prefer through content curation and platform design,[32] which can lead to overuse.[33] Retainment in this sense does not mean that consumers necessarily experience negative utility (e.g., frustration) while using the media. However, overuse does imply that individuals' use of social media exceeds their personal preferences for optimal use in a more general sense.

[32] Corcos & Hodara. (2023). How social media are collecting more of users' data: A behavioral model of platform retention strategies.
[33] Büchi, et al. (2019). Digital overuse and subjective well-being in a digitized society.

Thus, overuse is conceptualized and measured using questions about the regret users experienced from their own social media consumption and questions about users' tendency to experience difficulty in stopping their use of a social media platform once they have started using it. The questions used to measure overuse all refer to the respondent's preferred chat or content media, which allows the analysis to test whether overuse varies between different types of social media and between media within the different types.

Social Media Overuse in the Survey
Overuse is measured using an *overuse score*, which is constructed as an average of the respondent's answers to three statements:

Table 2.3 **Social Media Overuse Questions**

Here are questions about your experiences with social media. Choose the answer that best fits you.
"It can be hard to close [preferred social media] again once I get started."
"I regret the time I have spent on [preferred social media]."
"When I am on [preferred social media], I end up spending more time than I would actually like to."

Note: Responses to each statement are scored on a graded Likert scale (points in parentheses) defined as follows: very rarely or never (1), rarely (2), sometimes (3), often (4), and very often or always (5).

As the Social Media Overuse Scale was developed specifically for this study, no previous scientific validations were available. To ascertain the validity and internal consistency of the scale, a Cronbach's alpha (see Section 2.3) was calculated for the scale. With an alpha of 0.79, the scale demonstrates a high degree of reliability, which means that the questions are correlated and largely measure the same underlying construct.

2.8 Addiction to Social Media

Social media addiction is not recognized in diagnostic frameworks such as the *International Classification of Disease, Revision 11 (ICD-11)* or the *Diagnostic and Statistical Manual, Fifth Edition, Text Revision (DSM-5-TR)*,[34] but it has been defined broadly along the same diagnostic criteria as other behavioral addictions, such as pathological gambling or compulsive shopping. The concept also shares many commonalities with traditional substance dependencies such as nicotine and alcohol dependence. Social media addiction has been linked to an elevated risk of depression[35] and anxiety.[36]

To count as an addiction, a behavior or activity must be prevalent over time, cause recognizable harm or distress, and create a sense of deprivation when the individual is unable to partake in the activity.

[34] Brand & Potenza. (2023). Behavioral addictions in the ICD-11: An important debate that is anticipated to continue for some time.
[35] Santini, et al. (2024). Social Media Addiction Predicts Compromised Mental Health as well as Perceived and Objective Social Isolation in Denmark: A Longitudinal Analysis of a Nationwide Survey Linked to Register Data.
[36] Lopes, et al. (2022). Problematic Social Media Use and Its Relationship with Depression or Anxiety: A Systematic Review.

A meta-analysis estimated that the prevalence of social media addiction in Northern Europe is around 8 percent, while an even larger proportion experience milder forms of addiction.[37] A recent study in Denmark suggested that 2.3 percent of Danes between 16 and 64 years of age have some form of social media addiction.

Social Media Addiction According to the Survey: The Bergen Social Media Addiction Scale

Addiction to social media is measured with the Bergen Social Media Addiction Scale,[38] which consists of six questions designed using items similar to those used to measure other behavioral addictions. The scale was developed on the basis of the addiction theory, which measures addiction through six core components: salience, tolerance, mood modification, relapse, withdrawal, and conflict (see Box 3.3). The scale includes one statement for each component.

Table 2.4 **Social Media Addiction Question**

In the last few months, I have…
"Spent a lot of time thinking about social media."
"Felt the need to use social media more and more."
"Used social media to forget about personal problems."
"Tried to cut down on the use of social media."
"Become restless or troubled if I was unable to use social media."
"Used or thought about social media so much that it has disrupted my schooling/education/work."

Note: Responses to each statement are scored on a graded Likert scale (points in parentheses) defined as follows: very rarely or never (1), rarely (2), sometimes (3), often (4), and very often or always (5).

Points are summed to a total score (range, 6–30), where higher scores indicate stronger (unhealthy) dependence on social media. The scale has been validated for use among individuals older than 16 years, but it has also been used previously in research with children as young as 10 to 12 years.[39] In this study, it was administered to children and young consumers aged 11 to 25 years. The scale is frequently used in research and has shown good psychometric properties (Cronbach's alpha: 0.83–0.88).

2.9 Motivation for Social Media Use

Research in gaming suggests that different types of motivation play an important role in how prolonged gaming affects young consumers. Specifically, when users feel intrinsically

[37] Cheng et al. (2021). Prevalence of social media addiction across 32 nations: Meta-analysis with subgroup analysis of classification schemes and cultural values.

[38] Andreassen, et al. (2016). The relationship between addictive use of social media and video games and symptoms of psychiatric disorders: A large-scale cross-sectional study.

[39] Luo, et al. (2021). Determination the cut-off point for the Bergen social media addiction (BSMAS): Diagnostic contribution of the six criteria of the components model of addiction for social media disorder.

motivated, they tend to have higher levels of well-being, whereas extrinsic pressures tend to be associated with lower levels of well-being.[40]

In this report, intrinsic motivation refers to the primary hedonic reward (i.e., having fun and enjoyment) that users may associate with spending time on social media. Extrinsic motivation refers to the pressure that users may feel to be on social media due to FOMO (fear if missing out), or group pressure. These two types of motivation are not mutually exclusive and are measured separately through two series of survey questions (see Table 2.5 and Table 2.6 below). This approach recognizes that young consumers can feel both types of motivations concurrently and that a change in one type of motivation does not necessarily lead to a change in the other.

Internal and External Motivations According to the Survey
In this study, internal and external motivations were measured specifically for the respondents' use of their preferred social media platforms.

Table 2.5 **External Motivation Questions**

Here are questions about your experiences with social media. Choose the answer that best fits you.
"I am afraid of disappointing my friends if I am not present on [preferred social media]."
"I am afraid of missing out on something fun, exciting, or important if I am not on [preferred social media]."

Note: Responses to each statement are scored on a graded Likert scale (points in parentheses) defined as follows: very rarely or never (1), rarely (2), sometimes (3), often (4), and very often or always (5).

Table 2.6 **Internal Motivation Questions**

Here are questions about your experiences with social media. Choose the answer that best fits you.
"I enjoy the time I spend on [preferred social media]."
"I have fun when I am on [preferred social media]."

Note: Responses to each statement are scored on a graded Likert scale (points in parentheses) defined as follows: very rarely or never (1), rarely (2), sometimes (3), often (4), and very often or always (5).

2.10 Participants and Representativeness

From October to December 2023, 115,000 young social media consumers (8–25 years old) and parents of adolescent social media consumers (8–17 years old) were invited to participate in the survey. Invitation letters were distributed through the official Danish mailbox system e-Boks, a secure mail system that facilitates mail from public and official parties and is mandatory for Danes older than 15 years. The letter invited potential participants to participate in a

[40] Vuorre, et al. (2022). Time spent playing video games is unlikely to impact well-being.

"survey on social media, screen time, and well-being among children and young people" (see Appendix 6.1 for the full invitation text). The letter also contained information about the processing of personal data. Participation was voluntary but incentivized, as all final participants were enrolled in a lottery where they could win a gift card equivalent to 1,000 DKK.[41]

The Sample

The participants were identified from the Central Office of Civil Registration via the Danish Health Data Authority (*Sundhedsdatastyrelsen*) based on random selection of Civil Registration Numbers.[42] The sample was drawn from among the population of parents of minors (8–17 years old) and young adults (18–25 years old).

At the start of the survey, parents were asked to enter their child's mobile phone number so that they could receive a direct link. Children were asked to complete the survey themselves but were encouraged to reach out for help in cases of doubt. The parents provided informed consent on behalf of their children. Young adults between the ages of 18 and 25 years received the invitation directly through their e-Boks account.

The survey questionnaire was distributed to 115,000 parents and young adults. This led to 10,044 parents, young adults, and children opening the survey (4,330 parents and 5,714 children). Of these respondents, 3,445 between the ages of 8 and 25 years and 2,381 parents of children aged 8 to 17 years completed the survey and were included in the final sample. The final participation rate of 8- to 25-year-olds was approximately 3 percent. Among those who started answering the questionnaire, 76 percent of the young adults and children completed the survey and uploaded screen-time screenshots.[43] The corresponding completion rate for parents was 65 percent.

Age

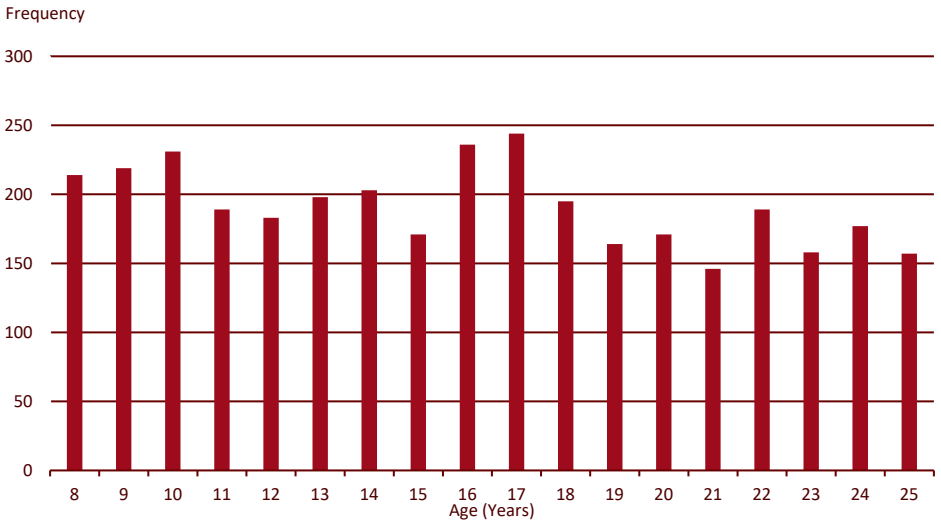
The final sample had an even age distribution ranging from 146 for the 21-year-olds to 244 for the 17-year-olds (see Figure 2.3).

[41] Ten gift cards were randomly assigned to the participants in the study. The gift cards were issued to Supergavekortet.dk, a Danish vendor of universal gift cards, which can be redeemed at a wide variety of retailers, both online and in physical stores. These gift cards are versatile because they allow the recipient to choose where they want to spend the card from a list of participating stores and services, which might include everything from fashion and electronics to sports and wellness facilities.

[42] **https://en.wikipedia.org/wiki/Personal_identification_number_(Denmark)**.

[43] The approximately 24 remaining children and young adults who began answering the questionnaire but were not included in the final sample were divided into three categories: the first group were young adults who did not receive the full questionnaire owing to a fault in a filter in one of the distribution rounds. The remaining participants who were not included either did not manage to upload a screenshot or dropped out in the very beginning of the survey.

Figure 2.3 **Age Distribution**



Note: This figure shows the number of final participants for each age group in the sample of children (8–17 years old) and young adults (18–25 years old).

Source: DCCA Survey, 2023

Gender

The gender distribution in the final sample among children and young adults was nearly equal, with 52 percent girls and young women and 48 percent boys and young men (see Figure 2.12).[44] However, although the questionnaire was evenly distributed to mothers and fathers, mothers had a higher participation rate. Thus, the final parent sample comprised 69 percent women and 31 percent men.

Representativeness

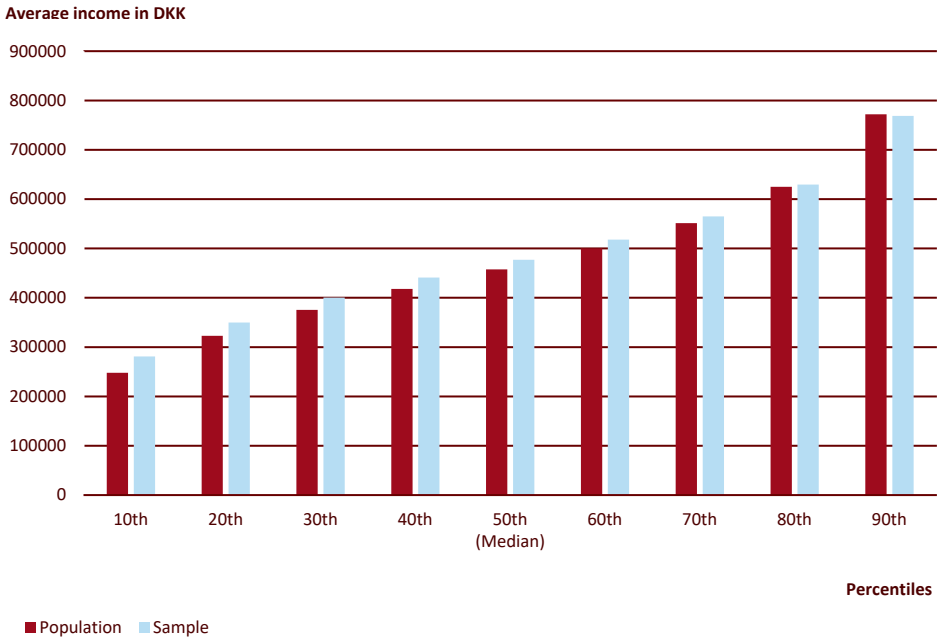
The selection of potential participants in the original sample was representative on the basis of the principles of random distribution over large samples. While this ensures that the survey was distributed evenly, there is still a risk of self-selection bias due to voluntary participation. Self-selection bias can occur when some respondents are more (or less) likely to participate in a study because of factors that play a role in the study itself. Bias could stem from the design of the survey invitation; for example, the chance to win a monetary reward could be more attractive to participants with fewer means, or the contents of the invitation could be written in a language that seemed inaccessible to less educated potential participants.

To examine the risk of self-selection bias, a range of variables from the final sample (those who finished the survey) were compared with the same variables for the entire relevant

[44] The sample of participants that the project selected for recruitment only included CPR-numbers of adult participants (i.e., parents and young adults), birthdays of the parent's children, children's names, and municipality codes. It was not possible to obtain the children's genders or the parents' socioeconomic statuses for recruitment purposes. However, this information was available upon coupling of data to the registries in the Statistics Denmark databases.

population of young consumers between 8 and 25 years old and family variables from parents to kids and young adults in that age range.

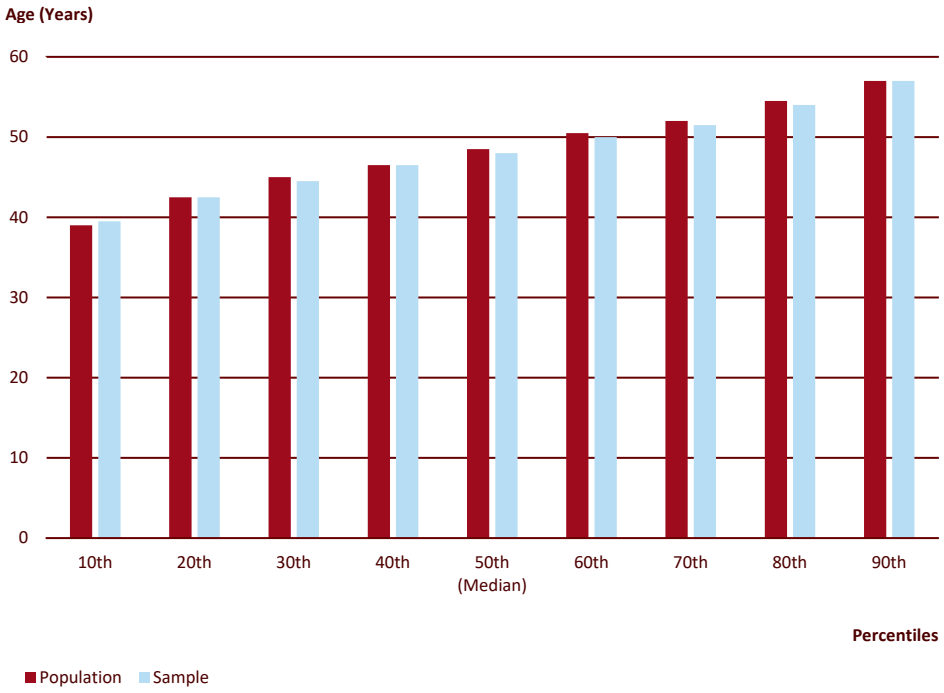
Figure 2.4 **Parental Income Distribution**



Note: The figure shows the average yearly income before tax for each decile of the Danish parent population compared with the sample parent population. Each decile represents 10 percent of the population (e.g., the "10th" decile includes data on the income of parents with the 10 percent lowest yearly earnings). The red bars represent the average income for the full population of Danish parents with children aged 8 to 25 years (N = 1,249,117). The blue bars represent the average income of the parents of the children who participated in the study (N = 3,445).

Source: Statistics Denmark

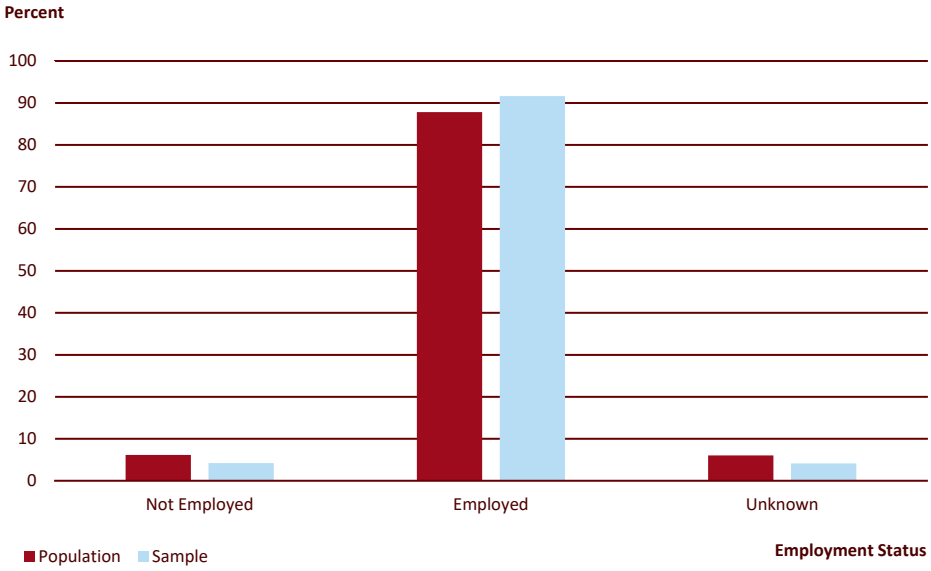
Figure 2.5 **Parental Age Distribution**



Note: The figure shows the average age for each decile of the Danish parent population compared with the sample parent population. Each decile represents 10 percent of the population (e.g., the "10th" decile includes data on the age of parents with the 10 percent lowest age). The red bars represent the average ages for the full population of Danish parents with children aged 8 to 25 years. The blue bars represent the average age of the parents of the children who participated in the study.

Source: Statistics Denmark

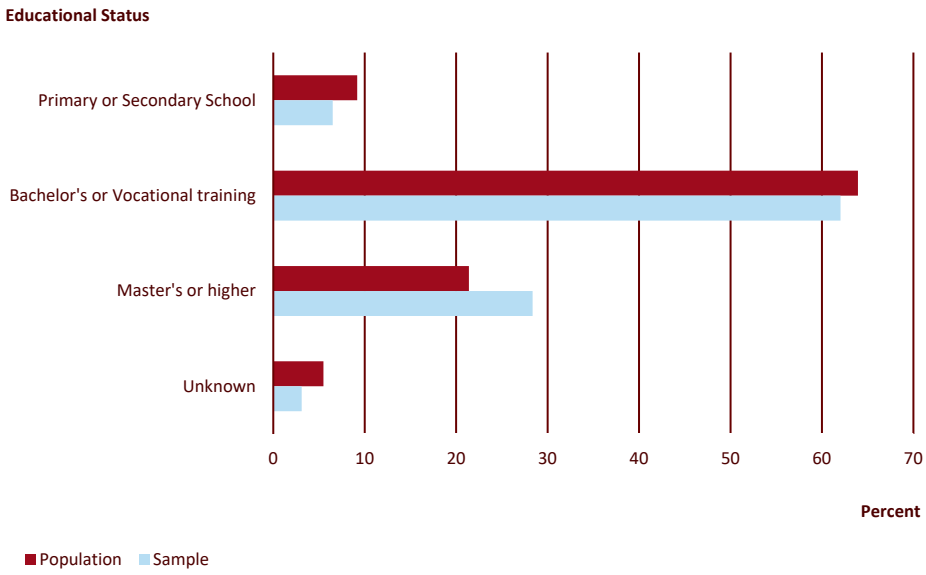
Figure 2.6 **Parental Employment Status**



Note: The figure shows the employment status of the entire population of Danish parents with children aged 8 to 25 years (red) and the parents to the children in the survey sample (blue).

Source: Statistics Denmark

Figure 2.7 **Highest Parental Education**

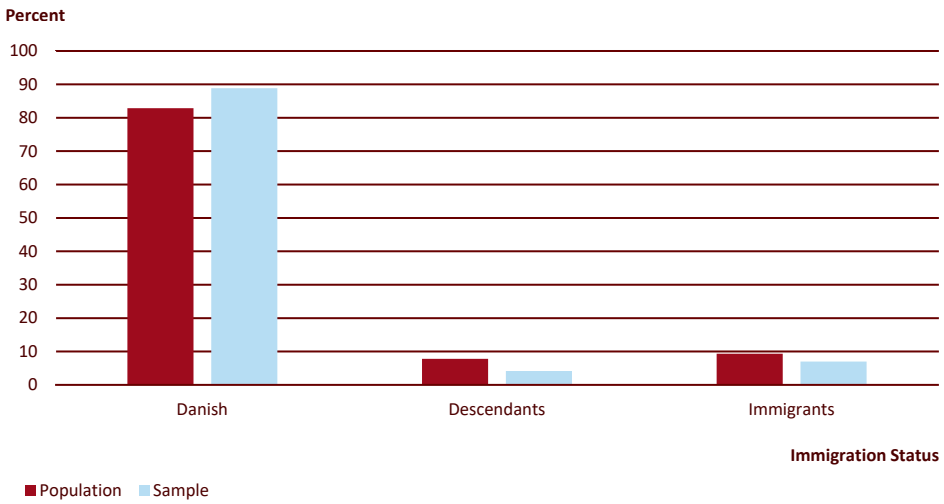


Note: The figure shows the parental education for the entire population of Danish parents to children aged 8 to 25 years (red) and for the parents to the children in the survey (blue).

Source: Statistics Denmark

Children and Young Adult Variables

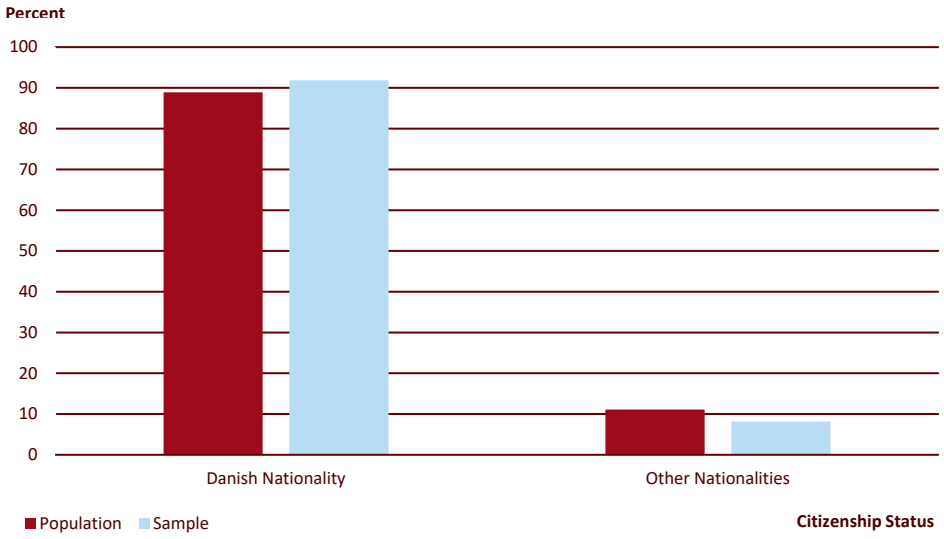
Figure 2.8 **Immigration Status of Children and Young Adults**



Note: The figure shows the immigration status of the entire population of children and young adults (red) and the children and young adults who participated in the survey (blue).

Source: Statistics Denmark

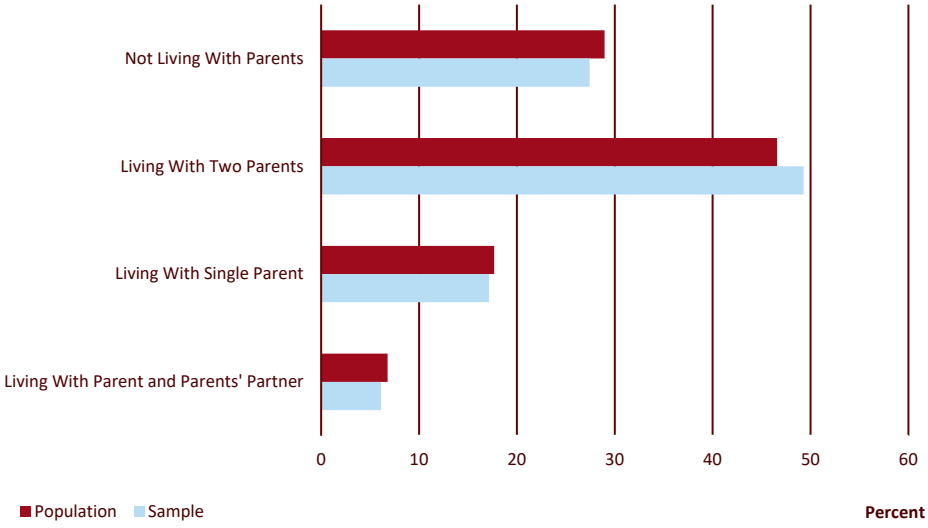
Figure 2.9 **Citizenship Statuses of Children and Young Adults**



Note: This figure shows the primary nationalities of the general population of children and young adults aged 8 to 25 years (red) and the participating sample (blue). Note that if the participant has two citizenships where one is Danish, they are counted as Danish nationality.

Source: Statistics Denmark

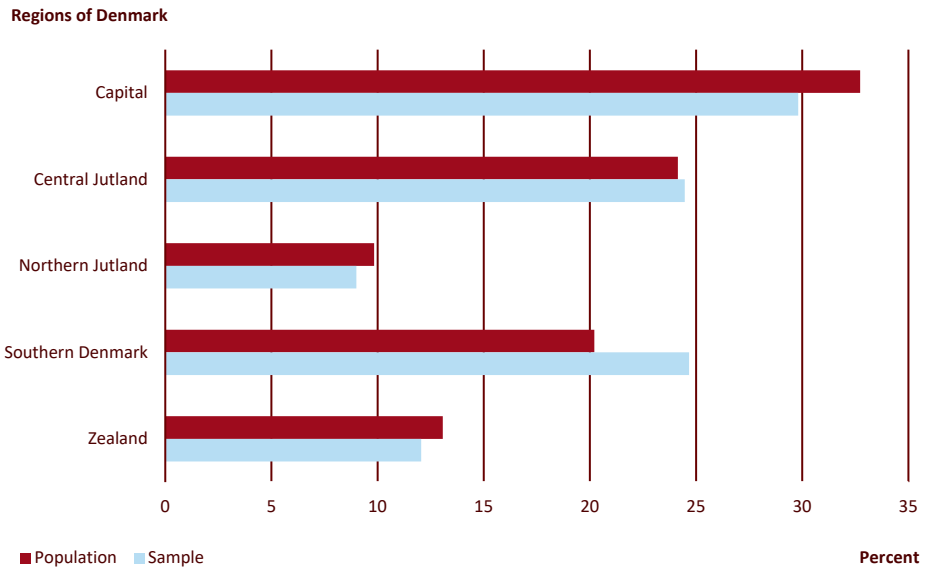
Figure 2.10 **Children and Young Adults Living with Parents or Not**



Note: This figure shows whether the child or young adult was living alone, with both parents, with only one parent, or with one parent and the parent's new partner.

Source: Statistics Denmark

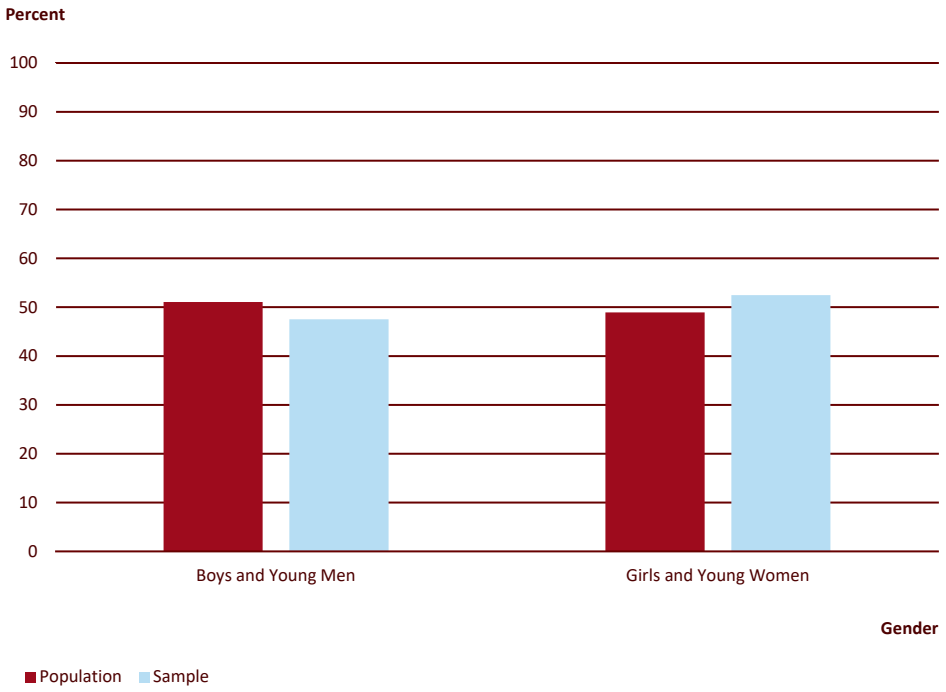
Figure 2.11 **Region of Residence for Children and Young Adults**



Note: This figure shows the distribution of Danish children and young adults (aged 8–25 years) in each of the five regions of Denmark (red). The blue bars denote the sample of children and young adults who participated in the survey.

Source: Statistics Denmark

Figure 2.12 **Gender Distribution Among Children and Young Adults**



Note: This figure shows the gender distributions of the population sample of children and young adults aged 8 to 25 years (red) and the survey sample (blue).

Source: Statistics Denmark

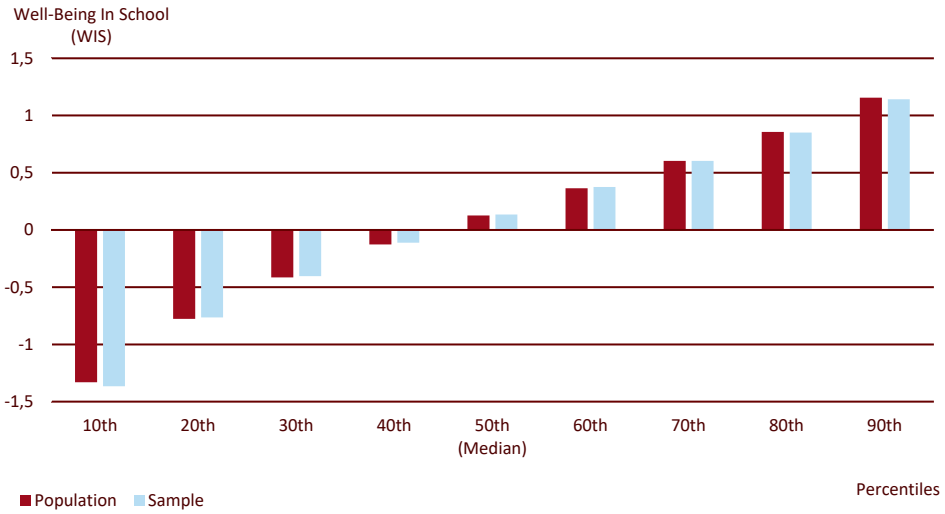
As Figures 2.4 to 2.12 demonstrate there are only minor deviations between the sample and the population it is meant to represent, at least in terms of background variables. The sample is slightly more often employed (or self-employed) and is somewhat better educated than the population, but these differences are too small to warrant concerns over self-selection bias in terms of the sample's sociodemographic composition.

Another potential source of self-selection bias is if some participants were more motivated to participate in the study because they felt worse (or better) about their social media consumption than their peers. In that case, the research could risk overestimating the prevalence of problematic social media use and the relationship this could have with other important variables.

This type of self-selection is more difficult to test, as it would require a comparison between the sample and the population across the outcome variables of the study, which, if possible, would eliminate the need for a sample to begin with.

Well-being in school (WIS) is the only outcome variable that allowed for a comparison between the sample and the population. As shown in Figure 2.13, the z-score percentiles for school well-being were nearly identical between the population and the survey sample. The comparison under-scores that the sample is not doing better or worse than their peers. As the WIS contains items on more general well-being, it is unlikely that the sample is distinctly different from the population in terms of this important variable.

Figure 2.13 **Well-Being In-School Between Population and Sample**



Note: This figure compares the distribution of school well-being z-scores between the Danish population (blue bars) and the survey sample (red bars) that were collected between 2018 and 2023. The percentiles range from the 10th to the 90th percentiles, illustrating marginal differences between the two groups. The close alignment of the scores across the percentiles indicates that the survey sample accurately represents the broader population in terms of school well-being, supporting the generalizability of the school well-being scores from the sample to the general population.

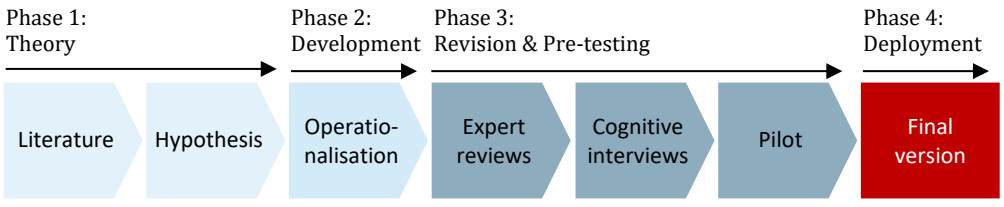
Source: Statistics Denmark

2.11 Survey Design

Survey Development

The development of the survey covered three phases (see Figure 2.14). The first phase was a literature study used to develop hypotheses and refine the questionnaire. The second phase was the development and selection of questions. The third part covered the review and pre-testing.

Figure 2.14 **Survey Development**



Note: This figure shows the different steps in developing the survey.

Source: DCCA, 2024

A large part of the survey was developed to test the hypotheses by means of psychometric scales and items. Novel items were developed to capture the respondents' experiences with social media overuse, among other topics (see Section 2.11 for questionnaire content and Appendix 6.2 for a full list of the questions posed).

The initial survey underwent three rounds of revisions before distribution: expert reviews, cognitive interviews, and piloting,[45] [46] which corresponds to the revision and pretesting phase in Figure 2.14. Several experts within the fields of psychology, social media, and quantitative methods provided feedback on the survey. Experts also commented on the theoretical background, hypotheses, survey methods, and design of the study. All comments were considered and, when feasible, incorporated into the final design. See Appendix 2 (Response Frequencies DCCA Survey) for an overview of the questions and response frequencies.

Survey Face Validity

Cognitive interviews were used to ensure that the survey questions were comprehensible and relatable. They were also used to test the length of the survey and that it could be completed in one take. Twenty cognitive interviews were performed across different age groups and genders. The interview procedure included printing out the survey and having the respondent go through the survey while the interviewer noted down comments and questions.

The final survey contained the following four main versions based on age:

Versions "D" for older teenagers (16–17 years, n = 482) and "E" for young adults (18–25 years, n = 1,357). They spent on average 14 minutes answering the full questionnaire of 58 to 60 questions.

Version "C" for children aged 11 to 15 (n = 942). At this age, most children have smartphones, and almost all are using one or more social media.[47] This group also received the full questionnaire with 58 to 60 questions, including all three psychometric questionnaires. They completed the full questionnaire in approximately 20 minutes, including uploading screenshots.

Version "B" for children aged 8 to 10 years (n = 664). In this group, children with a phone and access to social media answered around 49 questions. They were not asked to answer the questionnaire on addiction, as the scale is not suitable for this group. The young children spent approximately 20 minutes completing the questionnaire. Among the children between 8 and 10 years old, some (13.3 percent) did not have access to smartphones, and a larger group (33.6 percent) did not have access to social media. This subgroup of participants was included in the study but received a shorter questionnaire with 18 questions. They spent around 5 minutes completing the questionnaire.

Version "A" for parents (n = 2,381). Parents answered a trimmed version of the questionnaire with 13 to 14 questions about their social media use. Questions related to self-control, addiction, or well-being were excluded from this version. However, parents of the youngest children (8–10 years old) were asked to respond to the five self-control questions from the Brief Self-Control Scale on behalf of their child. In this case, the questions were formulated: "My child has…." instead of "I have...." Like the children and young adults, the parents were also asked to estimate how much time they spent on social media and upload a screenshot from their phone showing the time spent on social media. Parents spent an average of 17 minutes completing the questionnaire.

[45] Geisen & Bergstrom. (2017). Chapter 1. Usability and Usability Testing.

[46] Ruel, et al. (2016). Pretesting and Pilot Testing.

[47] A study from 2021 reported that 99 percent of Danish children had at least one social media account. *Børn og unges oplevelser med digitale krænkelser*, 2021, Red Barnet.

Pilot Testing
Finally, a pilot test was run to test for technical problems with filters, functionality, and so on. This test also validated that the respondents completed the survey in one session. The pilot questionnaire was sent to 10,000 participants who were also encouraged to comment on the questionnaire.

Stakeholders
Prior to launching the survey, four social media companies, Meta, Google, Snap, and ByteDance, were notified and asked for comments on the survey. All four companies responded. Some companies referred to relevant literature, their own well-being surveys, or their own initiatives to reduce children's online risks. Some also suggested adding questions for parents of very young social media consumers (below the age of 13 years) who used social media despite being too young, according to the companies' own terms and conditions. Overall, comments from social media companies did not lead to significant changes.

2.12 Survey Order

When the survey questions are in a fixed order, they may influence aggregate responses, which is typically referred to as *ordering effects* or *ordering bias*. This may occur in any type of survey-based research, but the risk is particularly high when survey questions are liable to affect the participant's mood.[48]

The present survey contained elements such as questions about well-being, self-control, and social relations that could potentially influence answers to subsequent questions. Ordering effects can be counterbalanced by randomizing the order of the survey, but complete randomization is often not desirable, as it undermines thematic structures and risks, confusing respondents.

The survey was designed to strike a balance between these risks by randomizing the order of some blocks, topics, and questions. Table 2.7 provides an overview of the randomization scheme. It was grouped into four blocks: *Background*, *Social media*, *Psychological test batteries*, and *Time spent*. Randomization was used for blocks 2 and 3, but not for blocks 1 and 4.

[48] Tourangeau, R., Rips, L. J., & Rasinski, K. (2012). The Psychology of Survey Response.

Table 2.7 **Semi-Randomization of Blocks, Topics, and Questions**

Block	Topic	Question no.	Randomization
1. Background	Type of phone and social media	1-8	No randomization Block always first
2. Social media	User type and time limits	9-12	Order of blocks randomized
	Community	13-19	Within each block, the order of topics randomized
	Social media experience	20-33	
3. Psychological test batteries	Social media addiction	34-39	Within topics, the order of questions randomized
	General well-being	40-51	
	Self-control	52-56	
4. Time spent	Estimates of and actual time spent on social media	57-60	No randomization Block always last

2.13 Block Design

The questionnaire consisted of four main blocks with several topics. The blocks were part of the randomization scheme to minimize confounders due to order effects. The questions in each of the four blocks were thematically related but covered different aspects of the themes.

Block 1. Background
In this block, the participants provided information on a range of questions about their social media consumption in general. They were also asked to indicate when they got their first smartphone and started using their favorite social media. The respondents listed the different social media platforms they used and specified which ones they used most often for viewing content or chatting.[49]

Block 2. Social Media Experience
Block 2 was designed to investigate children's and adults' perception of the time they spent on social media and their positive negative experiences related to social media. The block also contained questions on usage patterns, where the respondents indicated how often they performed different actions (e.g., posting, reacting to likes, and sending messages), and whether they had any restrictions on their use. This block also included questions about sociality, social media use during school, and so on. It featured a series of questions about the participants' social media overuse and intrinsic and extrinsic motivations for being on social media.

Block 3. Psychological Test Batteries
Three research-validated questionnaires were used to measure addiction to social media, well-being, and self-control.

[49] Respondents were presented with brief descriptions on the difference between the two social media types before giving their answers.

Block 4. Time Spent on Social Media
At the end of the questionnaire, the participants were asked to estimate their weekly social media use and subsequently upload a screenshot from their smartphone's "screen time" function. Finally, they were asked whether they were satisfied with their social media use. Hence, the survey distinguishes between perceived or estimated time spent and actual time spent on social media.

2.14 Enriching Data with Information from Statistics Denmark

Survey data were uploaded to Statistics Denmark's research database and enriched with individual-level information regarding income, labor market status, and so on from Statistics Denmark. This (enriched) dataset can only be accessed in an anonymized form.[50]

The present researchers were also granted access to individual registry data on WIS collected by the National Agency for IT and Learning (see Table 2.8).[51]

Table 2.8 **Registries from Statistics Denmark Included in This Study**

Register name	Purpose of the project	Population	Years	Source
BEF-Population statistics	Demographics	Parents/young adults	2023	Statistics Denmark
IND-Income	Socio economic indicator	Parents/young adults	2022	Statistics Denmark
RAS-Workforce statistics	Socio economic status - connection to the labor market	Parents/young adults	2021	Statistics Denmark
UDDA-Highest education completed	Educational level	Parents/young adults	2022	Statistics Denmark
UDG-Grades for completed education	Personal competences	Parents/young adults	2023	Statistics Denmark
UDFK-Elementary school grades	Personal competences	Parents/young adults/Children	2022	Statistics Denmark
UDGK-Individual course grades from secondary education	Personal competences	Parents/young adults/children	2022	Statistics Denmark
Well-being in school (Elementary school)		Young adults/children	2018-2023	National Agency for IT and Learning
Well-being in school (High school)		Young adults/children	2018-2023	National Agency for IT and Learning

[50] The authority collects, compiles, and publishes statistics on the Danish society. **https://www.dst.dk/en/**.
[51] **https://eng.uvm.dk/the-ministry/the-ministry-structure/national-agency-for-it-and-learning**.

Chapter 3
Overuse, Addiction, and Well-Being

3.1 Relationships Between Young Consumers' Social Media Overuse, Addiction, and Well-Being

Social media has provided consumers, particularly young consumers, with unparalleled opportunities to connect, create, and access entertainment. However, the rapid increase in the use of social media has also led to concerns about the impact that social media may have on users' mental health.

This chapter analyses the interplay between social media overuse and addiction, time spent on social media, and young consumers' well-being. The analyses used behavioral data and linked these to psychological outcomes in two complementary sets of models.

The first set of models examined the relationship between overuse and time spent on specific social media platforms. The second set of models explored how users' general social media consumption connects to addiction and well-being.

This integrated framework provides platform-specific insights and a wider perspective on how digital habits shape mental health. The key results are outlined below.

Overuse and Time Spent on Users' Preferred Social Media
Overuse is quite a widespread phenomenon. Ten percent of these users reported that they *often*, *very often*, or *always* regretted the time they spent on social media. In addition, 21 percent struggled to log off, and 29 percent spent more time on their favorite social media platform than they would prefer.

Overuse scores were similar across genders but revealed age-specific differences, with teenagers between 13 and 17 experiencing the highest levels of overuse compared with children and young adults.

Content-based platforms such as video-sharing and entertainment-focused social media such as TikTok and Instagram were associated with significantly more overuse than chat-based media such as Snapchat and Messenger.

Users with more self-control had significantly lower overuse scores, indicating that self-regulation acts as a protective buffer against becoming overly absorbed in social media. Extrinsic motivation such as the desire for social validation or FOMO was also tightly associated with overuse, suggesting that social pressures can lead users to engage with social media beyond what they would prefer.

Social Media Addiction, DTS, and Self-Control
Signs of social media addiction, characterized by compulsive use despite negative consequences, affects young people in Denmark in varying degrees. Teenage girls between 13 and 17 years old are particularly vulnerable, with the highest number of addictive symptoms. Girls and young women had higher addiction scores across all age groups than boys and young men, with the most pronounced disparity for teenagers.

Daily Time Spent (DTS) on social media displays a similar pattern, with teenage girls spending approximately 40 minutes longer on social media daily when compared with boys in the same age group. These findings highlight how gender plays an important role in how young consumers use and experience social media.

As with overuse, self-control has a strong mitigating effect on addiction. Conversely, addiction positively correlates with overall time spent across social media platforms, so users with higher addiction scores spend significantly more time across various media.

Well-Being
The analysis highlights a nuanced relationship between the time a user spends on social media and their well-being. For boys and young men, well-being follows an inverted U-shaped trajectory, where moderate levels of daily social media engagement of up to approximately 3 hours and 30 minutes correlate with higher well-being scores. However, beyond this threshold, more time spent corresponds to a decline in well-being, particularly for a minority of boys and young men who use social media for more than 5 hours a day. By contrast, for girls and young women, DTS on social media shows no meaningful relationship to how well they feel.

Addiction to social media has a highly significant negative relationship with well-being, with higher addiction levels associated with worse mental health, and the effect size is equal between both genders.

The analyses demonstrate the need to go beyond overly simple explanations to understand the role of social media in young consumers' well-being. While screen time has limited explanatory power on its own, the combination of extreme use patterns and addictive behaviors provides a more complete picture of how social media influences psychological outcomes.

3.2 Analytical Models

The first analysis builds on two sets of models designed to test the relationship between individual characteristics, social media overuse, addiction, time spent on social media, and well-being among young (8–25 years old) Danish consumers.

First Set of Models: Social Media Overuse and Time Spent on Preferred Media
The first set of models focused on the relationship between overuse and time spent on users' preferred social media platform (see Figure 3.1). Specifically, this includes the following:

1. **Model 1: Social Media Overuse**
   A model that tests the relationship between individual characteristics (e.g., self-control), media specific characteristics (e.g., media type), and overuse.
2. **Model 2: Time Spent on Preferred Media**
   A model that tests the relationship between overuse and time spent on users' preferred media platforms.

Purpose of the First Set of Models (Model 1)
The main variables for these models all pertain to the respondents' preferred chat or content media platform.

By focusing on the users' preferred media (either chat or content platforms), the models provided a high degree of specificity, which enabled the estimation of platform-specific overuse levels and comparisons of overuse levels between the media types (chat vs content). In addition, these models helped determine the direct link between social media overuse and time spent on social media.

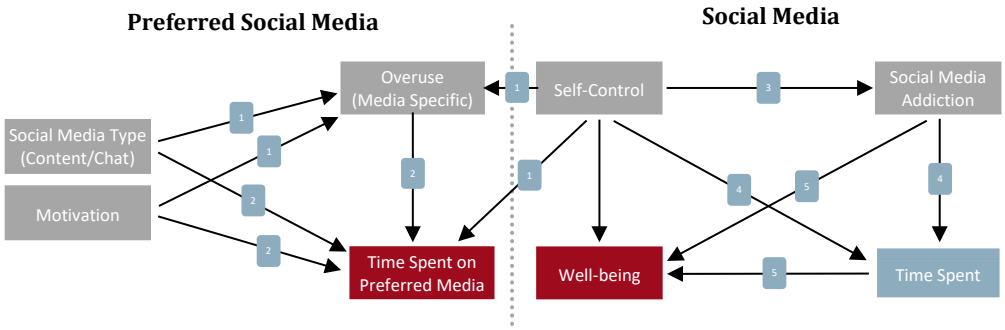
Second Set of Models: Social Media Addiction and Time Spent on Social Media
The second set of models was designed to analyze relationships between social media use in general and broader outcomes such as addiction, time spent across all social media platforms, and well-being. The second set has three models:

3. **Model 3: Social Media Addiction**
   A model that examines relationships between individual characteristics such as levels of self-control and signs of social media addiction.
4. **Model 4: DTS on Social Media**
   The model that was used to examine the relationship between social media addiction and time spent on social media.
5. **Model 5: Well-Being**
   The model used to test the relationships between social media addiction, time spent, and well-being.

Purpose of the Second Set of models
These models use more general variables such as time spent (across all social media platforms, social media addiction, and general well-being) to analyze broader patterns. Unlike the first set of media-specific models, the models in this set were not designed to evaluate the impact of specific platforms.

The complete analytical framework is outlined in Figure 3.1.

Figure 3.1 **Structure of the Analytical Models for Chapter 3**



Note: This figure visualizes the structure of the models analyzed in this study, outlining the relationships tested using regression models. The left side emphasizes media-specific engagement, showing how elements such as the type of social media and user motivations, which cover both intrinsic and extrinsic motivations, influence overuse and engagement with an individual's primary media platform, moderated by self-control. The right side focuses on broader media engagement, illustrating how general addiction and total media use impact well-being. The diagram highlights self-control as a central factor linking media habits to overall well-being, providing a comprehensive view of how different facets of digital media use are related to psychological outcomes.

Source: DCCA, 2024

3.3 Social Media Overuse

Descriptive Data
A substantial proportion of young consumers reported challenges related to managing their time on social media. Approximately 10 percent of the respondents reported (very) often or always regretting time spent on their most used social media platform. Furthermore, 21 percent found it difficult to close their preferred platform, and 29 percent admitted to spending more time on their preferred social media than they would like.

These self-reported behaviors were combined into a composite overuse score to measure how retained or "hooked" the respondents felt by their preferred social media platform. It is important to highlight that respondents were asked to select which social media they preferred for chat- and content-related use prior to being randomly allocated into answering media-specific questions for either the chat or content media. This means that the propensity to use either type of media (chat or content) was similar across all respondents.

The average overuse score for all respondents was M = 2.42, SD = 0.98, with some variation according to age and gender. Teenagers (13–17 years old) had the highest overuse score (M = 2.48, SD = 0.97), followed by young adults (18–25 years old; M = 2.42, SD = 1.00) and children (8–12 years old), who had the lowest overuse score (M = 2.34, SD = 0.95). Gender differences were more pronounced, as girls and young women reported notably more overuse of social media (M = 2.50, SD = 0.97) than boys and young men (M = 2.33, SD = 0.98).

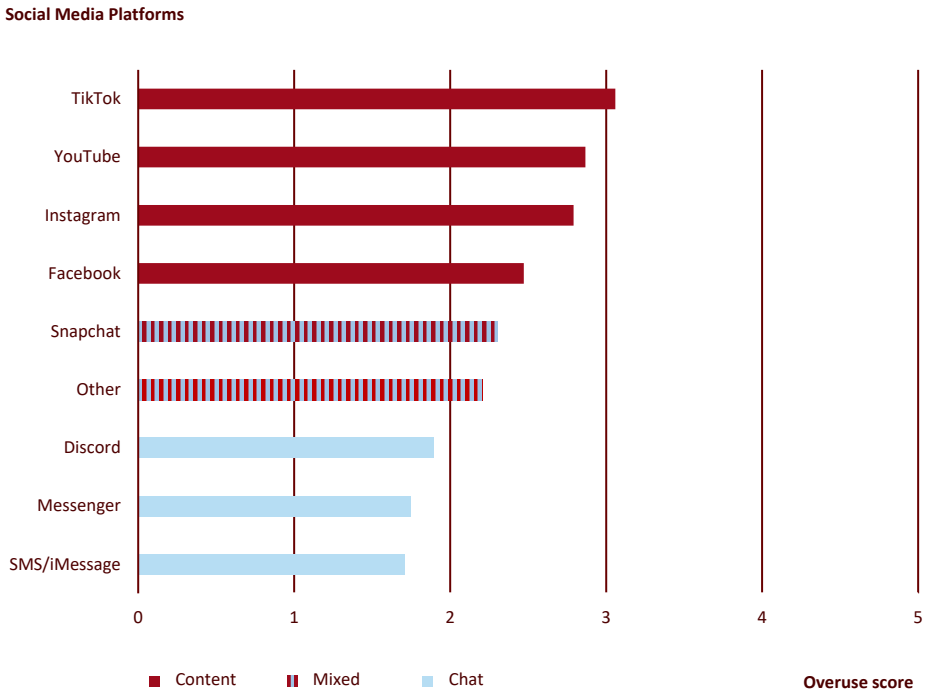
Combining age and gender, teenage girls aged 13 to 17 years had the highest average score across all groups, with a mean score of 2.63 (SD = 0.97), compared with teenage boys in the same age group, who scored 2.30 (SD = 0.94). Among young adults (18–25 years), women reported slightly higher overuse scores (M = 2.44, SD = 0.99) than men (M = 2.41, SD = 1.01). Similarly, among children (8–12 years old), girls reported higher overuse levels, with a mean score of 2.42 (SD = 0.93), than boys in the same age group, who scored 2.22 (SD = 0.98).

The level of overuse was related to platform type. Content-based platforms such as video sharing and entertainment-focused social media had significantly higher overuse scores (M = 2.76, SD = 0.93) than chat-based platforms (M = 2.06, SD = 0.90). This aligns with the characteristics of content-focused platforms, which often include features such as infinite scrolling and personalized recommendations designed to promote prolonged engagement.

Social media that children and young people used most frequently for viewing content (i.e., content media) included Instagram, TikTok, YouTube, and Snapchat (see also Figure 3.4), while social media that were used more frequently for sending messages, pictures, and chatting (i.e., chat media) included Snapchat, Messenger, SMS/iMessage, and Discord (see also Figure 3.3). Note how Snapchat is a media chosen both for chatting and viewing content.

This is evident in Figure 3.2, which also highlights a substantial variation in overuse scores between social media platforms within the chat and content categories.

Figure 3.2 **Overuse of the Most Widely Used Social Media Platforms**



Note: Average overuse scores among the respondents who answered the questionnaire based on one of the eight largest platforms in the questionnaire. Red bars are social media platforms mainly chosen as preferred content media, blue are social media chosen mainly as chat media and striped blue/red are media that are chosen as both chat and content media. Respondents who chose one of the less popular platforms are aggregated in the category "Other". TikTok (n = 469, SD = 0.89), YouTube (n = 353, SD = 0.89), Instagram (n = 514, SD = 0.94), Facebook (n = 120, SD = 1.01), Snapchat (n = 659, SD = 0.86), Other (n = 195, SD = 0.86), Discord (n = 201, SD = 0.76), Messenger (n = 317, SD = 0.66), and SMS/iMessage (n = 297, SD = 0.79).

Source: DCCA Survey, 2023

Model 1: Social Media Overuse

The overuse model was used to evaluate the relationships between social media overuse, self-control, intrinsic and extrinsic motivations, and social media type (content or chat). The model incorporated various sociodemographic controls to help isolate the psychological factors related to overuse. This linear regression approach allowed for the estimation of the strength and direction of the relationship of each factor with the level of overuse experienced by social media users. For more detailed information about the model, see Technical Box 3.1.

The results and coefficients from this regression analysis are presented in Table 3.1.

Table 3.1 **Regression Coefficients: Model 1 - Overuse**

Term	Estimate	Std. Error	Statistics	p Value
Intercept	0.37	0.088	4.185	<0.001
Media Type: Content Media	Reference Group			
Media Type: Chat Media	−0.788	0.031	−25.644	<0.001
Self-Control (z-score)	−0.215	0.016	−13.685	<0.001
Extrinsic Motivation (z-score)	0.296	0.016	18.504	<0.001
Intrinsic Motivation (z-score)	−0.015	0.015	−0.983	0.326
Males	Reference Group			
Females	0.101	0.031	3.261	0.001
Age (z-score)	−0.001	0.005	−0.13	0.897

Note: The full table of coefficients, including the additional controls, can be found in Appendix 3a1. Some controls are omitted here for brevity. These coefficients were derived from the full model, as specified in **Technical Box 3.1**.

Overuse is Higher on Content-Focused Media

The model confirms the importance of platform type found in the descriptive data, as this variable has the largest association with the tendency to report more or less overuse. Thus, social media users report significantly lower overuse on chat media compared to content media, as indicated by a substantial negative coefficient of -0.788 (SE = 0.031, t = -25.644, $p < 0.001$)[52]. The strong negative coefficient suggests that chat-based media are associated with overuse levels close to one standard deviation lower than content-focused platforms, underlining a notable difference in user experience. This result aligns with the observation that users spend more time daily on content-based platforms (see Figure 3.5).

Self-Control Reduces Overuse

Social media users with more self-control experience significantly less overuse, as indicated by a coefficient of -0.215 (SE = 0.016, t = -13.685, $p < 0.001$) from the linear model. Hence, for each standard deviation increase in self-control, there is a 0.215 standard deviation decrease in overuse. This suggests that self-regulation plays an important role in social media overuse. The ability to resist temptation or monitor one's own behavior may allow users to better align their social media consumption to match their personal preferences.

Social Motivation Drives Overuse

Overuse tends to be higher for consumers who report a high score for extrinsic motivation. Those whose social media consumption is more extrinsically motivated. is positively associated with overuse, reflected by a beta coefficient of 0.298 (SE = 0.016, t = 18.390, $p < 0.001$). A one standard deviation increase in extrinsic motivation is accompanied by an increase in overuse of 0.3 standard deviations. This indicates that users driven by external social factors, such

[52] All continuous variables, including overuse, self-control, and motivation, were standardized as z-scores before analysis, allowing coefficients to be interpreted as standard deviation (SD) changes.

as fear of missing out or an obligation towards friends or family, are more likely to continue using a social media for longer than they would prefer.

Intrinsic Motivation Does Not Drive Overuse

In contrast, intrinsic motivation, such as hedonic enjoyment, does not significantly influence overuse. With a beta coefficient of -0.015 (SE = 0.0150, t = -0.983, p = 0.326), intrinsic motivation has no statistical relationship with whether users engage excessively with social media.

Box 3.1
Technical Box - Model 1: Overuse

The model for overuse explores the psychological and demographic factors influencing individuals' experiences of retention on their preferred social media platform. Overuse is treated as a continuous outcome variable standardized to a z-score with a mean of 0 and a standard deviation of 1. This standardization allows coefficients to be interpreted as changes in overuse (measured in standard deviations) associated with a one-standard-deviation change in an explanatory variable.

The model incorporates psychological factors, including self-control and intrinsic or extrinsic motivation, alongside the type of platform (chat-based or content-based) used. A linear regression framework is applied, incorporating a comprehensive set of sociodemographic controls that are consistently used throughout the analysis. The sociodemographic controls account for individual, parental, and contextual factors.

Sociodemographic Controls:

- **Gender (participant):** Gender is treated as a categorical variable, with "male" as the reference category, allowing comparisons between male and female participants.
- **Age (participant):** Participant age, expressed in years with decimals, is derived from Statistics Denmark and reflects the respondent's age at the time of survey completion.
- **Citizen Status (participant):** Citizenship is coded as a binary variable, where "Danish citizen" serves as the reference category. This group includes individuals with dual citizenship if one citizenship is Danish. Non-Danish citizens residing in Denmark are compared against this baseline.
- **Region of Residence (participant):** The geographical location of participants within Denmark. The Capital Region of Denmark is the reference category, with the other four regions compared against this baseline.
- **Immigration Status (participant):** Immigration status is categorized as "ethnic Dane"[53] (reference category), "immigrant"[54] or "descendant"[55] capturing potential cultural or social differences in social media use.
- **Household Structure (participant):** A categorical variable reflecting participants' living arrangements. Categories include living with both biological or adoptive parents (reference category), living with a single parent, living with one parent and their partner, or living without parents.
- **Parental Income:** Average pre-tax income of both parents, excluding capital income. If data is available for only one parent, that parent's income is used. Income is categorized into four quartiles: the highest 25 percent (reference category), mid-high (next 25 percent), mid-low (next 25 percent), and the lowest 25 percent. A fifth category, "unknown", is included for cases where parental income data is unavailable, minimizing dropped observations.
- **Parental Employment Status:** Reflects whether parents are employed or not. If at least one parent is employed, the variable is coded as "working". If neither parent is employed (including retirees and those out of the workforce), the category is "not working". An "unknown" category is included for cases where parental employment status is unavailable.

[53] Persons born in Denmark, where at least one parent is both a Danish citizen and born in Denmark.

[54] A person born abroad, where neither parent is both a Danish citizen and born in Denmark. If there is no information about either parent and the person is born abroad, they are registered as immigrants.

[55] A person born in Denmark, where neither parent is both a Danish citizen and born in Denmark. If there is no information about either parent and the person is a foreign citizen, they are also considered descendants.

» **Parental Education Level:** Reflects the highest level of education attained by either parent. Categories include (1) primary school and upper secondary education (reference category), (2) bachelor's degree or vocational/post-secondary training, and (3) master's degree or higher research qualifications (e.g., PhD). An "unknown" category is included for cases where data on parental education is missing.

The complete overuse model is formulated accordingly:

$$Overuse_i = \beta_0 + \beta_1 Self control_i + \beta_2 Intrinsic\ Motivation_i + \beta_3 Extrinsic\ Motvation_i + \beta_4 Media\ Type_i + \boldsymbol{Z}_i\beta + \epsilon_i$$

where i denote the different individuals, ϵ_i captures unexplained variability in overuse across individuals. In this model β_1, β_2 and β_3 capture the effects of self-control and intrinsic/extrinsic motivation on overuse. These coefficients measure how each psychological trait is associated with a change in overuse, measured in standardized units (z-scores). Media Type is a binary variable indicating whether the platform is chat-based or content-based. Content-based platforms serve as the reference category, so the coefficient β_4 represents the difference in overuse for users on chat platforms compared to those on content platforms. $\boldsymbol{Z}_i$ represents a vector of socio-demographic controls that includes gender, age, citizen status, region of residence, immigration status, household structure, parental income, parental employment status, and parental education level.

Interaction Model: Age and Gender as Moderators
To assess whether the effects of media type on overuse vary by age and gender, interaction terms for both age and gender with media type are added to the model. The interaction model is specified as:

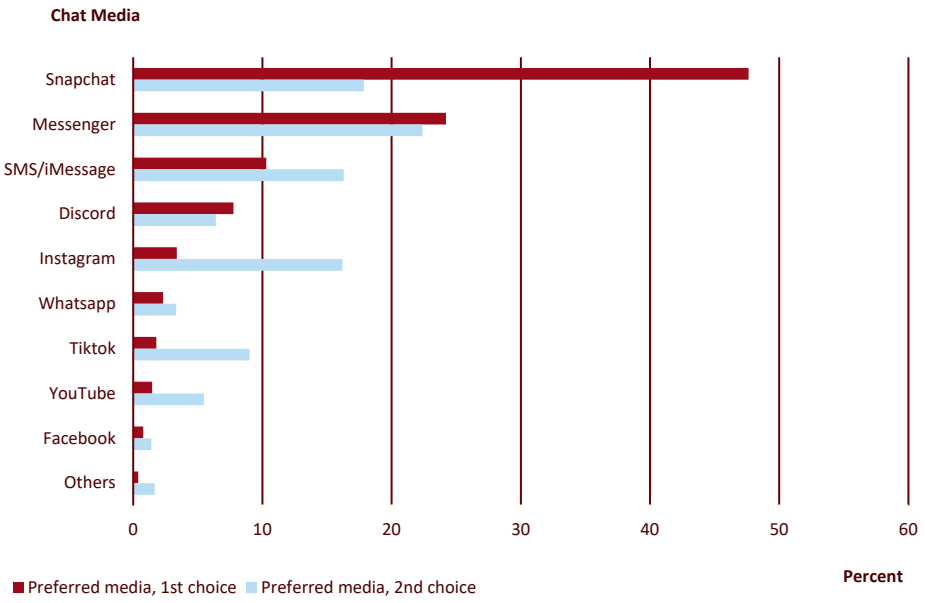
$$Overuse_i = \beta_0 + \beta_1 Self control_i + \beta_2 Intrinsic\ Motivation_i + \beta_3 Extrinsic\ Motvation_i + \beta_4 Media\ Type_i + \beta_5 Gender_i + \beta_6 (Media\ Type_i \cdot Gender) + \beta_7 (Media\ Type_i \cdot Age) + \boldsymbol{Z}_i\beta + \epsilon_i$$

In this expanded model β_5 assesses whether the impact of media type on overuse differs between males and females, with males as the reference group. β_6 examines whether the effect of media type on overuse changes with age, indicating if older or younger users respond differently to chat versus content media. The other coefficients and terms remain with the same interpretation as above.

3.4 DTS on Preferred Media

Descriptive Data
Snapchat was by far the most popular social media, with 48 percent of the respondents identifying it as their first choice for chatting and sending pictures and messages, followed by Messenger (24 percent) and SMS/iMessage (10 percent) (see Figure 3.3).

Figure 3.3 **Preferred Chat Media**

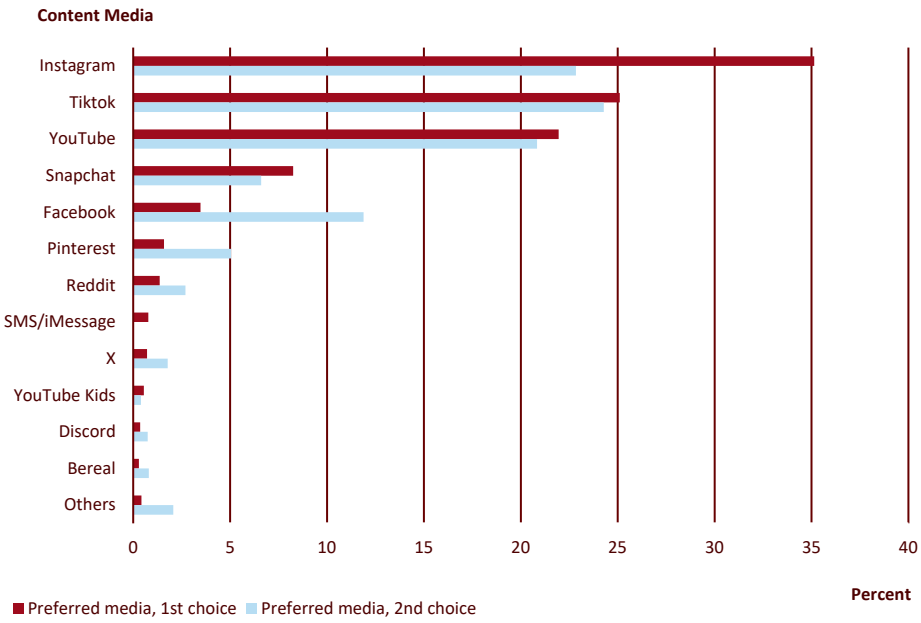


Note: The figure shows the social media platform most frequently chosen as chat media. The respondents could choose from the list of social media they had previously selected. They had the option to choose one or two favorites, but only one was mandatory (i.e., not all respondents had a second favorite). They also had the option to answer, "I do not use social media to send messages or chat." If they answered yes to this, questions 7 and 9 were omitted. "Other" is a combined category of the least chosen social media. They are combined because of the small number of respondents.

Source: DCCA survey, 2023

Instagram was the preferred content media for 35 percent of the respondents, closely followed by TikTok with 25 percent and YouTube with 22 percent (see Figure 3.4).

Figure 3.4 **Preferred Content Media**

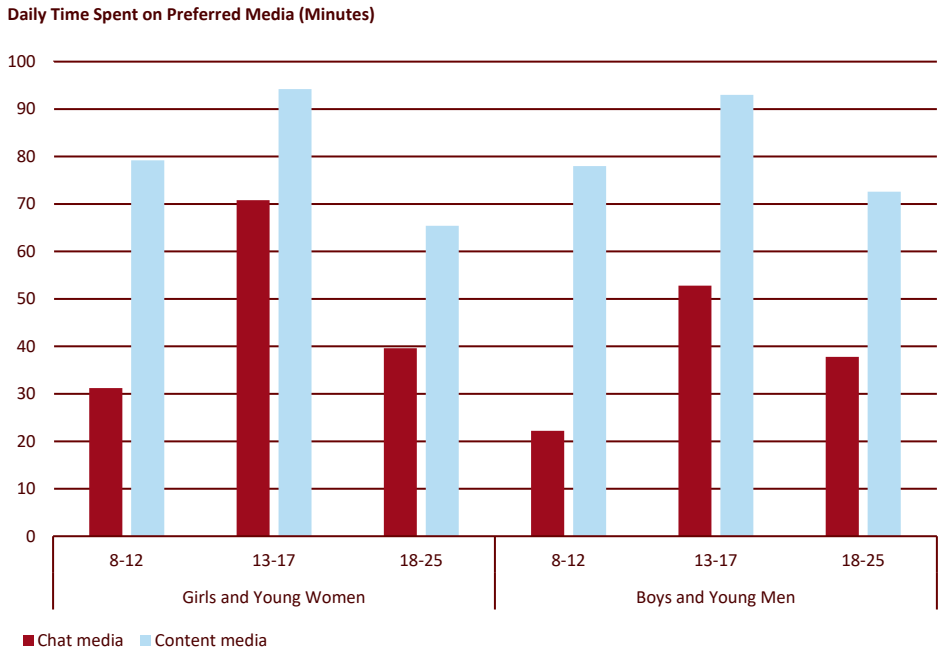


Note: The figure shows the social media platform most frequently chosen for viewing content. The wording of the question was slightly different for the youngest children aged 8 to 10 years old: "Which social media do you use the most to view content (for example, posts/pictures/videos/stories/reels/shorts)? Choose one or two favorites." The respondents could choose from the list of social media they selected in question 3. They had the option to choose one or two favorites, but only one was mandatory (i.e., not all respondents had a second favorite). They also had the option to answer, "I do not use social media to upload content, post content, or view content." If they answered yes to this, questions 8, 10, 11, and 33 were omitted. "Other" is a combined category of the least chosen social media. They are combined because of the small number of respondents.

Source: DCCA survey, 2023

On average, the respondents spent 65 minutes per day (n = 1,660, SD=1.09) on their preferred social media. However, this was notably higher for content-based platforms. Respondents who provided time data on content media spent 1.35 hours (81 minutes) per day, while those who provided data on chat media spent an average of 0.76 hours (46 minutes) daily. The amount of time users spent on preferred social media differs across age groups and less so between genders, as shown in Figure 3.5.

Figure 3.5 **DTS-PM for Content and Chat media Across Gender and Age Groups**



Note: This figure shows the daily time spent (in minutes) on the respondents' preferred social media. The daily time spent is shown for male and female respondents separately and the three main age groups.

Source: DCCA Survey, 2023

Model 2: DTS-PM

This model was used to examine the daily time users spent on their preferred social media platform (DTS-PM), focusing on four primary drivers: overuse, extrinsic motivation, intrinsic motivation, and media type.[56]

Media type was included, as time-spent patterns are expected to vary between chat and content platforms. The respondents were randomly assigned to answer questions related to either chat- or content-based platforms, allowing for a comparison of platform types and their influence on usage. For further details, see Technical Box 3.2.

Self-control was integrated into the model to capture an individual's capacity to manage their time spent according to personal goals and time management practices. Sociodemographic variables such as age, gender, and education were included as control factors to account for potential influences on social media use.

The regression results outlined in Table 3.2 show the coefficient estimates for each factor, providing insight into the direction and strength of their effects on time spent.

[56] Overuse may influence engagement rather than the other way around, as users who feel more retained by a platform may subsequently spend more time on it. This directional relationship warrants further discussion, as it underscores the complex interplay between how retained users feel and their subsequent media consumption behaviors.

Table 3.2 **Regression Coefficients: Model 2–DTS-PM**

Term	Estimate	Std. Error	Statistics	p Value
Intercept	1.08	0.156	6.918	<0.001
Overuse (z-score)	0.323	0.029	10.971	<0.001
Media Type: Content Media	Reference Group			
Media Type: Chat Media	−0.255	0.057	−4.439	<0.001
Self-Control (z-score)	−0.02	0.026	−0.766	0.444
Extrinsic Motivation (z-score)	−0.097	0.028	−3.503	<0.001
Intrinsic Motivation (z-score)	0.161	0.026	6.3	<0.001
Gender (Male)	Reference Group			
Gender (Female)	0.029	0.051	0.563	0.574
Age (z-score)	0.005	0.009	0.555	0.579

Note: The full table of coefficients, including the additional controls, can be found in Appendix 3a2. Some controls are omitted here for brevity. These coefficients were derived from the full model, as specified in Technical Box 3.2.

Overuse, Motivation, and Media Type Drives DTS-PM

Overuse is the most influential factor in explaining DTS-PM within the model. Overuse positively correlated with time spent. Specifically, a 1-standard deviation (SD) increase in overuse corresponds to a 0.323-SD increase in DTS on the favorite platform. This effect (coefficient of 0.323) underscores that users who feel more retained by a specific media also tend to engage with it considerably more.

Self-control does not appear to influence the DTS-PM. The results of a previous analysis (see Section 3.2) suggest that overuse is inversely related to self-control. However, when both overuse and self-control were included in the model, self-control did not have a significant effect on time spent, with a coefficient of −0.02 (SE = 0.026, t = −0.766, p = 0.444). This indicates that while self-control might help individuals manage their overall time consumption, it likely does so by mitigating the effects of overuse, that is, how "captivated" the users felt by the platform.

The model revealed a significant effect of media type on DTS-PM, distinguishing between chat- (e.g., Snapchat) and content-based platforms (e.g., Instagram and TikTok), with a negative coefficient of −0.255. This aligns with the observation that the users felt less retained by chat-based platforms than by content-based platforms (see Figure 3.2). The difference may stem from the nature of the engagement each media type promotes. Chat-based platforms typically facilitate quick back-and-forth interactions, which, though frequent, are often brief. Users may check messages or respond to notifications intermittently without prolonged engagement, resulting in a shorter overall time on the platform. By contrast, content-based platforms encourage a more passive, immersive browsing experience where users scroll through feeds, view videos, or explore recommended content. This style of interaction tends to keep users engaged for longer periods, contributing to the higher media-specific engagement reported for content-based media.

Intrinsic motivation, or the personal enjoyment derived from using a platform, had a positive effect on the time spent. This finding suggests that individuals who genuinely enjoy and derive satisfaction from their time on a platform are likely to engage with it more extensively.[57]

Media Type Moderates the Effect of Overuse

To better understand how overuse influences DTS-PM and whether this effect varies across user groups or media types, interaction terms were added to the model. Table 3.3 presents the interaction coefficients, showing how the impact of overuse on media engagement shifts depending on media type, age, and gender, providing further context for these results (see Technical Box 3.2).

Table 3.3 **Interaction Regression Coefficients: Model 2–DTS-PM**

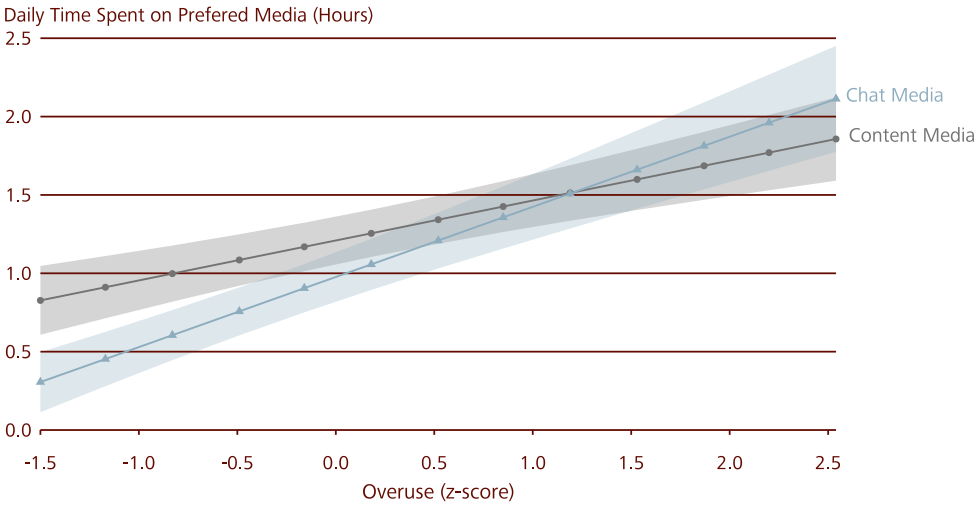
Term	Estimate	Std. Error	Statistics	p Value
Intercept	1.137	0.156	7.266	<0.001
Overuse (z-score)	0.386	0.111	3.482	0.001
Media Type: Content Media	Reference Group			
Media Type: Chat Media	−0.233	0.058	−4.046	<0.001
Age (z-score)	0.004	0.009	0.463	0.644
Gender (Male)	Reference Group			
Gender (Female)	0.027	0.051	0.537	0.591
Overuse * Age (z-score)	−0.007	0.006	−1.321	0.187
Overuse * Gender (Female)	−0.010	0.05	−0.194	0.846
Overuse * Chat Media	0.193	0.055	3.512	<0.001

The analysis highlights that the interaction between overuse and media type is significant, indicating that the influence of overuse on time spent is stronger for chat-based media than for content-based ones. The positive and significant interaction coefficient of 0.193 (SE = 0.055, t = 3.512, $p < 0.001$) shows that the relationship between feeling retained and actual media-specific time spent is more pronounced for chat-based platforms.

While users generally spend less time on chat-based social media, they also display greater sensitivity to overuse on these. At low overuse levels, users spend more time on content-based media. However, as overuse increases, the time spent on chat-based media surpasses that on content-based media (see Figure 3.6). The lack of statistical significance in the interactions between overuse and gender, and between overuse and age indicates that the influence of overuse on time spent is not moderated by these demographic factors.

[57] This relationship may be bidirectional so that higher engagement could also enhance intrinsic motivation by increasing familiarity or reinforcing enjoyable experiences on the platform.

Figure 3.6 **Relationship Between Overuse and DTS-PM on Chat and Content Media**



Note: This figure illustrates how social media addiction influences the DTS-PM differently across media types. The y-axis represents the predicted DTS-PM (in hours), as estimated from the interaction model for time spent on an individual's preferred media. The outcome is rescaled to its original units (hours) for better interpretability, although the linear model coefficients are reported as SD changes. The x-axis shows social media overuse (z-scores), demonstrating how time spent varies with overuse levels. Two lines represent the interaction effect by media type: one for content-based media and one for chat-based media. The visualization indicates that users spent more time on content-based media and that the increase in engagement with higher overuse scores is steeper for chat-based media. The shaded ribbons around each line represent the 95 percent confidence intervals for the effects.

Source: DCCA Survey, 2023

Box 3.2
Technical Box: Model 2-DTS-PM

This set of models was used to investigate the factors that drive DTS on an individual's preferred media platform, referred to as DTS-PM. The model was used to examine psychological traits, platform type, and demographic factors to understand how they influence the time spent on a preferred platform. The model is formalized as follows:

$$\text{DTS-PM}_i = \beta_0 + \beta_1 Overuse_i + \beta_2 Self control_i + \beta_3 Intrinsic\ Motivation_i + \beta_4 Extrinsic\ Motvation_i + \beta_5 Media\ Type_i + \boldsymbol{Z}_i\beta + \epsilon_i$$

Where DTS-PM_i represents the time spent on an individual's preferred media platform, measured as screen time data from phone screenshots. $\beta_1, \beta_2, \beta_3$ and β_4 correspond to the psychological correlates of media engagement: overuse, self-control, intrinsic motivation, and extrinsic motivation, each standardized to z-scores. Media type differentiates between content and chat platforms, which were assigned randomly for participants. Content-based media is the reference category, so β_5 represents the difference in time spent (in SDs) for individuals assigned to chat media compared with content media. $\boldsymbol{Z}_i$ represents a set of control variables included in the model to account for sociodemographic factors that may influence media engagement, such as gender, age, citizen status, region of residence, immigration status, household structure, parental income, parental employment status, and parental education level. These variables ensure that the observed relationships between psychological traits, media type, and time spent are not confounded by individual or contextual differences.

Media Type Moderates the Effect of Overuse
To determine how the effect of overuse on DTS-PM varies across user characteristics, interaction terms were added for overuse with gender, age, and media type. This enables an analysis of whether the impact of overuse on time spent differs by demographic factors or platform type (chat vs. content). For instance, overuse might drive time spent more strongly among younger users or users on content-based platforms, reflecting how individual characteristics and platform attributes shape time spent.

The interaction model is formalized as follows:

$$DTS - PM_i = \beta_0 + \beta_1 Overuse + \beta_2(Overuse \cdot Gender) + \beta_3(Overuse \cdot Age) + \beta_4(Overuse \cdot Media\ Type) + \beta_5 Self control_i + \beta_6 Intrinsic\ Motivation_i + \beta_7 Extrinsic\ Motvation_i + \beta_8 Media\ Type_i + \mathbf{Z}_i\beta + \epsilon_i$$

where the interaction terms (β_2, β_3 and β_4) capture the moderating effects of gender, age, and media type on the relationship between overuse and time spent. For instance, β_4 indicates whether the impact of overuse on time spent is different for chat-based platforms. The remaining coefficients and terms retain their interpretations, as described in the main model.

3.5 Social Media Addiction

Social media addiction is a type of behavioral addiction similar to pathological gambling or overeating.[58] The six social media addiction questions (see Table 2.4) track the degree to which social media use intrudes the respondent's everyday life, resulting in, for example, thinking excessively about social media, feeling irritated when not able to access social media, or using media to relieve feelings of anxiety. The six characteristics of social media addiction are outlined in Technical Box 3.3.

Box 3.3
Technical box: Six Characteristics of Social Media Addiction

- Salience. Salience measures preoccupation with a substance. When asked to think back to the last couple of months, more than one in four of the participants (approximately 28 percent) reported that they, often, or very often/always spent a lot of time thinking about social media.
- Tolerance. Tolerance indicates the need for increasing amounts of a substance to satisfy an urge. Approximately 16 percent of the participants reported that they often or very often/always felt the need to use social media more.
- Mood modifications. A hallmark of behavioral addictions is using the substance to remedy or relieve negative feelings such as anxiety, stress, or depression. Approximately 20 percent of children and young adults in this study reported using social media to forget problems often or very often/always.
- Relapse. It is common in addictions to have difficulty cutting down on the use of a substance, including relapse. In this study, approximately 27 percent of the children and young adults stated that they often or very often/always tried to use social media less.
- Withdrawal. A well-known property of many addictions is the negative feelings that accompanies the lack of the addictive substance. Here, 10 percent of the participants stated that they often or very often/always experienced feeling unwell if they were not able to use social media.
- Conflict. Finally, addictions can directly impact important obligations and relations such as those at school or work, or with important people in a child's life, including parents or friends. Here, children and young adults were asked if they had used or thought about social media to an extent where it disrupted their schoolwork. Approximately 6 percent answered often or very often/always to this question.

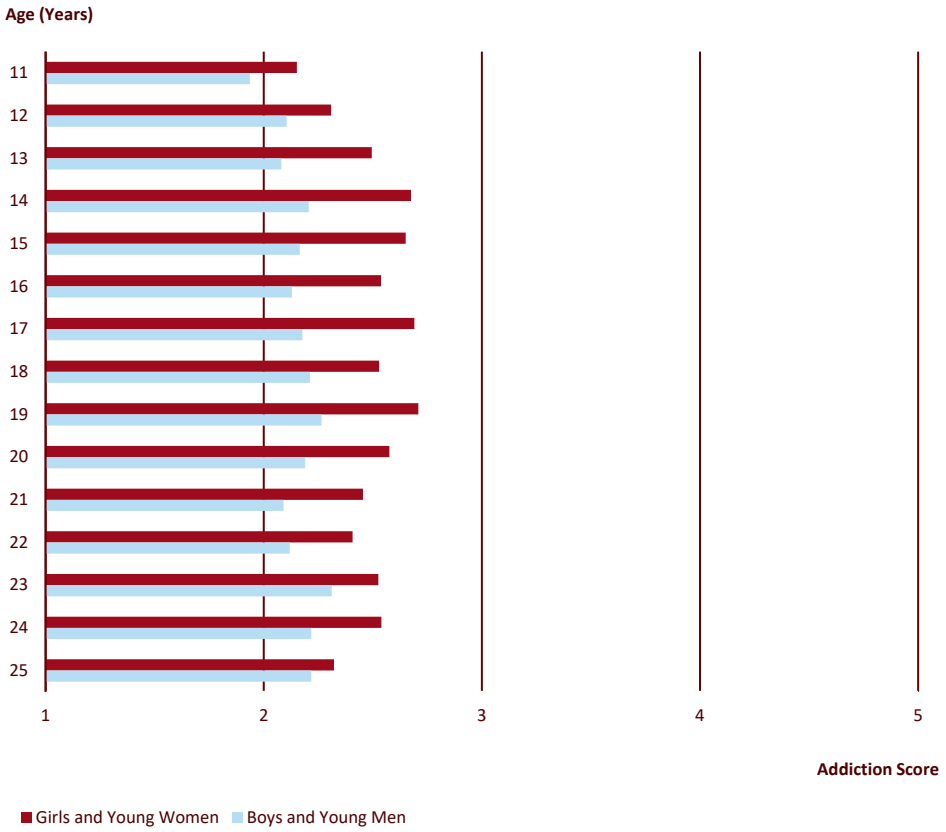
Descriptive Data

The addiction scores ranged from 1 to 5, with an average score of 2.34 (SD = 0.72) across all respondents. Girls and young women had significantly higher levels of social media addiction,

[58] Behavioral science distinguishes between behavioral addictions and substance addictions. The main difference is that behavioral addictions lack the direct pharmacological component (e.g., nicotine) of substance addiction. However, the two types of addiction produce very similar behavioral responses.

with an average score of 2.50 (SD = 0.71), than boys and young men, who had an average score of 2.16 (SD = 0.69). See Figure 3.7 for the distribution of addiction scores.

Figure 3.7 **Addiction Scores According to Age and Gender**



Note: This figure shows the average addiction scores for each age among female (red; n = 1,460) and male respondents (blue; n = 1,321). The degree of addiction-like behaviors was measured on a 5-point Likert scale with less signs of addiction toward the left side (i.e., toward 1) and more signs of addiction toward the right side (i.e., toward 5) of the bar graph. The age ranged from 11 to 25 years, excluding the 8- to 10-year-olds who were deemed too young to answer the addiction questions.

Source: DCCA Survey, 2023

Teenage girls aged 13–17 years reported the highest levels of social media addiction, with an average score of 2.61 (SD = 0.71), making them the most affected demographic group. Young women aged 18 to 25 years followed closely, with an average addiction score of 2.50 (SD = 0.71).

Across all age groups, boys and young men consistently reported fewer symptoms of social media addiction than their female counterparts. For young adult men aged 18 to 25 years, the average addiction score was 2.20 (SD = 0.72), which is notably lower than that of young women in the same age group. Similarly, among children aged 8 to 12 years, boys reported the lowest addiction scores overall, with an average of 2.02 (SD = 0.58), compared with girls in the same age group, who showed average scores of 2.23 (SD = 0.64).

Model 3: Social Media Addiction

The addiction model was designed to test how various factors impact the risk of developing addictive symptoms. The model incorporates self-control as a key factor alongside the socio-demographic variables introduced in Technical Box 3.1.

In addition, interactions between self-control and age, and between self-control and gender were included to examine whether these variables modify the influence of self-control on addiction. For the technical details on the model specification, including these interaction terms, please refer to Technical Box 3.4.

The regression estimates from the main effect model are presented in Table 3.4.

Table 3.4 **Regression Coefficients: Model 3-Social Media Addiction**

Term	Estimate	Std. Error	Statistics	p Value
Intercept	−0.334	0.109	−3.07	0.002
Self-Control (z-score)	−0.406	0.017	−24.257	<0.001
Males	Reference Group			
Females	0.519	0.033	15.607	<0.001
Age (z-score)	0.005	0.006	0.893	0.372

Note: The full table of coefficients, including additional controls, can be found in Appendix 3a3. Some controls are omitted here for brevity. These coefficients were derived from the full model, as specified in Technical Box 3.4.

Drivers of Social Media Addiction Scores

The analysis results show that social media users with more self-control experience had significantly lower levels of social media addiction. Specifically, a 1-SD increase in self-control was associated with a 0.406 SD decrease in addiction score (β = -0.406, SE = 0.017, t = −24.257, p < 0.001). This suggests that self-control is a protective buffer against addiction.

Girls and young women exhibited significantly higher levels of social media addiction than boys and young men, as indicated by a positive beta coefficient of 0.519 for girls and young women (SE = 0.033, t = 15.607, p < 0.001). This coefficient implies that girls scored 0.519 SD higher on the social media addiction score. This finding aligns with existing research that points to social validation and relational interactions, that is, common on social media, as factors that may affect girls and young women to a higher degree, potentially making them more prone to addictive behaviors.

Box 3.4
Technical Box: Model 3- Social Media Addiction

The addiction model was used to examine the factors that influence general social media addiction, focusing on overall patterns rather than on specific platforms. Linear regression was used to estimate the impact of predictors on these levels.

To enhance interpretation and comparability, all variables, including addiction and predictors such as self-control and age, were standardized to z-scores. The model was used to examine how self-control and sociodemographic factors affect social media addiction.

$$\text{Social Media Addiction}_i = \beta_0 + \beta_1 Selfcontrol + \boldsymbol{Z}_i\beta + \epsilon_i$$

In this equation,
» β_1 captures the effect of self-control on social media addiction, with higher levels of self-control expected to reduce addiction.
» $\boldsymbol{Z}_i$ represents a vector of sociodemographic controls that includes gender, age, citizen status, region of residence, immigration status, household structure, parental income, parental employment status, and parental education level.

Interaction Model: Examining Moderation by Age and Gender
To examine whether the relationship between self-control and addiction varies according to demographic factors, interaction terms between self-control and both gender and age were added to the model. This allowed for testing if the protective effect of self-control against addiction varies by age, gender, and so on.

$$\text{Social Media Addiction}_i = \beta_0 + \beta_1 Selfcontrol + \beta_2(Selfcontrol \cdot Gender) + \beta_3(Selfcontrol \cdot Age) + \boldsymbol{Z}_i\beta + \epsilon_i$$

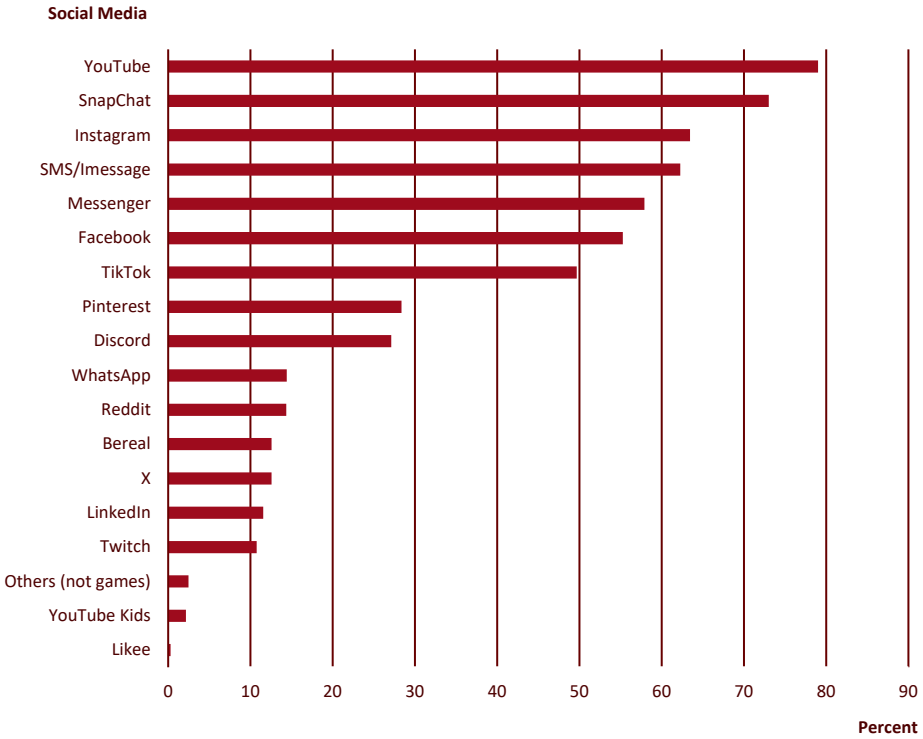
In this expanded model,
» β_2 captures the effect of self-control on addiction, which differs between males and females, with males as the reference category.
» β_3 captures the effect of self-control on addiction, which varies by age, demonstrating that the protective role of self-control is stronger or weaker for different age groups.

The interaction effects between self-control, gender, and age were not statistically significant. This suggests that the protective effect of self-control against social media addiction did not vary significantly by age or gender in the sample.

3.6 Daily Time Spent

Descriptive Data
To gauge how much time the respondents spent on social media, they were first asked to list the social media platforms they used in the last month. The list was topped by YouTube, Snapchat, and Instagram (see Figure 3.8).

Figure 3.8 **Social Media Platforms Used by Children and Young Adults**



Note: The figure shows the social media platforms children and young adults used during the last month (in percent; N = 3,392). For instance, 79 percent of the participants used YouTube during the last month. The participants could choose as many social media platforms applicable to them. The phrasing of the question was different for children who did not have a phone: "Here is a list of social media platforms. Select the ones you have used on a tablet/iPad, computer, or someone else's phone in the last month." Note that the participants could also choose to say "None" (either "None - I do not use any from the list" or "None - I use some from the list but have not used them in the last month"). Fourteen participants used one of these "None" options. If 8- to 10-year-olds responded that they had only used SMS/iMessage, YouTube, YouTube Kids, no social media, or no social media in the last month, they were given a modified questionnaire that accounted for them using no or very few social media. If the participant was between 11 and 25 years old, they were excluded from the survey. Children between 8 and 10 were not given the option to choose "X," and children between 8 and 15 years old were not given the option to choose "LinkedIn." If they chose "Other (non-games)," they had the option to enter free text, but any entry here could not be extracted as a favorite media further in the questionnaire.

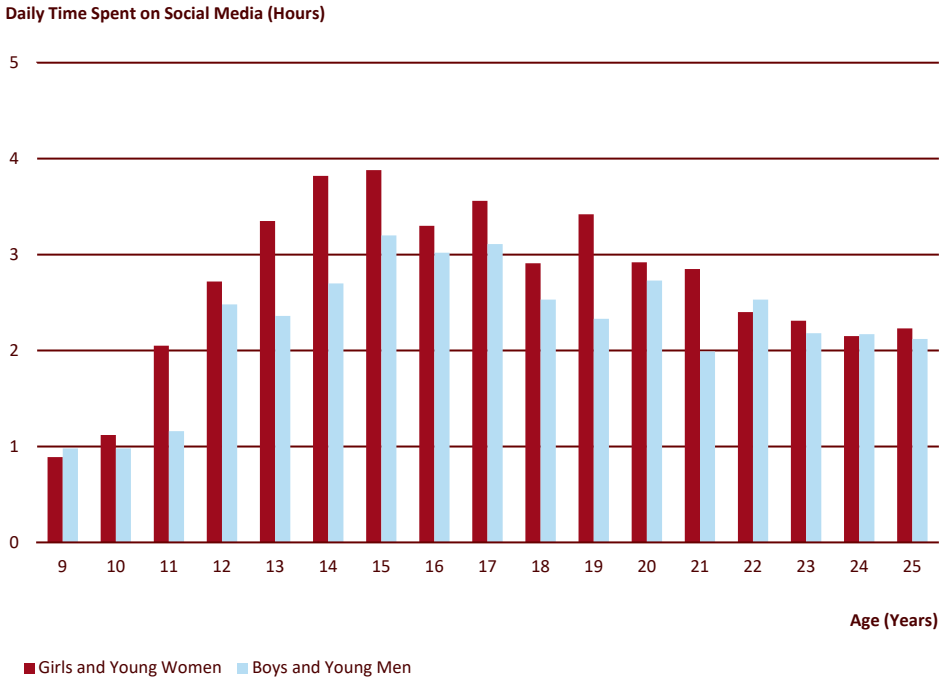
Source: DCCA Survey, 2023

Participants were subsequently asked to upload screenshots from their smartphones containing numbers for social media screen time.

The average DTS was 2.67 hours per day (n = 1,680, SD=1.72). Girls and young women spent more time (2.84 hours/day, n = 1,008, SD = 1.75) than boys and young men (2.42 hours/day, n = 672, SD = 1.66; see Figure 3.9 for the distribution across age groups).

These data refer exclusively to time spent on social media.[59] Total screen time, which includes all other activities on mobile devices, such as gaming or streaming, would be higher.

Figure 3.9 **DTS on Social Media Across Gender and Age**



Note: This figure shows the daily time spent (in hours) on social media for females (red; n = 997) and males (blue; n = 669) of different ages. Note that among the 8-year-olds, only a few children had screenshot data; thus, this group is excluded from the figure.

Source: DCCA Survey, 2023

Teenagers spent more time, averaging 3.3 hours per day (n = 647, SD = 1.77), on social media than both younger and older age groups. In comparison, young adults aged 18 to 25 years spent slightly less time on social media, with an average of 2.52 hours per day (n = 751, SD = 1.49). The youngest group, children aged 8 to 12 years, reported spending the least amount of time on social media, averaging 1.64 hours per day (n = 282, SD = 1.62).

When broken down by gender, notable differences emerged within each age group. Among teenagers aged 13 to 17 years, girls reported higher social media use, spending an average of 3.57 hours per day (n = 385, SD = 1.77), than boys, who averaged 2.9 hours per day in social media use (n = 262, SD = 1.69). In the young adult group aged 18 to 25 years, women also spent slightly more time on social media, averaging 2.64 hours per day (n = 445, SD = 1.46), than men, who reported an average of 2.34 hours per day (n = 306, SD = 1.52). For children aged 8 to 12 years, girls reported spending more time on social media, averaging 1.76 hours

[59] Note also that total Daily Time Spent (DTS) on social media could only be obtained from iPhone users. Around three quarters of the participants were iPhone users. DTS on social media did not include YouTube screen time data, as it is not categorized as a social media in the screen time app of iPhones.

per day (n = 178, SD = 1.68), than boys, who spent 1.43 hours per day on social media (n = 104, SD = 1.5).

Model 4: DTS

This model focused on users' overall social media engagement rather than on specific platforms or types of social media. For more information on the model, see Technical Box 3.5.

A key factor in this model is social media addiction, which, like other forms of addiction, can weaken users' ability to control their consumption. Self-control is also an essential component, as it helps users balance their intended media use with the actual time spent on social media. By including self-control as a counteracting force in addiction, the model highlights the interaction between compulsive engagement and an individual's capacity for self-regulation. In addition, the model incorporates sociodemographic control variables similar to those used in prior models.

Table 3.5 **Regression Coefficients: Model 4-DTS**

Term	Estimate	Std. Error	Statistics	p Value
Intercept	2.529	0.278	9.101	<0.001
Addiction (z-score)	0.231	0.046	5.054	<0.001
Self-control (z-score)	−0.166	0.044	−3.751	<0.001
Males	Reference Group			
Females	0.409	0.085	4.827	<0.001
Age (z-score)	−0.014	0.016	−0.872	0.383

Note: The full table of coefficients, including the additional controls, can be found in Appendix 3a4. Some controls are omitted here for brevity. These coefficients were derived from the full model, as specified in Technical Box 3.5.

Drivers of DTS Among Children, Teenagers, and Young Adults

The analysis revealed that social media addiction is a significant driver of DTS, as indicated by a positive coefficient of 0.231 (SE = 0.046, t = 5.054, $p < 0.001$). This finding implies that individuals who exhibit more compulsive social media behaviors tend to spend more time across media platforms. By contrast, self-control exerts an opposing influence. Users with higher levels of self-control tend to spend less time on social media, as shown by a coefficient of −0.166 (SE = 0.044, t = −3.751, $p < 0.001$), highlighting the role of self-control role in managing media consumption.

These coefficients align with theoretical expectations that addiction drives higher DTS, whereas self-control reduces the amount of time users spend on social media. These results underscore the contrasting roles of compulsive behaviors and self-regulation in shaping digital consumption patterns.

Gender differences are especially evident, with girls spending more time on social media than boys, as indicated by a positive coefficient of 0.409 (SE = 0.085, t = 4.827, $p < 0.001$). Individuals from the middle and lower educational categories spent significantly more time on social media than those in the higher education category. This suggests that lower educational attainment may be associated with less selective or less moderate media use.

Box 3.5
Technical Box: Model 4-DTS

The second model focuses on a broader measure of DTS across all social media platforms. This model is designed to address overarching patterns of media use and assess how generalized traits such as media addiction and self-control influence DTS.

$$DTS_i = \beta_0 + \beta_1 Addiction_i + \beta_2 Self control + \boldsymbol{Z}_i\beta + \epsilon_i$$

where DTS_i represents the total time spent across all social media platforms, measured by individual screen time on iPhones and standardized to a z-score for analysis. β_1 captures the effect of addiction on DTS, representing how compulsive media behaviors influence the time spent on social media. β_2 represents the effect of self-control. As before, $\boldsymbol{Z}_i$ includes a vector of sociodemographic controls, namely gender, age, citizen status, region of residence, immigration status, household structure, parental income, parental employment status, and parental education level.

Addiction Moderated by Age and Gender
To determine whether the influence of addiction on media usage varies across demographic groups, interaction terms were introduced between addiction and both age and gender. This approach allowed for examining whether age and gender modulate the effect of addiction on total media engagement, providing insight into how compulsive engagement behaviors might affect media use depending on demographic characteristics.

$$DTS_i = \beta_0 + \beta_1 Addiction_i + \beta_2 Self control + \beta_3(Addiction_i \cdot Gender) + \beta_4(Addiction_i \cdot Age) + \boldsymbol{Z}_i\beta + \epsilon_i$$

where the interaction term β_3 represents whether the effect of addiction on DTS differs between females and males (the reference category). A significant and positive effect of β_3 would indicate that addiction has a different impact on DTS for females compared with males, suggesting that gender moderates the relationship between addiction and time spent. The interaction term β_4 tests whether the effect of addiction varies by age, indicating whether the impact of addiction on time spent changes as individuals grow older.

The interaction terms were not statistically significant, indicating that the relationship between addiction and DTS does not vary significantly by age or gender.

Impact of Parental Social Media Habits
This analysis investigated the relationship between parental DTS and children's screen habits by extending Model 4: DTS. By utilizing survey responses and screenshots of DTS on social media from parent-child pairs, parental screen time can be included as a predictor in the model to examine whether and how parental habits shape or mirror those of their children (for details, see Technical Box 3.6).

The dataset included 508 child-parent pairs, where both the child and the parent provided screenshots of time data. This linkage provides a unique window into family dynamics, highlighting the potential impact of parental screen time on children's media habits.

Given that social influences may vary between boys and girls, the analysis results model the effect separately for children of different genders. This approach clarifies whether the impact of a parent's screen time differs according to the child's gender.

The analysis of around 500 parent-child pairs revealed a positive link between parents' daily screen time (or DTS) and their children's DTS:

Table 3.6 **Coefficient Estimates: Model 4–DTS with Child-Parent Pairs**

Term	Estimate	Std. Error	Statistics	p Value
Intercept	−3.069	0.467	−6.57	<0.001
Parent Screen Time (z-score)	0.294	0.085	3.445	<0.001
Self-Control (z-score)	−0.061	0.071	−0.854	0.394
Males (children)	Reference Group			
Females (children)	0.399	0.145	2.757	0.006
Age (z-score)	0.334	0.028	12.021	<0.001

Note: The full table of coefficients, including the additional controls, can be found in Appendix 3a5. Some controls are omitted here for brevity. These coefficients were derived from the full model, as specified in Technical Box 3.6.

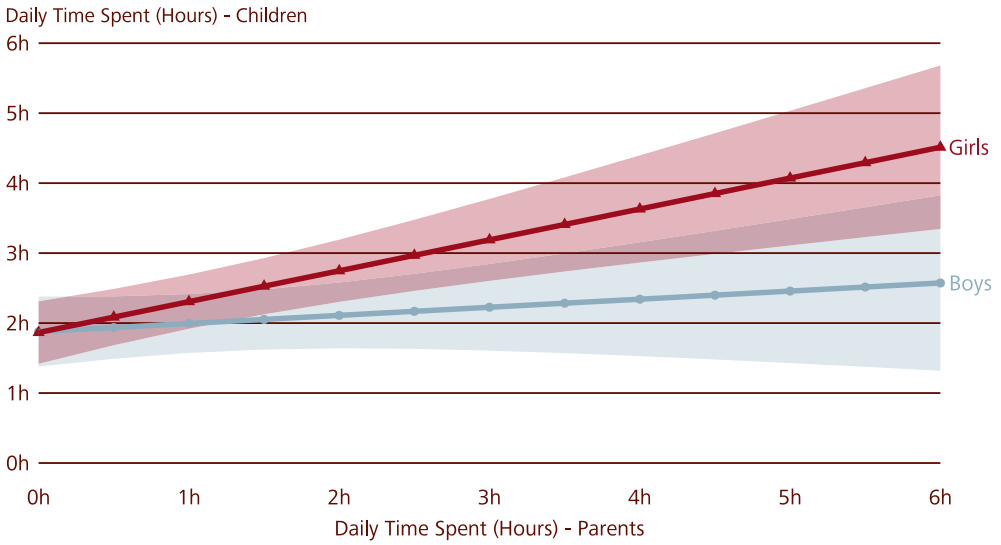
This finding suggests that children tend to mirror their parents' DTS. The standardized effect size is 0.294 (SE = 0.085, t = 3.445, p = 0.001), indicating a moderate association comparable with the effect size observed for media addiction.

Table 3.7 **Coefficient Estimates from the Gender-Specific Parent Time Model**

Term	Estimate	Std. Error	Statistics	p Value
Intercept	−2.823	0.481	−5.864	<0.001
Parent Screen Time: Males	0.116	0.123	0.939	0.348
Parent Screen Time: Females	0.441	0.112	3.927	<0.001

Further examination of this relationship by gender revealed a distinct pattern. For girls, parental screen time had a strong impact on their DTS, with a significant effect size of 0.441 (SE = 0.112, t = 3.927, p < 0.001; see Figure 3.10). This finding suggests that girls are more sensitive to parental screen time habits than boys. By contrast, the association for boys was smaller but not statistically significant (β = 0.116, SE = 0.123, t = 0.939, p = 0.348). This finding highlights that girls are influenced not only by parental DTS but also to a greater extent than boys, suggesting that parental behavior on social media resonates more strongly with daughters than with sons.

Figure 3.10 **Relationship Between Parents' and Their Children's DTS**



Note: This figure illustrates the predicted relationship between parental DTS on social media (x-axis) and children's DTS on social media (y-axis), measured in hours. The predictions are based on Model 4: DTS, which was extended to include parental screen habits as a predictor (see Technical Box 3.6). The red line represents girls, while the blue line represents boys, with shaded areas indicating 95 percent confidence intervals.

Source: DCCA Survey, 2023

In summary, this indicates that parental social media habits have a measurable influence on children's social media screen time, with the effect being mostly driven by girls. For girls, this effect also appeared to be sizable. These findings suggest that parental media behavior, particularly in families with daughters, may play a significant role in shaping adolescent screen time patterns.

Box 3.6
Technical Box: Model 4-DTS with Child-Parent Pairs

This technical box outlines models that were used to examine the relationship between parental and adolescent DTS using matched child-parent data.

Data Collection Overview
The analysis included 508 matched child-parent pairs, with both providing screen time data on time spent via screenshots. Children completed surveys on their media use, while parents supplied comparable screen time data. Linking these datasets enabled a direct comparison of DTS within families and an assessment of parental influence on adolescent behavior.

DTS Models: Incorporating Parent Screen Time
Building on prior models that assess adolescent media engagement, this model adds parental media engagement as a predictor to examine how parental habits might shape adolescent media use.

$$\text{Child DTS}_i = \beta_0 + \beta_1 \text{Parent DTS}_i + \beta_2 Addiction_i + \beta_3 Self control + \boldsymbol{Z}_i\beta + \epsilon_i$$

Child DTS_i represents the total time children spend across all social media platforms, standardized to a z-score. Parent DTS_i represents the corresponding DTS for parents, which is also standardized. β_1 represents the effect of parental time spent on social media on child's time spent on social media, β_2 represents the effect of addiction on child DTS, and β_3 represents the effect of self-control. As before, $\boldsymbol{Z}_i$ includes a vector of sociodemographic controls: gender, age, citizen status, region of residence, immigration status, household structure, parental income, parental employment status, and parental education level.

Gender-Specific Analysis
To determine if parental influence differs by child gender, separate models were created for boys and girls, allowing for tailored estimation of parental impact on each group:

$$\text{Child DTS}_i = \beta_0 + \gamma_1 \text{Parent } DTS_i^{Gender} + \beta_1 Addiction_i + \beta_2 Self control + \mathbf{Z}_i\beta + \epsilon_i$$

where γ_1 refers to the coefficients of parental media engagement on daughters and sons, modeled with one coefficient for each. This gender-specific model enables the examination of how parental screen time influences boys and girls differently.

3.7 Well-Being

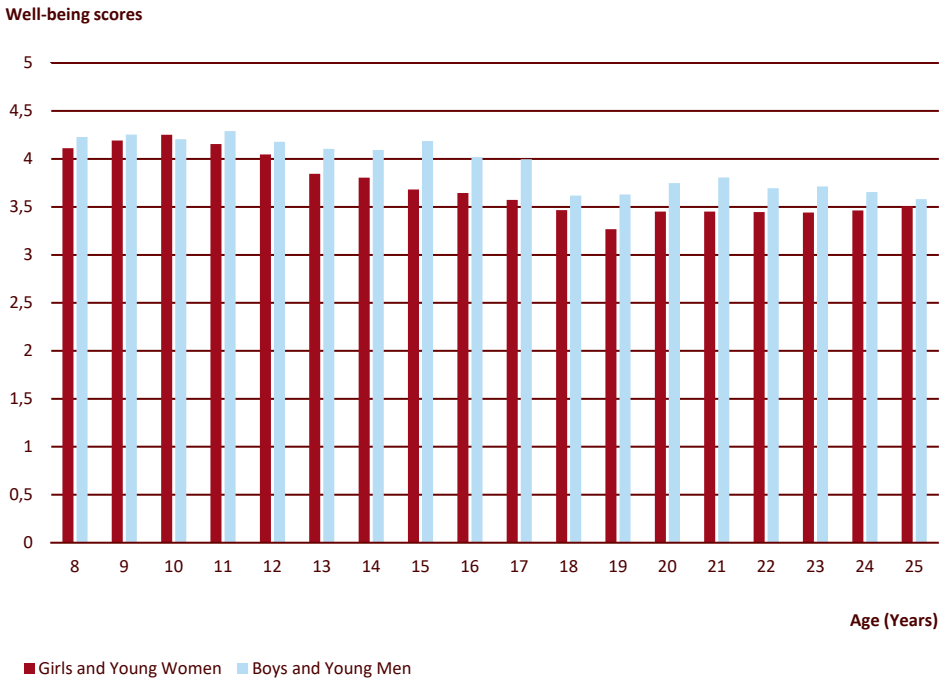
Well-being is a multifaceted physical and mental state that is affected by many components, and causal relationships are difficult to uncover. Although some aspects are more likely to affect well-being, it is unlikely that only one component, such as social media, is the sole basis of well-being.

The average accumulated well-being score of the participants in the present study was slightly higher than that of a European reference sample,[60] demonstrating that the participants' scores fell within the normal range of well-being at least in a European context.

Descriptive Data
Children aged 8–12 years reported the highest levels of well-being, with an average score of 4.19 (n = 1,036, SD = 0.51), followed by teenagers aged 13 to 17 years, who reported a slightly lower average score of 3.87 (n = 1,052, SD = 0.63). Young adults aged 18 to 25 years had the lowest well-being scores, averaging 3.56 (n = 1,357, SD = 0.67). Decline in well-being begins during the teenage years and stabilizes in early adulthood (see Figure 3.11).

[60] Sample size for the European norm data: N = 20,640. Norm data samples can be found on the home page of KIDSCREEN **https://www.kidscreen.org/english/analysis/manual-appendices/**

Figure 3.11 **Well-Being Decline Through Teenage Years**



Note: This figure shows the average survey well-being scores (KIDSCREEN-10) for girls and young women and boys and young men among all participating age groups between 8 and 25 years old.

Source: DCCA Survey, 2023

Gender differences in well-being were evident across all age groups. Boys and young men consistently reported higher levels of well-being, averaging 3.96 (n = 1,637, SD = 0.62), than girls and young women, who had an average score of 3.74 (n = 1,808, SD = 0.69). Among preteens aged 8 to 12 years, boys had an average well-being score of 4.23 (n = 473, SD = 0.47), slightly higher than the average for girls, which was 4.16 (n = 563, SD = 0.53).

In the teenage group, aged 13 to 17 years, boys again reported higher well-being, with an average score of 4.07 (n = 493, SD = 0.53), compared with the 3.70 (n = 559, SD = 0.65) for girls. The gender gap widened among young adults (aged 18–25 years), where men reported an average well-being score of 3.68 (n = 671, SD = 0.66), while women had a lower average of 3.44 (n = 686, SD = 0.67).

Model 5: Well-Being

Previous research has argued that a high daily screen time can be harmful to children's physical and mental health[61] and that more screen time is negatively associated with numerous

[61] Saunders & Vallance. (2017). Screen Time and Health Indicators Among Children and Youth: Current Evidence, Limitations and Future Directions.

health indicators in child and youth populations, including reduced fitness, quality of life, self-esteem, and academic achievement, and increased depression and anxiety.[62] [63]

However, other researchers have argued that the relationship between screen time and well-being is better represented by a quadratic function known as the *Goldilocks effect*.[64] They argue that while excessive and minimal screen times have negative effects on well-being, moderate use may not only be non-harmful but also potentially advantageous.

Building on these insights, the well-being model was used to examine the relationship between DTS on social media and well-being among children, teenagers, and young adults. With the model, it was hypothesized that the relationship between DTS and well-being follows a quadratic pattern, where well-being is highest at moderate levels of social media use and declines at both the low and high extremes of use. Furthermore, this relationship can be understood as having a breakpoint, where beyond a certain level of use, social media begins to exert a negative effect on well-being.

In addition, the model includes variables for social media addiction and self-control to explain well-being. Addiction is expected to negatively influence well-being, reflecting compulsive use patterns that might interfere with other vital aspects of a teenager's life, such as sleep, physical activity, and in-person social interactions. Conversely, self-control is anticipated to have a protective effect on well-being, potentially moderating the negative impact of excessive screen time. The model also includes a comprehensive set of sociodemographic controls to account for social determinants of health, such as gender, age, citizenship status, region of residence, immigration status, household structure, parental income, parental employment status, and parental educational level. For more information on "Model 5: Well-being," see Technical Box 3.7.

Table 3.8 **Coefficient Estimates: Model 5-Well-Being**

Term	Estimate	Std. Error	Statistics	p Value
Intercept	1.511	0.16	9.473	<0.001
DTS	0.11	0.039	2.843	0.005
DTS2	−0.016	0.005	−3.112	0.002
Addiction (z-score)	−0.213	0.025	−8.372	<0.001
Self-Control (z-score)	0.223	0.024	9.129	<0.001
Gender (Male)	Reference Group			
Gender (Female)	−0.352	0.047	−7.504	<0.001
Age (z-score)	−0.073	0.009	−8.46	<0.001

Note: The full table of coefficients, including additional controls, can be found in Appendix 3a6. Some controls are omitted here for brevity. These coefficients were derived from the full model, as specified in Technical Box 3.7.

[62] Liu, et al, (2016). Dose–response association of screen time-based sedentary behaviour in children and adolescents and depression: A meta-analysis of observational studies.

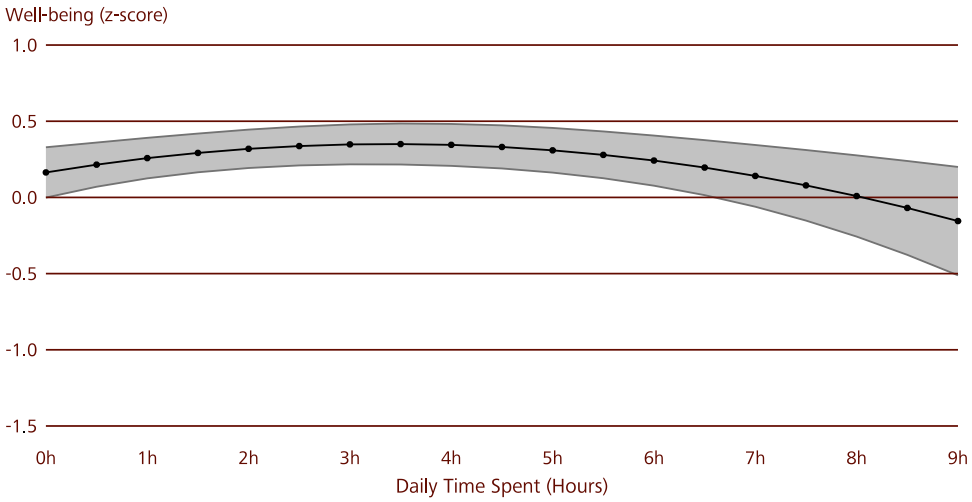
[63] Tremblay, et al. (2011). Systematic review of sedentary behaviour and health indicators in school-aged children and youth.

[64] Przybylski & Weinstein. (2017). A Large-Scale Test of the Goldilocks Hypothesis: Quantifying the Relations Between Digital-Screen Use and the Mental Well-Being of Adolescents.

DTS, Social Media Addiction, Self-Control, and Well-being

While no systematic decline in well-being was observed with increased DTS, a significant association emerged at the higher end of the spectrum. Specifically, a decline in well-being became apparent when the DTS exceeded 3 hours and 30 minutes. This trend, as illustrated in Figure 3.12, shows that high levels of DTS on social media were associated with slightly reduced well-being, affecting approximately 30.5 percent of the sample who had more than 3 hours and 30 minutes of DTS.

Figure 3.12 **Predicted Well-Being Across Levels of DTS**



Note: This figure presents the predicted well-being (z-score) from the well-being model, with DTS (hours) on the x-axis. DTS is modeled as a quadratic effect to capture the nonlinear relationship between media use and well-being. The curve illustrates that well-being initially increases very slightly from no time spent to moderate time spent before beginning to decline as media engagement becomes excessive. The ribbons around each line depict the 95 percent confidence intervals of the effects.[65]

Source: DCCA Survey, 2023

A piecewise linear regression analysis was conducted to further investigate the relationship between DTS on social media and well-being. This method was utilized to identify potential breakpoints, or thresholds, where the association between DTS and well-being would shift. The analysis identified a breakpoint at approximately 5 hours and 30 minutes of DTS. Below and above this threshold, no significant association with well-being was observed.

The model revealed that social media addiction is a stronger predictor of reduced well-being than DTS. Specifically, a 1-SD increase in social media addiction was associated with a 0.21-SD decrease in well-being ($\beta = -0.213$).

By contrast, self-control was positively associated with well-being. A 1-SD increase in self-control corresponded to a 0.22-SD increase in well-being, highlighting the potential protective role of self-control in moderating the effects of media engagement.

[65] The well-being distribution is left-skewed, with a normal distribution and a long tail toward lower scores. Consequently, the model's predicted values also reflect this skew. While most respondents cluster around average or higher well-being, a notable portion reports significantly lower scores, highlighting a vulnerable subgroup.

Overall, while high levels of DTS may be associated with reduced well-being, this effect appears to be less significant than the impact of social media addiction. These findings suggest that addiction, rather than time spent, plays a more critical role in the decline in well-being observed among young individuals.

Moderation Effects: Gender

Girls and young women reported lower well-being than boys and young men, with a coefficient of −0.352. Beyond this difference, it may be that DTS affects boys' and girls' well-being differently owing to variations in how they use and interact with social media.

To explore this, the relationship between DTS and well-being was modeled separately for girls and young women, and boys and young men (see Table 3.9). The approach tested whether the association between DTS and well-being varies between genders (see Technical Box 3.7), while the coefficients for addiction and self-control continue to be independent of gender.

Table 3.9 **Gender-Specific Coefficient Estimates: Model 5–Well-Being**

Term	Estimate	Std. Error	Statistics	p Value
Gender (Male)	Reference Group			
Gender (Female)	−0.238	0.124	−1.917	0.055
DTS (Female)	0.071	0.053	1.348	0.178
DTS2 (Female)	−0.011	0.007	−1.604	0.109
DTS (Male)	0.154	0.056	2.748	0.006
DTS2 (Male)	−0.022	0.008	−2.811	0.005

The results highlight gender differences in the relationship between DTS and well-being (see Figure 3.13).

For boys and young men, a significant quadratic (inverted U-shaped) relationship was identified, with a quadratic term coefficient of −0.022 (SE = 0.008, t = −2.811, p = 0.005) and a linear term of 0.154 (SE = 0.056, t = 2.748, p = 0.006). This indicates that well-being initially increased with moderate media engagement, reaching a peak before declining as engagement continued to increase. The highest level of well-being for males occurred at approximately 3.5 hours of DTS. Beyond this threshold, further media engagement is associated with decreased well-being. Approximately 25 percent of the male sample reported a DTS exceeding this level. However, boys' and young men's well-being did not decrease below the average level (a z-score of 0) until their DTS surpassed 7 hours, suggesting that the negative association between well-being and screen time primarily affects extreme cases.

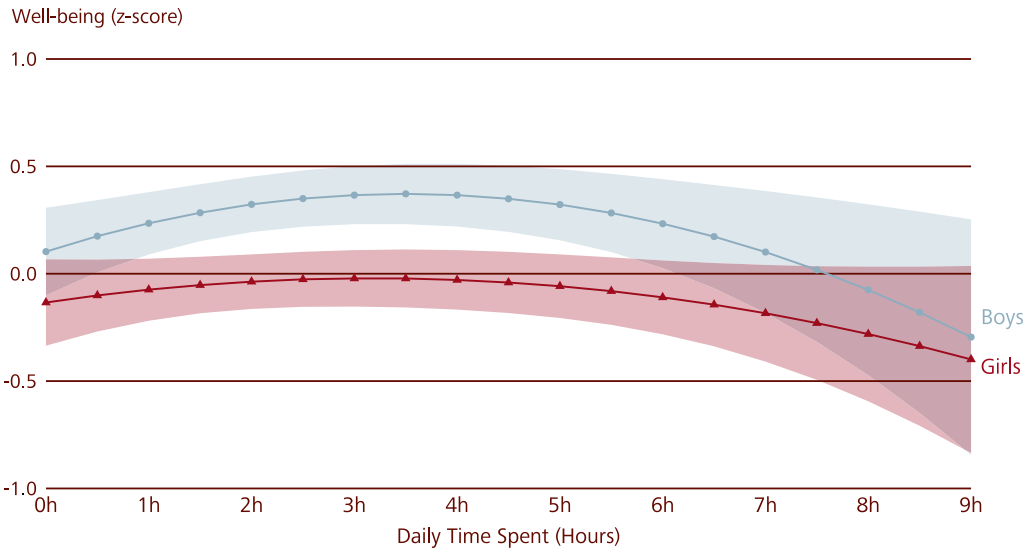
A piecewise regression analysis for males revealed a breakpoint at approximately 5 hours of DTS, consistent with the result observed in the overall sample (see Figure 3.14). Below this threshold, no significant linear association between DTS and well-being was detected. However, when DTS exceeded 5 hours, a negative linear relationship emerged, indicating a decrease in well-being with increasing engagement. Notably, only 6.6 percent of the male sample reported a DTS exceeding this threshold.

For girls and young women, neither the linear nor the quadratic effect of DTS on well-being was statistically significant. The linear (β = 0.071, SE = 0.053, t = 1.348, p = 0.178) and quadratic terms (β = −0.011, SE = 0.007, t = −1.604, p = 0.109) both failed to reach significance, indicating no clear association between DTS and well-being for this group. While piecewise regression analysis suggested a potential breakpoint at approximately 0.6 hours of daily

engagement, no significant relationship with well-being was observed, either below or beyond this level. These findings suggest that well-being among girls and young women is not significantly influenced by variations in daily media engagement.

Overall, these findings challenge the notion that DTS alone has a significant or consistent association with well-being. While extreme levels of DTS may correlate with reduced well-being among boys and young men, no consistent negative effect was observed for either gender across all ranges of DTS.

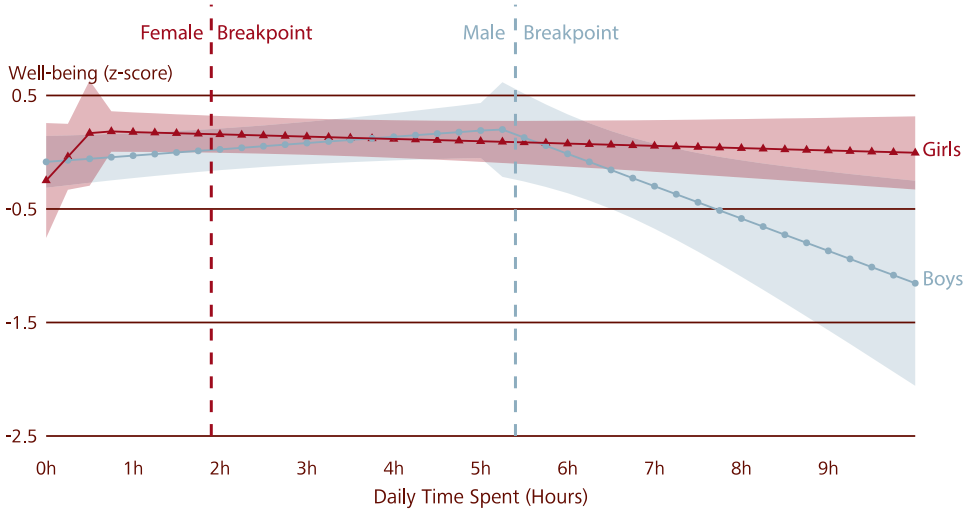
Figure 3.13 **Predicted Well-Being Across All Amounts of DTS by Gender**



Note: This figure displays the predicted well-being (y-axis, z-score) from the interaction model, with DTS (hours) on the x-axis. The two lines represent the relationship between DTS and well-being for boys (blue line) and girls (red line), capturing the gender-based interaction effect. The figure illustrates that boys exhibit a significant quadratic (inverted U-shaped) relationship, where well-being initially increases with moderate media engagement before declining as media engagement becomes excessive. For girls, however, the relationship is less pronounced, with a flatter curve indicating a smaller and statistically nonsignificant quadratic effect. This suggests that boys' well-being is more sensitive to changes in time spent on social media, showing a distinct peak in well-being at moderate levels of engagement, while girls exhibited a less pronounced pattern. The ribbons around each line depict the 95 percent confidence intervals of the effects.

Source: DCCA Survey, 2023

Figure 3.14 **Predicted Well-Being Across All Levels of Engagement by Gender (Piecewise Regression)**



Note: This figure illustrates the predicted well-being (y-axis, z-score) based on DTS (x-axis, hours) using piecewise regression models to identify breakpoints for boys and girls. The red line represents the relationship for girls, with a breakpoint at approximately 2 hours of engagement, while the blue line shows the relationship for boys, with a breakpoint at approximately 5 hours. For boys, well-being exhibits an initial stable trend before declining significantly beyond the 5-hour breakpoint. By contrast, for girls, no meaningful changes in well-being can be observed before or after the 2-hour breakpoint, indicating a minimal association between DTS and well-being. The dashed vertical lines mark the respective breakpoints for each gender.

Source: DCCA Survey, 2023

Box 3.7
Technical Box: Model 5-Well-Being

The well-being model was used to investigate the effects of screen time on adolescents' mental health, incorporating both linear and quadratic terms. This model conceptualizes well-being as a continuous outcome, analyzed using a linear regression framework, where higher values indicate better well-being outcomes.

The well-being model tests whether the relationship between daily screen time and well-being follows a quadratic curve. Next, this curvature was examined separately for males and females to determine whether each gender would exhibit a distinct well-being curve in response to DTS. To further refine understanding, a gender interaction effect was tested to assess whether the relationship between screen time and well-being significantly differs between males and females. Finally, an age interaction effect was evaluated to determine whether age moderates the impact of both the linear and quadratic screen time terms on well-being. Both time spent and well-being were z-scored (standardized), which means that they were transformed to have a mean of 0 and an SD of 1.

Core Model Specification
The model includes both linear and quadratic terms for screen time to capture the hypothesized nonlinear relationship with well-being. The specifications are as follows:

$$Wellbeing_i = \beta_0 + \beta_1 DTS_i + \beta_2 DTS_i^2 + \beta_3 Addiction_i + \beta_4 Self control_i + \boldsymbol{Z}_i\beta + \epsilon_i$$

In this equation, β_1 represents the linear effect of DTS_i on well-being, capturing an immediate positive or negative association. β_2 represents the quadratic effect. A significant negative coefficient for this term would indicate an inverted U-shaped relationship, where well-being initially increases with screen time to a peak before declining. β_3 and β_4 represent the effects of addictive behaviors and self-control on well-being. $\boldsymbol{Z}_i$ represents a vector of sociodemographic controls, including gender, age, region of residence, citizenship status, immigration status, household structure, parental income, parental employment status, and parental educational

level. These controls help account for other characteristics that may influence well-being independently of psychological traits.

Modeling the DTS Curve Separately by Gender
To examine potential differences in the screen time well-being curve between the genders, the curve was modelled separately for males and females. This specification allowed for independent linear and quadratic terms for each gender, which are useful for identifying any variation in the shape of the DTS curve by gender. Coefficients for addiction and self-control continue to be independent of gender. The gender-specific model is specified as follows:

$$Wellbeing_i = \beta_0 + \beta_1 DTS_i^{\text{Gender}} + \beta_2 DTS_i^{2,\text{Gender}} + \beta_3 Addiction_i + \beta_6 Selfcontrol_i + \boldsymbol{Z}_i\beta + \epsilon_i$$

In this model, β_1 represents the linear terms that capture the gender-specific effects of screen time on well-being, allowing for potential differences in the initial direction and magnitude of the relationship for each gender. β_2 represents the quadratic terms that capture the nonlinear effect separately for each gender.

Moderating Effects of Age and Gender: Interaction Model
In addition to examining gender-specific curves, interaction terms were introduced to assess whether the linear and quadratic relationships between DTS and well-being differ by age or gender. This interaction model captures whether the impact of screen time on well-being changes with age or differs significantly between genders. The interaction model specification is as follows:

$$\begin{aligned} Wellbeing_i = \beta_0 + \beta_1(DTS \cdot Age) + \beta_2(DTS \cdot Gender) + \beta_3(DTS_i^2 \cdot Age) \\ + \beta_4(DTS_i^2 \cdot Gender) + \beta_5 Addiction_i + \beta_6 Selfcontrol_i + \beta^T X_i + \epsilon_i \end{aligned}$$

Where β_2 and β_4 represent the interaction terms with gender to assess whether the linear and quadratic effects of time spent on well-being vary by gender. β_1 and β_3 are the interaction terms with age that indicate whether the effects of time spent differ with age, allowing us to test whether older adolescents experience more pronounced impacts from high or low levels of screen time than younger adolescents.

Breakpoint Analysis for DTS and Well-being
To further examine the relationship between DTS and well-being, a breakpoint method was employed. This approach identified specific thresholds where the association between DTS and well-being changed direction. The analysis estimated breakpoints for the overall sample and separately for each gender.

Overall Breakpoint: The overall model estimated the point at which the DTS began to have a negative effect on well-being. This threshold provides insight into when screen time becomes excessive and starts to reduce well-being across all participants.

Gender-Specific Breakpoints: Separate breakpoint analyses were conducted for males and females to assess whether thresholds differ according to gender. This method allowed for identifying gender-specific levels of DTS where well-being peaked and began to decline, reflecting potential behavioral or social differences between boys and girls.

The breakpoint method complements the quadratic analysis by providing a different way of viewing the relationship in which specific use levels are associated with shifts in well-being.

Chapter 4
Smartphone and Social Media Exposures

4.1 Long-Term Impacts of Smartphones and Social Media on Well-Being and Addiction

This chapter examines the influence of LTE to smartphones and social media on young consumers' well-being and social media addiction in the school context. Combining cross-sectional and longitudinal approaches, the analysis examined how the duration of exposure - whether to smartphones, chat, or content media - relates to cognitive and emotional outcomes.

In this chapter, LTE is defined as the number of years users were exposed to smartphones and social media. LTE was determined by subtracting the self-reported age at which individuals first acquired a smartphone or began using their preferred chat or content media from their current age. This provides a measure of cumulative exposure to digital media.

The first part of the analysis provides a cross-sectional analysis of the relationship between users' current well-being and social media addiction levels across all durations of LTE to smartphones, chat media, and content media. The second part is longitudinal and compares WIS before and after the introduction of smartphones and social media to assess any changes.

Gendered Patterns in Well-Being, LTE, and Addiction
The strong correlation between age and LTE to smartphones, chat media, and content media presents a significant challenge in disentangling their independent effects on well-being and social media addiction. Most individuals acquire smartphones and begin using social media at a young age, complicating efforts to separate the impacts of age from exposure duration in a cross-sectional analysis.

For boys, LTE to smartphones was associated with an initial decline in well-being, which stabilized after approximately 8 years of use. For girls, LTE to smartphones showed a more pronounced negative impact on well-being, which also attenuated with prolonged exposure. By contrast, the effects of LTE on chat and content media were less pronounced and exhibited gender-specific patterns. Boys experienced a diminishing negative effect of chat media over time, while no significant associations were observed for girls. For content media, girls showed an initial decline in well-being that moderated with longer exposure, whereas no significant effects were found for boys. Overall, age had a stronger and more consistent negative association with well-being for girls than for boys, highlighting the difficulty of isolating the contributions of age and LTE.

In the context of social media addiction, the results suggest that age is the dominant explanatory factor, with LTE showing no significant direct effects. For girls, addiction levels increased with age across all three models, as indicated by the significant positive linear age coefficients, but the rate of increase slowed over time owing to significant negative quadratic age terms. A similar pattern was observed for boys, but significant effects were only found in the smartphone model. None of the LTE variables (smartphone, chat media, or content media) reached statistical significance for either boys or girls, indicating no evidence that the duration of media exposure directly contributes to social media addiction. Self-control remains the strongest individual predictor of addiction outcomes, as noted earlier.

Overall, these findings indicate that social media addiction and well-being outcomes are more closely tied to age-related developmental or behavioral changes than to media exposure duration. The high correlation between age and LTE not only underscores the difficulty of disentangling these effects but also suggests that age provides a better explanation of the observed patterns in both well-being and addiction. While LTE effects may vary slightly by gender and media type, they appeared to have minimal direct influence when age and individual factors were accounted for.

Relationship Between LTE and WIS

Unlike the cross-sectional analysis of well-being and addiction, which captures a snapshot of individuals exposed to digital media for varying durations, this part of the study adopted a longitudinal approach. It observed how WIS evolves before and after users acquire smartphones, chat media, or content media. This method allowed for a direct examination of how the introduction and prolonged use of these technologies influence WIS trajectories, providing insights into both immediate and long-term effects.

For smartphones, the data reveal contrasting effects between boys and girls. For boys, long-term smartphone exposure was associated with a significant improvement in WIS compared with the pre-acquisition period. This suggests that prolonged use of smartphones may bring certain benefits to boys, such as improved connectivity or access to information, which positively influence their WIS over time.

For girls, however, the results show a significant negative shift in WIS trajectories after smartphone acquisition. Over time, their WIS declined to below pre-smartphone levels, with this decrease becoming apparent approximately 2 to 3 years after acquisition. This indicates that the challenges associated with prolonged smartphone use, such as increased distractions, social pressures, or other stressors, may have a more pronounced and sustained impact on girls.

In the context of chat media, boys showed no significant changes in WIS, either immediately after adoption or over the long term. This suggests that chat media has a relatively neutral effect on boys' school well-being. For girls, however, the adoption of chat media was linked to a significant immediate decline in WIS. Over time, this decline did not persist, as the long-term trajectory did not differ significantly from the preadoption period. This indicates that the initial negative impact of chat media on girls' WIS might have diminished as they adjusted to its use or as its effects stabilized over time.

Content media exposure demonstrates a limited impact on WIS for both boys and girls. The data show no significant changes in WIS trajectories for boys or girls, either immediately after acquisition or over the long term.

These findings underscore the gender- and media-type-specific effects of digital media on school well-being. While boys appeared to benefit slightly from prolonged smartphone use and showed no significant impact from chat or content media, girls faced more pronounced challenges, particularly with smartphones and chat media. The results highlight the importance of examining both immediate and long-term effects to fully understand how digital media exposure shapes WIS trajectories.

To contextualize these findings, the next section provides a detailed overview of the analytical framework and models used to assess these effects. By combining cross-sectional and longitudinal analyses, this chapter offers a comprehensive view of how digital media acquisition and LTE influence WIS over time.

4.2 Smartphone and Social Media Exposures: Analytical Models

When kids and teenagers get their first smartphone, they gain access to a world of new digital options with which they are likely to continue interacting from that point on. The analysis presented in this chapter examined how the duration of users' exposure to smartphones and social media affects outcomes such as WIS in general and social media addiction. The findings were derived from both cross-sectional and longitudinal data, allowing for a deeper understanding of the dynamics at play over time.

The analysis in this chapter builds on two sets of models (see also Figure 4.1).

First Set of Models: Long-Term Social Media Exposure, Well-Being, and Addiction
The first models use between-subject variation to test how differences in LTE to social media and smartphones relate to the respondents' current well-being and social media addiction levels.

1. **Model 1: LTE and General Well-being**
   A linear regression model that tests the relationship between LTE to smartphones and social media and experienced well-being. For details, see Technical Box 4.1.
2. **Model 2: LTE and Addiction**
   A linear regression model that tests the relationship between LTE to smartphones and social media and social media addiction. For details, see Technical Box 4.2.

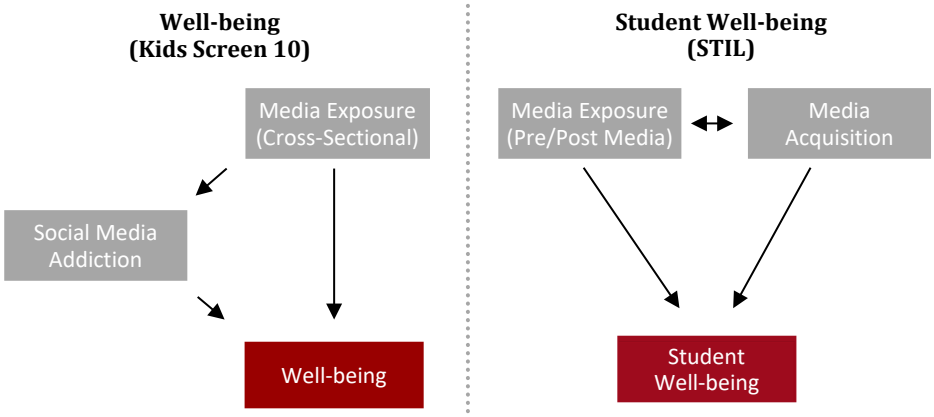
The first two models rely on data collected in the survey to estimate both LTE to smartphone and social media use and the current levels of general well-being and addiction. The well-being measure itself was only collected in the survey; as such, the relationships examined in these models are cross-sectional.

Second Set of Models: Social Media Exposure and WIS
The relationships between smartphone and social media LTEs and WIS was examined using a longitudinal model.

3. **Model 3: LTE and WIS**
   This model was used to investigate the impacts of LTE to smartphones, chat, and content media on WIS using a longitudinal approach with survey and national registry data collected on Danish students since 2014. The model employed an interrupted time series (ITS) framework within a mixed-effects structure to capture both the immediate effects of media acquisition and changes in well-being trajectories before and after media acquisition over time. For details, see Technical Box 4.3.

This model is particularly valuable for identifying both the short- and long-term effects of media acquisition. By accounting for individual differences in baseline well-being and responses to media exposure, it provides a comprehensive understanding of how *digital media acquisition* and *extended exposure* influence *WIS*. The model further controls for a range of demographic and educational factors to ensure robust results.

Figure 4.1 **Analytical Framework for Chapter 5: Smartphone and Social Media Exposures**



Note: This figure illustrates the analytical models tested in Chapter 5, highlighting the examined relationships between media exposure, media acquisition, social media addiction, and well-being outcomes. The left panel represents cross-sectional analyses using survey data from KIDSCREEN-10, focusing on how media exposure and social media addiction relate to general well-being. The right panel outlines the longitudinal approach using STIL data, analyzing student well-being in relation to media exposure and acquisition while assessing changes before and after media introduction.

Source: DCCA, 2024

4.3 LTE to Social Media and Smartphones: Well-Being

Exposure Analysis: Descriptive Data

The respondents were 9.88 years old on average (SD = 2.5) when they started using a smartphone. However, there were notable differences in the age of smartphone acquisition across the age groups. Young adults (18–25 years old) got their first smartphone significantly later, at an average age of 11.21 years (SD = 2.7). Teenagers (13–17 years old) started using smartphones slightly earlier, at an average age of 9.43 years (SD = 2.0). Finally, children (8–12 years old) started using smartphones at an average age of 8.26 years (SD = 1.29).

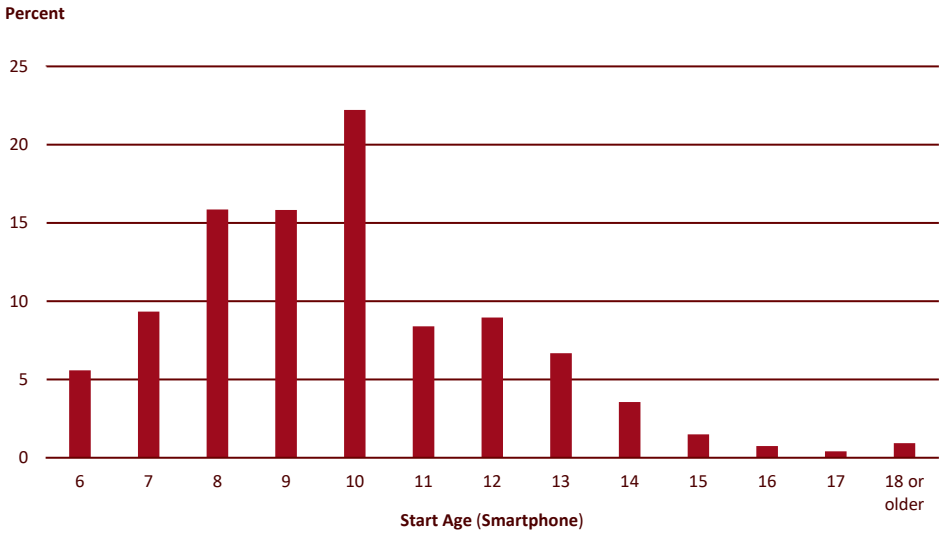
The participants also reported the average age at which they began using their preferred social media. For chat media, the average age was 11.64 years (SD = 2.45), with preteens starting at age 9.06 years (SD = 1.42), teenagers at 11.26 years (SD = 1.73), and young adults at 13.24 years (SD = 2.06). For content media, the average starting age was slightly higher, at 11.89 years (SD = 3.41), with children starting at 8.57 years (SD = 1.87), teenagers at 11.4 years (SD = 2.23), and young adults at 13.95 years (SD = 3.3). This progression highlights the acceleration with which these technologies are introduced into young consumers' lives (see Figure 4.2).

On average, boys received their first smartphones at the age of 10.19 years, slightly later than girls, who received theirs at 9.61 years of age. A similar trend was observed for the adoption of favorite chat and content media. Boys started using their favorite chat platforms at the age of 11.97 years and content media at 11.79 years, whereas girls began using their favorite chat platforms at the age of 11.34 years and content media at 11.98 years. These gender differences in adoption timing highlight consistent patterns across the media types.

Approximately 58 percent of the children began using their preferred content media before the age of 13 years, and approximately 62 percent started using their preferred chat media before the age of 13 years, which is below the official age limit of most social medias.[66]

This trend could be subject to selection bias. Although the survey was designed to include participants regardless of smartphone ownership, it is possible that children without smartphones were less inclined to participate. Nonrandom participation could lead to an underestimation of the average age of smartphone acquisition in younger age groups, as those without devices might be underrepresented in the data.

Figure 4.2 **Starting Age of Smartphone Use**



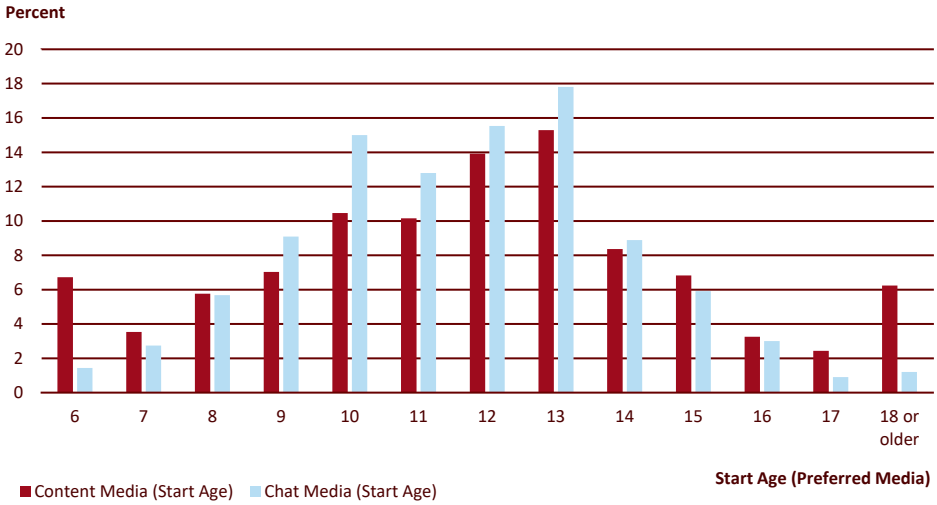
Note: This figure shows the distribution (in percent) of the respondents' ages when they got their first smartphone (N = 3204). For the minimum data retrieval requirements from Statistics Denmark, responses in the age range of 18 to 25 years are combined into the "18 or older" category. An option to answer, "I can't remember" was provided (not included here).

Source: DCCA Survey, 2023

The age at which the respondents first used any social media platform may be younger than the reported ages, as their currently preferred (or mostly used) content or chat media could have changed over time. For example, a 22-year-old participant might prefer to use TikTok and have been using it the past 5 years (starting at age 17 years) but could have used YouTube before that. This means that the exposure analyses for different media types refer only to the impact of specific media platforms rather than social media use in general.

[66] For example, **https://da-dk.facebook.com/help/570785306433644/?helpref=hc_fnav** or **https://da-dk.facebook.com/help/157793540954833**.

Figure 4.3 **Starting Age of Using Preferred Chat and Content Media**



Note: The figure shows the number (percent) of children who started using their preferred content media (red) and chat media (blue) at a certain age. The respondents had the option to answer, "No, I can't remember" (not included). The category "18 years or older" is a consolidation of the few responses that were in the age range of 18 to 25 years. They are combined to fit in the figure and to anonymize the results.

Source: DCCA Survey, 2023

Model 1: LTE and Well-Being

To examine the relationship between LTEs to social media and smartphone and well-being, survey responses were integrated with age data from Statistics Denmark to construct an exposure duration variable (LTE). This variable was calculated by subtracting the reported starting age of smartphone, chat, or content media usage from the respondent's age at the time of the survey, thereby providing a measure of the duration of exposure to each media type.

The analysis tested whether different durations of media exposure impact well-being in varying ways. For instance, while initial exposure to media might enhance well-being through social connections or novelty, extended exposure could lead to overstimulation or reduction in time available for other activities, ultimately reducing well-being, as suggested by the displacement theory.

It was not possible to include data on DTS on social media in this analysis, as this could only be reliably estimated for respondents with iPhones, which would significantly limit the sample size. For further methodological details, see Technical Box 4.1.

Gender-Specific Exposure Effects

Given the inherent differences in both the effects of social media consumption on well-being (see Chapter 4) and the general gendered differences in well-being, it seems reasonable to expect that LTE may also have gender-specific properties. To address this, the analysis involved calculating LTE coefficients separately for girls and boys.

The analysis accounted for the high correlations between survey age and LTE, which is 0.85 for chat media exposure, 0.70 for content media exposure, and 0.84 for smartphone exposure (all statistically significant at $p < 0.001$). These correlations suggest multicollinearity, making it challenging to disentangle the effects of LTE from age-related changes in well-being and addiction. Accordingly, all models control for the gender-specific effects of both the main effect of age and the quadratic effect of age.

The analysis used a quadratic modeling approach to evaluate both linear and nonlinear trends in the relationship between LTE and well-being. This includes testing the direct effects of exposure duration on well-being for boys and young men, and for girls and young women separately, controlling for age-related effects to ensure that findings reflect genuine exposure effects rather than age. Accordingly, both the quadratic and gender-specific coefficients for age and LTE were modeled on the basis of three separate models, each focusing on a different media type: chat media, content media, and smartphone exposure.

Table 4.1 **Coefficients of LTE and Age Effects: Well-being**

Variable	Estimate	Std. Error	Statistics	p Value
Chat Media Exposure Model				
Intercept	1.800	0.611	2.948	0.003
Chat Exposure: Male	−0.059	0.043	−1.382	0.167
Chat Exposure: Female	−0.047	0.043	−1.094	0.274
Chat Exposure²: Male	0.007	0.003	2.138	0.033
Chat Exposure²: Female	0.003	0.003	0.889	0.374
Survey Age: Male	−0.084	0.074	−1.138	0.255
Survey Age: Female	−0.309	0.074	−4.188	<0.001
Survey Age²: Male	0.000	0.002	0.007	0.995
Survey Age²: Female	0.007	0.002	3.325	0.001
Content Media Exposure Model				
Intercept	2.708	0.622	4.354	<0.001
Content Exposure: Male	0.044	0.041	1.063	0.288
Content Exposure: Female	−0.095	0.039	−2.408	0.016
Content Exposure²: Male	−0.003	0.003	−1.041	0.298
Content Exposure²: Female	0.008	0.003	2.366	0.018
Survey Age: Male	−0.223	0.072	−3.097	0.002
Survey Age: Female	−0.245	0.068	−3.624	<0.001
Survey Age²: Male	0.004	0.002	2.187	0.029
Survey Age²: Female	0.005	0.002	2.694	0.007
Phone Exposure Model				
Intercept	1.981	0.535	3.704	<0.001
Phone Exposure: Male	−0.074	0.03	−2.463	0.014
Phone Exposure: Female	−0.103	0.032	−3.276	0.001
Phone Exposure²: Male	0.004	0.002	2.287	0.022
Phone Exposure²: Female	0.006	0.002	3.057	0.002
Survey Age: Male	−0.104	0.064	−1.622	0.105
Survey Age: Female	−0.218	0.061	−3.595	<0.001
Survey Age²: Male	0.001	0.002	0.67	0.503
Survey Age²: Female	0.004	0.002	2.556	0.011

Note: The full table of coefficients, including the additional controls for the three models, can be found in Appendix 3b1-3. Some controls are omitted here for brevity. These coefficients were derived from the full model, as specified in Technical Box 4.1.

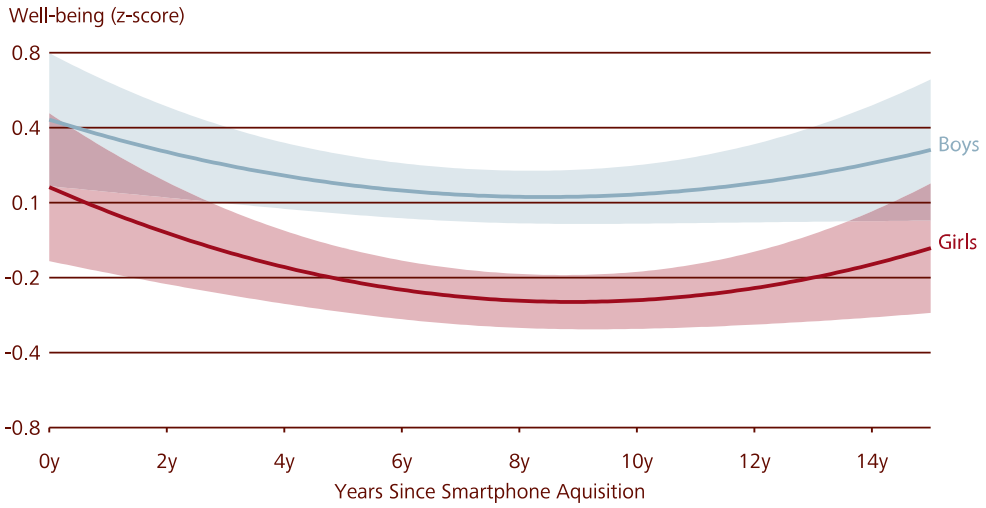
The analysis results demonstrate that survey age has a negative and significant linear association with well-being for girls across all three models. Both the linear and quadratic terms are statistically significant, indicating that as girls age, their well-being declines, although this negative effect diminishes over time (see Table 4.1). For boys, similar trends were observed, but the effects were only significant in the content media exposure model. Overall, the age effects for boys were in the same direction as those for girls but are smaller in magnitude.

LTE effects vary across genders and media types. The Smartphone LTE model identified significant effects for boys, with a negative linear association between LTE and well-being (β = −0.074, SE=0.034, p = 0.014). This negative effect decreases over time, as indicated by a positive quadratic term (β = 0.004, SE=0.002, p = 0.022). For girls, LTE to smartphones also exhibited a significant negative linear effect on well-being (β = −0.103, SE = 0.032, p = 0.001) that attenuated with prolonged exposure, supported by a positive quadratic term (β = 0.006, SE = 0.002, p = 0.002). These results suggest that the impact of smartphone use on well-being stabilized after about 8 to 9 years of cumulative exposure (see Figure 4.4).

The effects of LTEs to chat and content media were less pronounced. For boys, the quadratic term for chat exposure was significant (β = 0.007, SE = 0.003, p = 0.033), indicating a diminishing negative effect over time. For girls, however, chat exposure did not show significant associations with well-being in either linear or quadratic terms. In the content media exposure Model, significant effects were observed for girls, with a negative linear association (β = −0.095, SE = 0.039, p = 0.016) and a positive quadratic term (β = 0.008, SE = 0.003, p = 0.018), suggesting that the initial decline in well-being moderated over time. No significant effects were found for boys in this model.

Disentangling the effects of age and LTE to social media is challenging owing to their high correlation. Most individuals begin using media at a young age, making it difficult to separate the impact of age from exposure duration. For boys, LTE to smartphone was linked to an initial decline in well-being, which stabilized after around 8 years. For girls, the negative impact was more pronounced but also diminished with prolonged exposure. The LTE effects for chat and content media were weaker, with boys showing diminishing negative effects for chat and girls experiencing an initial decline in content media that moderated over time. Overall, age showed a stronger and more consistent negative association with well-being for girls than boys, highlighting the difficulty of isolating age and LTE effects.

Figure 4.4 **Predicted Well-Being Across All Amounts of Smartphone LTE by Gender**



Note: The figure illustrates the predicted well-being (z-score) across years of cumulative smartphone use, derived from the Smartphone LTE model. The y-axis shows the predicted well-being, while the x-axis indicates the number of years of exposure to smartphones, as reported by the respondents. The separate lines represent boys (blue) and girls (red), capturing gender-specific trends in the relationship between cumulative smartphone use and well-being. The shaded areas around each line represent 95 percent confidence intervals, highlighting the precision of the estimates.

Source: DCCA Survey, 2023

Box 4.1
Technical Box - Cross-Sectional LTE and Well-Being Analysis

This model was used to assess the relationship between cumulative years of exposure to social media and well-being among adolescents using a linear regression framework. Both linear and quadratic terms for LTE were included to capture potential nonlinear patterns, where moderate exposure may impact well-being differently than minimal or extensive exposure. Exposure durations were measured in full-year increments.

Formulating the LTE Variables
The participants reported the age they first acquired a smartphone and began using their primary content and chat media. By using their current age at the time of the survey (Survey Age), the LTE duration for each media type was calculated as follows:

$$\text{Long Term Exposure}_{\text{i, media}} = \text{Survey Age}_{\text{i}} - \text{Age at Use}_{\text{i, media}}$$

These variables reflect the total number of years the participants were exposed to each media type.

During the initial data inspection, some participants reported "future" media use, indicating that they planned to acquire or begin using smartphones or media after the survey date. These entries, a total of 33 cases, were excluded from the analysis to focus solely on existing patterns of media exposure. To enhance the robustness of the analysis and mitigate the influence of extreme values, LTE was truncated at the 97.5th percentile for each media type. This approach ensured that the analysis captured trends that were reflective of most participants while reducing the impact of outliers. Consequently, the maximum exposure periods considered were 12.2 years for content media (n = 2,394), 12.6 years for chat media (n = 2,656), and 15.7 years for smartphone use (n = 3,114).

Model Structure
The model included linear and quadratic terms for LTE to each media type. Quadratic terms tested for inflection points where the relationship between LTE and well-being would shift, such as a decline after moderate exposure. This approach captured both linear trends and potential U-shaped patterns in well-being. To account for potential gender differences in the impact of exposure on well-being, the model estimated separate effects for males and females, allowing each gender to have distinct linear and quadratic coefficients:

$$\text{Well-being}_{\text{i}} = \beta_0 + \beta_1\, Exposure_i^{Gender} + \beta_2 Exposure_i^{2,Gender} + \beta_3\, Age^{Gender} + \beta_4\, Age_i^{2,Gender} + \beta_5 \text{Addiction}_{\text{i}} + \beta_6 \text{Self-control}_{\text{i}} + \boldsymbol{Z}_i\beta + \epsilon_i$$

The model estimated gender-specific effects for exposure and age, incorporating both linear and quadratic terms to capture potential nonlinear relationships. Control variables for psychological factors such as addiction and self-control, alongside sociodemographic controls represented by $\boldsymbol{Z}_i$ help isolate the association between media exposure and well-being. $\boldsymbol{Z}_i$ represents a vector of sociodemographic controls, including gender, age, region of residence, citizenship status, immigration status, household structure, parental income, parental employment status, and parental educational level. This framework was applied in three separate models: smartphone LTE, content media LTE, and chat media LTE.

4.4 Long Term Exposure and Social Media Addiction

Model 2: LTE and Social Media Addiction Score
This section examines how LTEs to smartphones, chat, and content media relates to the development of social media addictive behaviors. By using the same predictors as the previous model, the analysis replaced well-being as the outcome variable with the social media addiction score. The core structure of the model remains consistent with the specification detailed in Technical Box 4.1. In addition, the control for addiction score as a covariate was removed to focus entirely on the role of smartphone and social media LTE in predicting addiction.

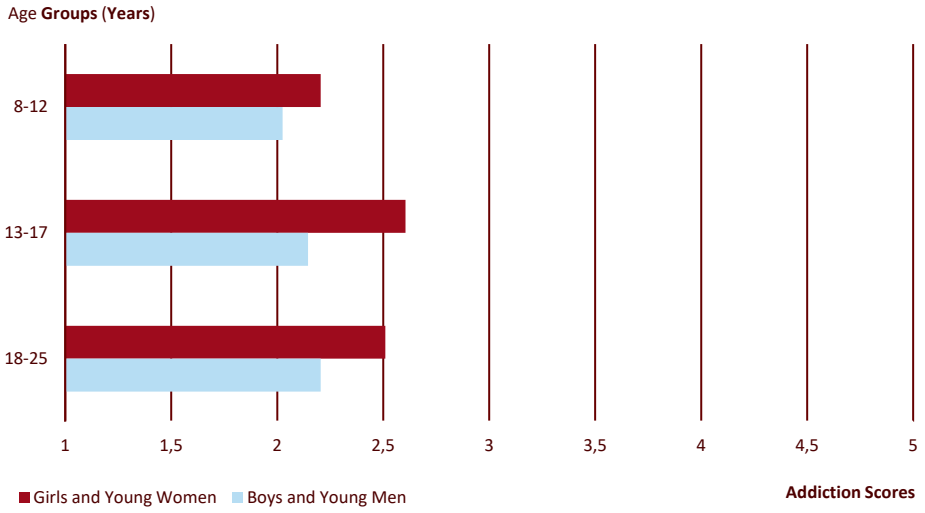
To capture potential nonlinear trends, the analysis incorporated both linear and quadratic terms for each type of media exposure. This approach enabled an assessment of whether prolonged exposure corresponds to varying levels of addiction over time. The quadratic terms allowed for the identification of points where addiction levels may increase, stabilize, or

decrease with extended exposure. Moreover, the model included quadratic age effects for boys and girls, as outlined above in the well-being model. These age-related trends highly correlated with LTE, introducing multicollinearity and complicating the interpretation of whether addiction is more directly associated with age or digital media exposure.

Self-control was included as a control variable, accounting for individual differences in regulating media use, as lower self-control is often linked to higher addiction risk. The model also contained sociodemographic controls to provide a comprehensive understanding of the factors that influence addiction.

Gender-Specific Effects on Social Media Addiction
Descriptive Data
Girls and young women had higher average addiction scores relative to boys and young men. Age also played a role in social media addiction (see Figure 4.5). Generally, there appears to be a slight increase in addiction with age for boys and young men. For girls and young women, the youngest age group demonstrated the least signs of addiction, while teenage girls (13–17 years old) displayed the most signs of addiction.

Figure 4.5 **Addiction Scores by Age and Gender**



Note: This graph shows the addiction scores of girls and young women (red; n = 1,457), and boys and young men (blue; n = 1,318) in the three main age groups of the sample.

Source: DCCA Survey, 2023

Gender-Specific LTE and Social Media Addiction
Building on these observations, the analysis examined the relationship between media LTE and addiction separately for boys and girls. Both linear and quadratic components of LTE were included in the models to capture nonlinear patterns. These age-related trends, which strongly correlated with exposure duration, complicate the disentanglement of their individual contributions to addiction.

Three separate models are specified to evaluate the relationship between addiction and each type of LTE: smartphones, chat media, and content media. This approach ensures that the unique role of each type of LTE in shaping addiction is examined while controlling for the overlapping influences of age and exposure duration.

Table 4.2 **Coefficients of LTE Effects: Social Media Addiction**

Variable	Estimate	Std. Error	Statistics	p Value
Chat Media Exposure Model				
Intercept	−1.248	0.621	−2.009	0.045
Chat Exposure: Male	−0.032	0.043	−0.749	0.454
Chat Exposure: Female	0.068	0.044	1.539	0.124
Chat Exposure²: Male	0.005	0.003	1.44	0.150
Chat Exposure²: Female	−0.005	0.003	−1.569	0.117
Survey Age: Male	0.129	0.075	1.706	0.088
Survey Age: Female	0.186	0.075	2.477	0.013
Survey Age²: Male	−0.004	0.002	−1.894	0.058
Survey Age²: Female	−0.005	0.002	−2.391	0.017
Content Media Exposure Model				
Intercept	−0.746	0.634	−1.177	0.239
Content Exposure: Male	0.023	0.042	0.549	0.583
Content Exposure: Female	0.062	0.04	1.531	0.126
Content Exposure²: Male	−0.002	0.003	−0.453	0.65
Content Exposure²: Female	−0.003	0.003	−1.046	0.296
Survey Age: Male	0.054	0.073	0.742	0.458
Survey Age: Female	0.195	0.069	2.838	0.005
Survey Age²: Male	−0.002	0.002	−0.799	0.424
Survey Age²: Female	−0.006	0.002	−3.001	0.003
Phone Exposure Model				
Intercept	−1.288	0.539	−2.392	0.017
Phone Exposure: Male	−0.058	0.03	−1.912	0.056
Phone Exposure: Female	0.040	0.032	1.274	0.203
Phone Exposure²: Male	0.004	0.002	1.883	0.06
Phone Exposure²: Female	−0.002	0.002	−0.997	0.319
Survey Age: Male	0.138	0.065	2.131	0.033
Survey Age: Female	0.241	0.061	3.954	<0.001
Survey Age²: Male	−0.004	0.002	−2.111	0.035
Survey Age²: Female	−0.007	0.002	−4.057	<0.001

Note: The full table of coefficients, including the additional controls for the three models, can be found in Appendix 3b4-6. Some controls are omitted here for brevity. These coefficients were derived from the full model, as specified in line with Technical Box 4.1, but where the outcome is social media addiction instead of well-being.

The results of the three LTE models with social media addiction as the outcome suggest that the observed patterns were predominantly driven by age-related factors rather than by LTE itself. The high correlations between age and LTE complicate efforts to isolate their individual contributions.

For girls, addiction levels increased with age across all three models, as indicated by significant positive linear age coefficients (see Table 4.2). This effect attenuated over time, as shown by the significant negative quadratic age coefficients. For boys, a similar pattern was observed, but significant effects were only found in the smartphone model. This suggests that while social media addiction intensifies with age, the rate of increase slows over time, particularly for girls.

None of the LTE variables reached statistical significance for either boys or girls across any of the models. Consequently, no evidence suggests that the duration of media exposure directly contributes to social media addiction. For example, coefficients for chat media, content media, and smartphone exposure fail to meet the alpha threshold of 0.05.

Overall, these findings indicate that age better explains social media addiction outcomes, while LTE appears to have little direct impact. Self-control remains the strongest individual predictor of addiction, as noted earlier. The strong correlation between age and LTE underscores the difficulty of disentangling these effects, but the results suggest that addiction is more closely tied to age-related developmental or behavioral factors than to media exposure.

4.5 LTE and WIS

The data used in this part of the analysis were collected through yearly surveys conducted by the National Agency for IT and Learning as a nationwide tool for tracking student well-being. These data support schools and municipalities in fostering positive learning environments and promoting student development. The data used in this chapter are distinct from the survey data collected for other parts of the analysis.

The well-being measure in this dataset specifically focuses on WIS, which includes questions about the learning environment and social connections. In addition, it incorporates items that directly relate to general well-being, such as experiences of headaches, stomachaches, loneliness, and bullying in school. For a full list of the questions included in the WIS measure, see Appendix 6.4.

The data from the National Agency for IT and Learning were collected annually as mandated by Danish law. It spans from 2019 to 2023 for grades 0–9 and from 2018 to 2022 for secondary education (gymnasium) students. The continuous data collection for each respondent allowed for the examination of the effects of smartphone and social media exposure in a longitudinal analysis, providing unique insights into long-term trends.

Limitations in the Categorization of WIS Survey Items

The items in the National Agency for IT and Learning surveys are designed to be grouped into more nuanced categories such as “Academic Well-Being,” “Social Well-Being,” and “General Well-Being,” rather than to be a single comprehensive measure of school well-being.

However, critiques have highlighted inconsistencies in the clustering of survey items into these intended thematic categories. Analyses have revealed that the expected clustering of questions into these specific categories is not consistently achieved, as responses from the

same students can vary significantly across questions presumed to measure identical aspects.[67] This indicates that certain items may not effectively capture their intended constructs.

To address these challenges, a single composite measure of WIS was constructed. This composite measure was developed using a factor analysis applied separately to three educational levels: grades 0–3, grades 4–9, and secondary education. By synthesizing survey items tailored to these age groups into one unified metric, this approach enables more robust comparisons and reduces concerns about inconsistencies in the original thematic groupings. For further details on the development of this measure, see Technical Box 4.2.

Comparison of KIDSCREEN-10 and the WIS Index

To assess the alignment between the KIDSCREEN-10 index, which measures general health-related quality of life, and the WIS index, a comparative analysis was conducted using data collected in 2023. The KIDSCREEN-10 scores were derived from survey data, while the WIS measure was constructed using data from the National Agency for IT and Learning linked to the digital media use survey data and demographic information via Denmark's Central Person Register (CPR).

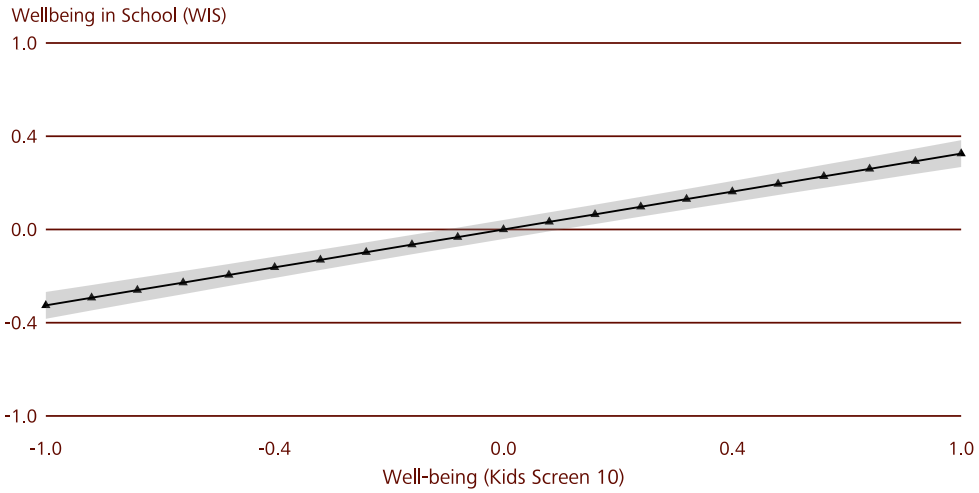
The WIS index was created through a factor analysis with varimax rotation and applied across three educational stages: 0–3rd grade, 4–9th grade, and secondary education. One factor was extracted for each group and combined into a single composite measure of WIS. To ensure comparability, both the KIDSCREEN-10 and WIS indexes were standardized (z-scores).

A strong linear relationship was identified between the two measures. Specifically, a one SD increase in KIDSCREEN-10 score corresponded to a 0.4-SD increase in WIS index, with statistical significance ($p < 0.001$). This relationship indicates that both measures reflect overlapping constructs of student well-being.

The linear dependency is visualized in Figure 4.6, where the KIDSCREEN-10 scores are plotted on the x-axis and the WIS index values are plotted on the y-axis.

[67] **https://www.folkeskolen.dk/borneliv-forskning-skolen-i-samfundet/evaluering-den-nationale-trivselsmaling-maler-ikke-som-den-skal/348552**.

Figure 4.6 **Correspondence Between KIDSCREEN-10 and WIS index scores**



Note: The figure shows the standardized relationship between the KIDSCREEN-10 index (x-axis) and WIS scores (y-axis). A 1-SD increase in KIDSCREEN-10 score corresponds to a 0.4-SD increase in WIS index. The shaded area represents the 95 percent confidence interval of the estimated regression line, indicating strong linear dependency.

Source: DCCA Survey, 2023 and National Agency for IT and Learning

Box 4.2
Technical Box - Student Well-Being Factor Analysis

Developing a Unified Well-Being Measure
Data from the National Agency for IT and Learning were used to develop a comprehensive measure of WIS. Polychoric factor analysis with varimax rotation was applied across three educational stages (grades 0–3, grades 4–9, and secondary education), with one factor extracted per educational group. Please see Appendix 4 School Factor Loadings for Well-Being for the full list of questions included. This analysis identified the underlying structure among survey items to create a unified well-being measure. To ensure reliability, the respondents with more than 50 percent "Don't know" or non-responses were excluded from the analysis.

Zero to 3rd Grade Dimensionality Reduction
The sample comprised 2,775 entries from individuals who participated in the survey. The initial Cronbach's alpha was 0.830 (standardized 0.838), indicating good internal consistency. A polychoric factor analysis with varimax rotation was conducted, and two items were identified with low loadings:
» "Are you involved in deciding what to do in class?" (loading = 0.28)
» "Are the toilets clean at your school?" (loading = 0.32)

These items were removed. The revised Cronbach's alpha showed a slight improvement (raw 0.832, standardized 0.840), and the final factor analysis was concluded, excluding these items.

Fourth to 9th Grade Dimensionality Reduction
The sample included 3,443 observations from the survey respondents. In total, nine cases of excessive "Don't know" responses were removed. The initial exploratory analysis led to the exclusion of three questions:
» "I try to understand my friends when they are sad or angry": Removed owing to lack of use across response categories.
» "Are your teachers on time for classes" and "Is it easy to hear what the teachers say during classes" were excluded owing to extreme median values and high skewness of 6.8 and 17.9.

An initial calculation of Cronbach's alpha yielded a raw Cronbach's alpha of 0.921 and a standardized alpha of 0.924. The following items with factor loadings < 0.40 were removed:
» "Do you and your friends get to decide what to work on in class?" (loading = 0.25)
» "If there is noise in the class, can the teacher quickly restore order?" (loading = 0.23)

» "What do your teachers think about your progress at school?" (loading = 0.36)
» "Most of the students in my class are nice and helpful." (loading = 0.37)
» "I think that the toilets at school are nice and clean." (loading = 0.31)

After recalculating Cronbach's alpha post-removal confirmed stability (raw 0.922, standardized 0.924), the final factor analysis excluded the aforementioned questions.

Secondary Education Dimensionality Reduction
The sample comprised 1,625 entries from individuals who participated in the survey. Bullying-related items were excluded owing to differences in survey content and skewed distributions. The initial alpha was 0.931 (standardized 0.934). Five items with loadings < 0.40 were excluded:
» "The teachers coordinate submission deadlines with one another." (loading = 0.18)
» "I have good contact with students from other classes." (loading = 0.26)
» "To what degree have you experienced in the last year that students or employees at school have been forced to do things they did not want?" (loading = 0.28)
» "I have a hard time starting assignments." (loading = 0.38)
» "I have contact with the others from the class outside school time." (loading = 0.38)

Removing these items did not significantly change the reliability metrics (raw 0.933, standardized 0.935). The final factor analysis excluded these questions.

Comprised Measure of WIS
After finalizing the factor analyses for each educational stage, factor loadings were used to compute scores that represented the latent variable of well-being for each individual at each survey point. A regression method was employed, regressing the observed variables on the extracted factors to compute individual scores. Median imputation was applied to handle missing data, ensuring that complete scores were calculated for each respondent.

The derived scores represent a unified measure of WIS based on the survey responses. These scores reflect the underlying latent variable of school well-being and are referred to as "well-being in school" for each student at the time of survey completion.

Model 3: LTE to Smartphones and WIS
A version of the ITS model, implemented within a mixed-effects framework, was used to evaluate both the immediate impact of smartphone and media exposure and the changes to well-being trajectories before and after such exposure. The ITS approach was designed to assess the effects of interventions, such as the introduction of smartphones or social media, by comparing outcomes over a long-term period before and after the intervention occurred.

The mixed-effects framework added flexibility and robustness to the ITS model. It accounted for repeated measures of WIS over time by addressing dependencies among the observations from the same individual. This ensures that correlations within the data are properly modeled. In addition, the model includes individually tailored random slopes for exposure and introduction variables, such as smartphones, chat media, and content media exposure.

Sociodemographic controls, including age, gender, and parental education, were integrated into the model to account for baseline differences between individuals. These controls minimized the risk of confounding and strengthened the ability of the model to isolate the specific effects of exposure on WIS. Additional controls for region, household composition, parental income, parental employment status, citizenship status, immigration status, and educational level further addressed the potential sources of variability. The model also included fixed effects for test year and educational level (grades 0–3, grades 4–9, and secondary education) to adjust for differences in survey methods and developmental stages. Potential interactions between age and gender were included to account for demographic-specific variations.

The mixed-effects ITS model was set up to evaluate two specific types of effects:

1. **Immediate Impact:** The immediate effect of acquiring a smartphone or exposure to chat- or content-based media on student well-being, captured as a binary indicator for the post-acquisition period. This measured whether the WIS decreased immediately after exposure.
2. **Changes in Trajectories:** Long-term changes in WIS trajectories in the post-acquisition period compared with the pre-acquisition period. This evaluated whether the rate of change in well-being differs before and after exposure.

Gender interactions were included to assess whether boys and young men exhibited different trajectories in WIS after the introduction of smartphones and media compared with girls and young women. These interactions enable the model to identify any gender-specific patterns in the immediate or long-term effects of media exposure on well-being. Comprehensive model specifications and descriptions can be found in Technical Box 4.3.

Gender Moderates the Effect of Smartphone Exposure on WIS

The smartphone LTE model was used to examine how the introduction and long-term use of smartphones are associated with WIS. It examined gender-specific patterns over time and incorporated terms for smartphone exposure and acquisition. Model comparison[68] validated the inclusion of smartphone exposure and introduction terms, demonstrating that these additions enhance the model's ability to explain how smartphones impact well-being in school. Table 4.3 lists the coefficients from the smartphone LTE model, detailing the effects observed across gender and periods of smartphone use.

Table 4.3 **Coefficients of the Smartphone LTE Model**

Term	Estimate	Std. Error	Statistics	p Value
Pre-Phone (Male)	Reference Group			
Post-Phone (Male)	0.043	0.063	0.687	0.492
Pre-Phone (Female)	Reference Group			
Post-Phone (Female)	0.054	0.06	0.888	0.374
Smartphone LTE: Pre-Phone (Male)	−0.051	0.032	−1.597	0.11
Smartphone LTE: Post-Phone (Male)	0.068	0.034	2.014	0.044
Smartphone LTE: Pre-Phone (Female)	0.019	0.035	0.535	0.593
Smartphone LTE: Post-Phone (Female)	−0.084	0.036	−2.343	0.019

Note: The full table of coefficients, including the additional controls for the model, can be found in Appendix 3b7. Some controls are omitted here for brevity. These coefficients were derived from the full model, as specified in line with Technical Box 4.3.

The results show that acquiring a smartphone had no immediate effects in boys or girls. However, prolonged exposure to smartphones after acquisition was associated with significant changes in WIS trajectories, differing in direction between the genders.

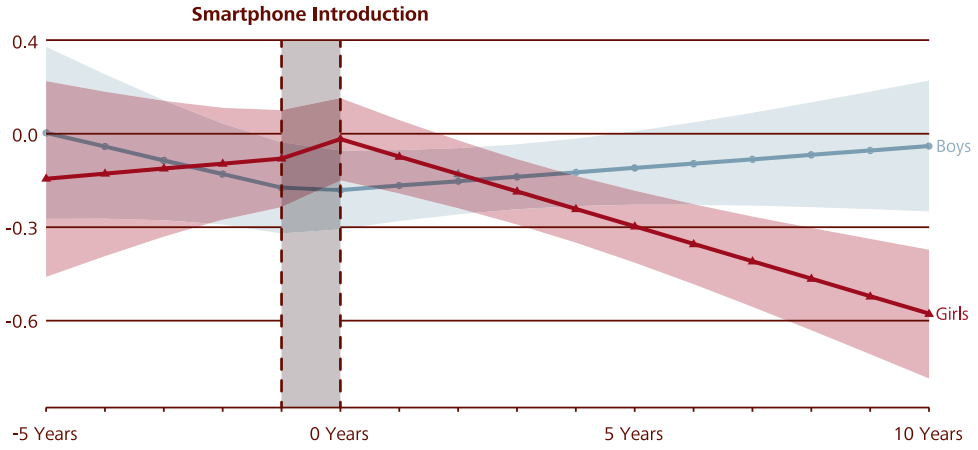
[68] Refer to Appendix 5 for details on model comparison for the smartphone exposure model.

For boys and young men, the LTE coefficient (β = 0.068, SE = 0.034, t = 0.888, p = 0.044) reflects a positive shift in the trajectory of WIS after acquiring a smartphone compared with the pre-smartphone period. This suggests that boys experienced a slight but significant improvement in their school well-being trajectory in the years after smartphone acquisition.

For girls and young women, the coefficient for long-term smartphone exposure (β = −0.084, SE = 0.036, t = −2.343, p = 0.019) indicates a significant negative shift in their WIS trajectory after acquiring a smartphone compared with the pre-smartphone period. This implies that for girls, school well-being declines at a faster rate in the post-acquisition period. Over time, their WIS trajectory decreased below the pre-smartphone levels, with this decline becoming noticeable approximately 2 to 3 years after acquisition.

These findings highlight that the impact of smartphone acquisition on school well-being is not uniform across genders. Boys experienced an improvement in their post-acquisition trajectory, while girls faced a worsening trajectory, with WIS decreasing to below the pre-acquisition levels over time. This pattern is visually represented in Figure 4.7, which highlights the contrasting trajectories before and after smartphone acquisition.

Figure 4.7 **Predicted WIS Before and After Smartphone Acquisition by Gender**



Note: This figure displays the predicted WIS (z-score) derived from the smartphone LTE model. The y-axis represents the predicted WIS, while the x-axis illustrates the duration of smartphone exposure (in years). Values lower than zero on the x-axis indicate years before engaging with chat media, representing pre-smartphone WIS. Values higher than zero represent well-being after smartphone use. The figure shows the WIS trajectories for boys (blue line) and girls (red line) to facilitate gender-based comparisons before and after smartphone acquisition. The shaded regions depict 95% confidence intervals, providing a measure of estimate precision.

Source: DCCA Survey, 2023 and National Agency for IT and Learning

LTE to Chat Media and WIS

The longitudinal analysis of chat media exposure and WIS, as presented in Table 4.4, examined the potential relationship between the introduction and prolonged use of chat media platforms and WIS. A model comparison further confirmed that the inclusion of interaction terms substantially enhanced the model's ability to explain variations in well-being associated with chat media exposure (see Appendix 5: Model Comparison).

For boys and young men, the acquisition of their preferred chat media did not produce significant changes in WIS. The post-chat media trajectory shows no significant difference after acquisition (estimate = 0.076, SE = 0.056, p = 0.178). See also Figure 4.8. Similarly, LTE to chat media did not yield significant changes in WIS for boys (estimate = 0.024, SE = 0.033, p =

0.467). These findings suggest that for boys, both immediate and prolonged exposure to content media did not notably influence their WIS trajectories.

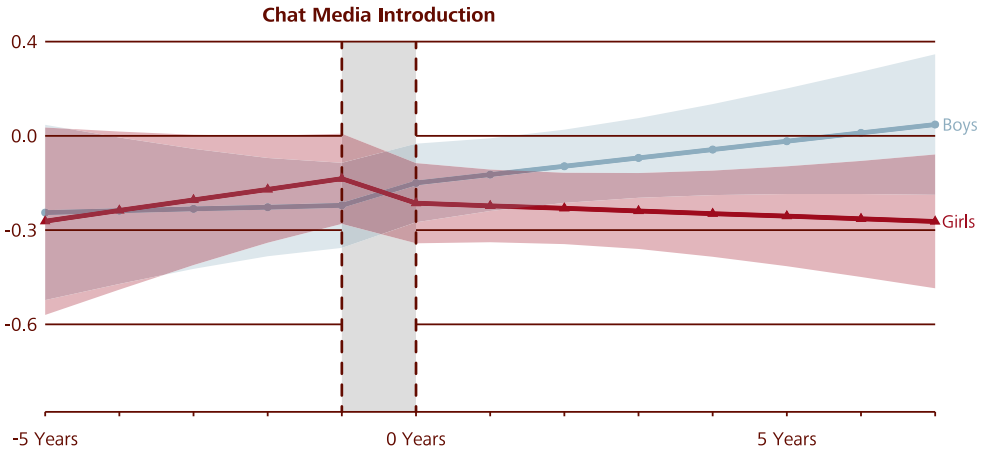
By contrast, girls and young women experienced a significant decline in WIS immediately after acquiring their preferred chat media (estimate = −0.13, SE = 0.053, p = 0.013). This indicates an immediate negative impact on their WIS after chat media adoption. However, the decline did not persist over time, as the long-term trajectory for girls did not differ significantly from the pre-chat media trajectory (estimate = −0.049, SE = 0.032, p = 0.129). While girls initially experienced a decrease in WIS after adopting chat media, the trajectory in the long term did not significantly differ from the pre-adoption period, indicating that the initial negative impact did not persist over time. These results are visually depicted in Figure 4.8, which highlights the gender-based differences in WIS before and after chat media acquisition.

Table 4.4 **Coefficients of the Chat Media LTE Model**

Term	Estimate	Std. Error	Statistics	p Value
Pre-Chat (Male)	Reference Group			
Post-Chat (Male)	0.076	0.056	1.348	0.178
Pre-Chat (Female)	Reference Group			
Post-Chat (Female)	−0.13	0.053	−2.473	0.013
Chat LTE: Pre-Chat (Male)	0.007	0.032	0.21	0.834
Chat LTE: Post-Chat (Male)	0.024	0.033	0.728	0.467
Chat LTE: Pre-Chat (Female)	0.039	0.032	1.219	0.223
Chat LTE: Post-Chat (Female)	−0.049	0.032	−1.517	0.129

Note: The full table of coefficients, including the additional controls for the model, can be found in Appendix 3b9. Some controls are omitted here for brevity. These coefficients were derived from the full model, as specified in line with Technical Box 4.3.

Figure 4.8 **Predicted WIS Before and After Chat Media Acquisition by Gender**



Note: This figure displays the predicted WIS (z-score) derived from the chat media LTE model. The y-axis represents the predicted WIS, while the x-axis illustrates the duration of chat media exposure (in years). Values lower than zero on the x-axis indicate the years before engaging with chat media, representing pre-chat media WIS. Values higher than zero represent well-being after chat media use. The figure shows the WIS trajectories for boys (blue line) and girls (red line) to facilitate gender-based comparisons before and after chat media acquisition. The shaded regions depict 95percent confidence intervals, providing a measure of estimate precision.

Source: DCCA Survey, 2023 and National Agency for IT and Learning

LTE to Content Media and WIS

The longitudinal analysis of content media LTE and WIS, as presented in Table 4.5, investigated the potential relationships between content media acquisition, prolonged exposure, and WIS. However, the model comparison did not support the inclusion of content exposure and acquisition terms, indicating that these variables do not enhance the model's explanatory power regarding gender-specific effects on WIS (see Appendix 5: Model Comparison).

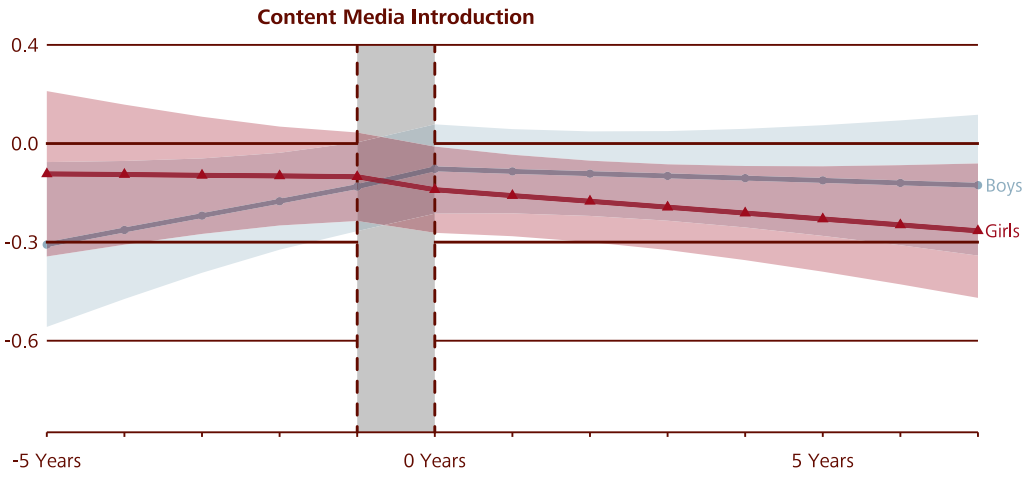
The results of the content media exposure model suggest that neither the introduction nor the prolonged use of preferred content media was significantly associated with WIS. For both boys and girls, neither initial exposure to content media or long-term use on WIS showed a statistically significant effect. These findings are visually represented in Figure 4.9.

Table 4.5 **Coefficients of the Content Media LTE Model**

Term	Estimate	Std. Error	Statistics	p Value
Pre-Content (Male)	Reference Group			
Post-Content (Male)	0.012	0.059	0.2	0.842
Pre-Content (Female)	Reference Group			
Post-Content (Female)	−0.043	0.05	−0.866	0.387
Content LTE: Pre-Content (Male)	0.051	0.03	1.702	0.089
Content LTE: Post-Content (Male)	−0.059	0.032	−1.852	0.064
Content LTE: Pre-Content (Female)	−0.003	0.028	−0.092	0.926
Content LTE: Post-Content (Female)	−0.018	0.029	−0.619	0.536

Note: The full table of coefficients, including the additional controls for the model, can be found in Appendix 3b11. Some controls are omitted here for brevity. These coefficients were derived from the full model, as specified in line with Technical Box 4.3.

Figure 4.9 **Predicted WIS Before and After Content Media Exposure by Gender**



Note: This figure illustrates the predicted WIS (z-score) based on content media LTE models. The y-axis represents the predicted WIS, while the x-axis shows the duration of exposure to an individual's most used content media (in years). Values lower than zero on the x-axis indicate pre-content media exposure years, reflecting the WIS before engagement with content media. Values higher than zero represent WIS after the onset of content media use. The graph highlights school well-being trends for boys (blue line) and girls (red line), facilitating gender-based comparisons before and after exposure to content media. The shaded regions indicate 95 percent confidence intervals, illustrating the precision of the predicted estimates.

Source: DCCA Survey, 2023 and National Agency for IT and Learning

Box 4.3
Technical Box: ITS Mixed-Effects Model for WIS

The analysis examined how the introduction and LTE to digital media - smartphones, preferred chat, and content media - affect WIS using an ITS model within a mixed-effects framework. This approach evaluated both the immediate effect of acquiring media and any subsequent shifts in WIS over time. The model assessed the short-term impact of media acquisition and changes in WIS trajectories after acquisition while accounting for individual differences in baseline WIS and responses to media and smartphone exposure. This provides a comprehensive understanding of how WIS changes with media exposure.

Variable Definitions and Model Structure
To achieve this, specific variables were derived from the dataset that quantify the exposure and acquisition timing in relation to the students' ages at the time of the WIS survey. These variables were crucial for modeling potential shifts in school well-being associated with digital media exposure. The two main variables for this analysis are detailed below.

Exposure Calculation in Years
To measure LTE to smartphones, favorite chat media, and favorite content media, three variables were created to represent the number of years each student had been exposed to these media types by the time of the school well-being survey. Their age at first access was based on self-reported data where participants indicated the age at which they first acquired a smartphone or started using their favorite chat and content media. Exposure was calculated as the number of years between the reported age of media acquisition and the age at the time of the well-being survey[69]:

$$\text{Exposure}_{(i,t)}^{\text{Media}} = \text{School Survey Age}_{(i,t)} - \text{Age at First Access}_{i}^{\text{Media}}$$

Here, exposure is a continuous variable for measuring the number of years a student had had access to each media type at the time of the well-being survey. For individuals who had not yet acquired the media, the exposure values are negative, indicating the time remaining until acquisition.

Media Introduction (Binary Variable)
For each media type, introduction status is represented as a binary variable, indicating whether the student had acquired the media by the time of the survey:

$$Introduction_{i,t}^{Media} = \begin{cases} 0 \ if \ School \ Survey \ Age_{i,t} < Age \ at \ First \ Access_i^{Media} \\ 1 \ if \ School \ Survey \ Age_{i,t} \geq Age \ at \ First \ Access_i^{Media} \end{cases}$$

$Introduction_{i,t}^{Media}$ is a binary indicator of whether individual i has access to the media (1 = acquired, 0 = not yet acquired) by the time the school well-being survey was conducted.

Refining the Sample for Consistent Media Exposure Analysis
To ensure consistent effects of chat and content media exposure, the sample included only cases in which individuals reported using these media types longer than their smartphone use. This approach isolated the impact of pre-smartphone exposure and distinguished early media use (e.g., child-focused content on iPads) from later smartphone features such as infinite scrolling (e.g., used in TikTok). This led to the exclusion of 515 participants from the chat media dataset and 733 from the content media dataset.

Exposure was truncated at the 97.5th percentile to exclude outliers with unusually high exposure, centering the analysis on typical engagement to avoid skewed results. The final sample sizes post truncation and after removing entries with missing data were 6,201 for chat

[69] In the secondary education dataset, neither the age at testing nor the specific test date is provided. However, STIL mandates that testing for secondary education (gymnasium) occurs between November 1st and December 31st. To standardize this, December 1st was set as the test date for all secondary education students, and age was determined using birth date information from Denmark Statistics. For the 0 to 3rd and 4th to 9th grade datasets, test dates were available, allowing for accurate age calculations at the time of testing using birth date data from Denmark Statistics.

(capped at 7 years), 5,472 for content media (capped at 7.1 years), and 7,191 for smartphones (capped at 9.7 years).

General Model Specification for Media Impact on WIS

The model used to assess the impact of the three LTEs on WIS includes both *media exposure* and *media acquisition* for smartphones, chat media, and content media. To capture the unique impact of each media type on WIS, a model was applied separately to each type, allowing for a clear understanding of how these media independently contribute to WIS outcomes. The models incorporated interaction effects between *media exposure* and *media acquisition* modelled individually for each gender, denoted as follows:

$$\begin{aligned} Y_{i,t} = \beta_0 + \gamma_1(\text{Media Exposure}_{i,t} \cdot Media\ Aquisition_{i,t})^{Gender} + \gamma_2 Age^{Gender} + \gamma_3 Age_i^{2,Gender} \\ + \beta_1 \text{Test Year}_{i,t} + \beta_2 \text{EduLevel}_{i,t} + \boldsymbol{Z}_i\beta + u_{0i} + u_{1i} + u_{2i} + \epsilon_{i,t} \end{aligned}$$

where γ_1 represents the coefficients for the combined effect of media exposure and acquisition, allowing for separate coefficients based on gender and acquisition timing. It models both the effect of yearly exposure before and after media acquisition and the change in levels after acquisition for boys (men) and girls (women), respectively. γ_2 and γ_3 were added to control for linear and quadratic effects of age, separately for boys (men) and girls (women), accounting for the potential developmental trends in well-being with age for both genders. β_1 controls for year-specific effects such as changes in policies, norms, or external events that may influence well-being independently of media usage. β_2 accounts for the variation in WIS that may be associated with different educational backgrounds and dataset differences among students in the three educational levels. $\boldsymbol{Z}_i$ represents a vector of sociodemographic controls, including gender, age, region of residence, citizenship status, immigration status, household structure, parental income, parental employment status, and parental educational level.

The random effects:

- Random Intercept "(u_{0i}): Represents the random intercept for each child i. It captures the individual variation in the baseline WIS that is not explained by the fixed effects. This allows each child to have a unique starting point (intercept) for WIS.
- Random Slope for Media Acquisition "(u_{1i}): Represents the random slope for *media acquisition* for each child i. It allows the effect of *media acquisition* on WIS to differ across children, indicating that some children may respond more positively or negatively to *media acquisition* than others.
- Random Slope for Media Exposure "(u_{2i}): Represents the random slope for *media exposure* for each child i. It accounts for variability in how *media exposure* affects WIS across different children. Each model captures both the initial impact of media acquisition and the potential changes in well-being associated with prolonged exposure. The gender-specific interaction terms ensure that the analysis results reflect how boys and girls may be differently affected by media use. The random effects allowed for individual variability, recognizing that each student's response to media introduction and exposure can vary.

Chapter 5
Literature

5.1 Literature List

Allcott, H., Gentzkow, M., & Song, L. (2022). Digital addiction. *American Economic Review, 112(7), 2424–2463*.

Andreassen, C. S., Billieux, J., Griffiths, M. D., Kuss, D. J., Demetrovics, Z., Mazzoni, E., & Pallesen, S. (2016). The relationship between addictive use of social media and video games and symptoms of psychiatric disorders: A large-scale cross-sectional study. *Psychology of Addictive Behaviors, 30*(2), 252–262. **https://doi.org/10.1037/adb0000160**

Aridor, G., Jiménez-Durán, R., Levy, R., & Song, L. (2024). The Economics of Social Media. Available at: **https://ssrn.com/abstract=4708840** or **http://dx.doi.org/10.2139/ssrn.4708840**

Beknazar-Yuzbashev, G., Jiménez-Durán, R., & Stalinski, M. (2024). A model of harmful yet engaging content on social media. *AEA Papers and Proceedings, 114*, 678–683.

Brand, M., & Potenza, M. N. (2023). Behavioral addictions in the ICD-11: An important debate that is anticipated to continue for some time. *Journal of Behavioral Addictions, 12*(3), 585–589. **http://dx.doi.org/10.1556/2006.2023.00042**

Büchi, M., Festic, N., & Latzer, M. (2019). Digital overuse and subjective well-being in a digitized society. *Social Media + Society, 5*(4), 2056305119886031. **https://doi.org/10.1177/2056305119886031**

Cao, F., Su, L., Liu, T., & Gao, X. (2007). The relationship between impulsivity and Internet addiction in a sample of Chinese adolescents. *European Psychiatry, 22*(7), 466–471. **https://doi.org/10.1016/j.eurpsy.2007.05.004**

Cheng, C., Lau, Y. C., Chan, L., & Luk, J. W. (2021). Prevalence of social media addiction across 32 nations: Meta-analysis with subgroup analysis of classification schemes and cultural values. *Addictive Behaviors, 117*, 106845. **https://doi.org/10.1016/j.addbeh.2021.106845**

Corcos, A., & Hodara, L. (2023). How social media are collecting more of users' data: A behavioral model of platform retention strategies. *SN Business & Economics, 3*(7), 117. **https://doi.org/10.1007/s43546-023-00501-9**

Coyne, P., Voth, J., & Woodruff, S. J. (2023). A comparison of self-report and objective measurements of smartphone and social media usage. *Telematics and Informatics Reports, 10*, 100061. **https://doi.org/10.1016/j.teler.2023.100061**

DR Medieforskning. (2022). *Medieudviklingen 2022*. Available at: **https://www.dr.dk/static/documents/2023/01/24/medieudviklingen2022_a50af9a5.pdf/**

Geisen, E., & Bergstrom, J. R. (2017). *Usability Testing for Survey Research* (1st edition). Morgan Kaufmann.

Haidt, J. (2024). *The Anxious Generation: How the Great Rewiring of Childhood Is Causing an Epidemic of Mental Illness*. Allen Lane.

Henshall, W. (2024, March 21). *Maybe Our Phones Aren't the Problem, Argues a New Book*. TIME. **https://time.com/6958809/smartphones-screen-time-danger-pete-etchells/**

International Classification of Diseases (ICD). Downloaded 20th. December 2024, fra. Available at: **https://www.who.int/standards/classifications/classification-of-diseases**

Information Commissioner's Office (ICO) & the Competition and Markets Authority (CMA). (2023). *Harmful Design in Digital Markets: How Online Choice Architecture Practices Can Undermine Consumer Choice and Control over Personal Information*. A joint position paper. Available at: **https://www.drcf.org.uk/siteassets/drcf/pdf-files/harmful-design-in-digital-markets-ico-cma-joint-position-paper.pdf?v=380506**

Johannes, N., Nguyen, T., Weinstein, N., & Przybylski, A. K. (2021). Objective, subjective, and accurate reporting of social media use: No evidence that daily social media use correlates with personality traits, motivational states, or well-being. *Technology, Mind, and Behavior, 2*(2). **https://doi.org/10.1037/tmb0000035**

LaBrie, J. W., Kenney, S. R., Napper, L. E., & Miller, K. (2014). Impulsivity and alcohol-related risk among college students: Examining urgency, sensation seeking and the moderating influence of beliefs about alcohol's role in the college experience. *Addictive Behaviors, 39*(1), 159–164. **https://doi.org/10.1016/j.addbeh.2013.09.018**

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. **https://doi.org/10.1136/bjsports-2015-095084**

Lopes, L. S., Valentini, J. P., Monteiro, T. H., Costacurta, M. C. D. F., Soares, L. O. N., Telfar-Barnard, L., & Nunes, P. V. (2022). Problematic social media use and its relationship with depression or anxiety: A systematic review. *Cyberpsychology, Behavior, and Social Networking, 25*(11), 691–702. **https://doi.org/10.1089/cyber.2021.0300**

Lumby, C. (2017, August 10). Enough with the moral panic over smartphones. The kids are all right. *The Guardian*. **https://www.theguardian.com/commentisfree/2017/aug/10/enough-with-the-moral-panic-over-smartphones-the-kids-are-alright**

Luo, T., Qin, L., Cheng, L., Zhu, Z., Xu, J., Chen, H., Liu, Q., & Hu, M. (2021). Determination the cut-off point for the Bergen social media addiction (BSMAS): Diagnostic contribution of the six criteria of the components model of addiction for social media disorder. *Journal of Behavioral Addictions, 10*(2), 281–290. **https://doi.org/10.1556/2006.2021.00025**

Madsen, K. R., Román, J. E. I., Damsgaard, M. T., Holstein, B. E., Kristoffersen, M. J., Pedersen, T. P., Michelsen, S. I., Rasmussen, M., & Toftager, M. (2023) *Skolebørnsundersøgelsen 2022*. København. Statens Institut for Folkesundhed, SDU. Available at: **https://www.hbsc.dk/**

Manapat, P. D., Edwards, M. C., MacKinnon, D. P., Poldrack, R. A., & Marsch, L. A. (2021). A psychometric analysis of the Brief Self-Control Scale. *Assessment, 28*(2), 395–412. **https://doi.org/10.1177/1073191119890021**

McDool, E., Powell, P., Roberts, J., & Taylor, K. (2020). The internet and children's psychological well-being. *Journal of Health Economics, 69*, 102274. **https://doi.org/10.1016/j.jhealeco.2019.102274**

Odgers, C. L. (2024). The great rewiring: Is social media really behind an epidemic of teenage mental illness? *Nature, 628*(8006), 29–30. **https://doi.org/10.1038/d41586-024-00902-2**

Ofcom. (2024, September 17). Understanding Online Choices, Preferences, and Welfare. Available at: **https://www.ofcom.org.uk/siteassets/resources/documents/research-and-data/online-research/understanding-online-choices-preferences-and-welfare/understanding-online-choices-preferences-and-welfare.pdf?v=380756**

Ottosen, M. H., Andreasen, A. G., Dahl, K. M., Lausten, M., Rayce, S. B., & Tagmose, B. B. (2022). *Børn og unge i Danmark: Velfærd og trivsel 2022*. København: VIVE – Det Nationale Forsknings- og Analysecenter for Velfærd.

Przybylski, A. K., & Weinstein, N. (2017). A large-scale test of the Goldilocks hypothesis: Quantifying the relations between digital-screen use and the mental well-being of adolescents. *Psychological Science, 28*(2), 204–215. **https://doi.org/10.1177/0956797616678438**

Ravn, K. (2018, August 17). *Evaluering: Den nationale trivselsmåling måler ikke som den skal*. **https://www.folkeskolen.dk/borneliv-forskning-skolen-i-samfundet/evaluering-den-nationale-trivselsmaling-maler-ikke-som-den-skal/348552**

Ravens-Sieberer, U., Erhart, M., Rajmil, L., Herdman, M., Auquier, P., Bruil, J., Power, M., Duer, W., Abel, T., Czemy, L., Mazur, J., Czimbalmos, A., Tountas, Y., Hagquist, C., & Kilroe, J., The European KIDSCREEN Group. (2010). Reliability, construct and criterion validity of the KIDSCREEN-10 score: A short measure for children and adolescents' well-being and health-related quality of life. *Quality of Life Research, 19*(10), 1487–1500. **https://doi.org/10.1007/s11136-010-9706-5**

Red Barnet (2021). Børn og unges oplevelser med digitale krænkelser. Available at: **https://sletdet.redbarnet.dk/wp-content/uploads/2022/02/sletdet-boern-og-unges-oplevelser-med-digitale-kraenkelser-rapport.pdf**

Ruel, E., Wagner, W. E., & Gillespie, B. J. (2016). Pretesting and pilot testing. In E. Ruel, W. E. Wagner III, & B. J. Gillespie (Eds.), *The Practice of Survey Research: Theory and Applications*. Sage Publications, Inc.

Santini, Z. I., Thygesen, L. C., Andersen, S., Tolstrup, J. S., Koyanagi, A., Nielsen, L., Meilstrup, C., Koushede, V., & Ekholm O. (2024) Social media addiction predicts compromised mental health as well as perceived and objective social isolation in Denmark: A longitudinal analysis of a nationwide survey linked to register data. *International Journal of Mental Health and Addiction*. **https://doi.org/10.1007/s11469-024-01283-3**

Saunders, T. J., & Vallance, J. K. (2017). Screen time and health indicators among children and youth: Current evidence, limitations and future directions. *Applied Health Economics and Health Policy, 15*(3), 323–331. **https://doi.org/10.1007/s40258-016-0289-3**

Stacy, A. W., & Wiers, R. W. (2010). Implicit cognition and addiction: A tool for explaining paradoxical behavior. *Annual Review of Clinical Psychology, 6*(1), 551–575. **https://doi.org/10.1146/annurev.clinpsy.121208.131444**

Tangney, J. P., Baumeister, R. F., & Boone, A. L. (2004). High self-control predicts good adjustment, less pathology, better grades, and interpersonal success. *Journal of Personality, 72*(2), 271–324. **https://doi.org/10.1111/j.0022-3506.2004.00263.x**

Tremblay, M. S., LeBlanc, A. G., Kho, M. E., Saunders, T. J., Larouche, R., Colley, R. C., Goldfield, G., & Gorber, S. (2011). Systematic review of sedentary behaviour and health indicators in school-aged children and youth. *International Journal of Behavioral Nutrition and Physical Activity, 8*(1), 98. **https://doi.org/10.1186/1479-5868-8-98**

Twenge, J. M. (2017). Have smartphones destroyed a generation? *The Atlantic*. **https://www.theatlantic.com/magazine/archive/2017/09/has-the-smartphone-destroyed-a-generation/534198/**

Vuorre, M., Johannes, N., Magnusson, K., & Przybylski, A. K. (2022). Time spent playing video games is unlikely to impact well-being. *Royal Society Open Science, 9*(7), 220411. **https://doi.org/10.1098/rsos.220411**

Vuorre, M., & Przybylski, A. K. (2023). Estimating the association between Facebook adoption and well-being in 72 countries. *Royal Society Open Science, 10*(8), 221451. **https://doi.org/10.1098/rsos.221451**

Zarate, D., Hobson, B. A., March, E., Griffiths, M. D., & Stavropoulos, V. (2023). Psychometric properties of the Bergen Social Media Addiction Scale: An analysis using item response theory. *Addictive Behaviors Reports, 17*, 100473. **https://doi.org/10.1016/j.abrep.2022.100473**

Zhao, Y., Cingel, D. P., Xie, L., & Muheng, Y. (2022). Exploring the relations of subjective and objective Instagram use on young adults' mental health. *SSRN Electronic Journal*. **https://doi.org/10.2139/ssrn.4058133**

Chapter 6
Appendixes

6.1 Appendix 1: Contact Letters and Information Provided to Participants

Below are the contact letters that were sent out through e-Boks to invite parents of children aged 8–17 years and young adults aged 18 to 25 years.

Date: 12. oktober 2024

KONKURRENCE- OG FORBRUGERSTYRELSEN

BØRNE- OG UNDERVISNINGSMINISTERIET

We need your help to better understand social media, screen time and well-being

Dear [Name]

We would like to invite you and your child [Name] to participate in our survey on social media, screen time, and well-being among children and young people aged 8 to 25 years.

It takes around 10 minutes in total to answer the questions. We hope that both you and your child will fill out the questionnaire. Your responses makes a difference for the outcome of the study and cannot be replaced by answers from others.

You can begin the questionnaire by clicking on this link: **[Unique link written in color]**. If you experience any issues accessing the survey, you may also copy the link directly into your browser.

5 gift cards of 1000 dkk. will be drawn at random amongst participants of the survey

Winners will be contacted directly

All information obtained in the study about you and your child will be treated confidentially. Furthermore, results are anonymous so no single participant can be identified. Your personal data will therefore not be shared with anyone outside of the project team. You can read more about the project and how we handle your personal data on pages 2-4 or on our website: https://www.kfst.dk/forbrugerforhold/survey-sociale-medier/

Thank you in advance for your help

Sofie A. V. Gelskov
Special consultant and Ph.d
Center for Consumer Policy
The Danish Competition and Consumer Authority

If you have questions or need any help, you can contact our hotline on: hotline@kantarpublic.dk or telephone: 31136287 (Monday to Friday 09h00-16h00).

Appendix 1b: Contact letter for young adults aged 18 to 25 years

Dato: 12. oktober 2023

KONKURRENCE- OG FORBRUGERSTYRELSEN

BØRNE- OG UNDERVISNINGSMINISTERIET

We need your help to better understand social media, screen time and well-being

Dear <Name>

We would like to invite you to participate in our survey on social media, screen time, and well-being among children and young people aged 8 to 25 years.

It takes around 10 minutes in total to answer the questions. Your response makes a difference to the outcome of the study and cannot be replaced by answers from other people.

You can begin the questionnaire by clicking on this link: **[Unique link written in color]**. If you experience any issues accessing the survey, you may also copy the link directly into your browser.

All information obtained from the study is treated confidentially. Furthermore, results are anonymous so no single participant can be identified. Your personal data will therefore not be shared with anyone outside of the project team. You can read more about the project and how we handle your personal data on pages 2-4 or on our website: https://www.kfst.dk/forbrugerforhold/survey-sociale-medier/

Thank you in advance for your help

Sofie A. V. Gelskov
Special consultant and Ph.d
Center for Consumer Policy
The Danish Competition and Consumer Authority

If you have questions or need any help, you can contact our hotline on: hotline@kantarpublic.dk or telephone: 31136287 (Monday to Friday 09h00-16h00).

Below, you can read more about the survey and how your personal data are processed.
Appendix 1c: Information sheet sent to prospective participants

About the survey

Who is behind the survey?
The Danish Competition and Consumer Authority and the Ministry of Children and Education are behind the survey, which is carried out with the help of the analytic company Kantar Public.

What is the purpose of the survey?
The purpose of the survey is to gain insight into consumers' experiences with social media and how these experiences relate to their overall well-being. The results will provide greater knowledge in these areas and inform policy development.

Who can participate in the survey?
The survey includes children and young people aged 8 to 25 and their parents.

About your participation

How do I participate?
You participate by opening the link to the questionnaire in the invitation, you received in your e-Boks.

Why am I receiving an invitation to participate in the survey?
You have been contacted on the basis of a selection from the Civil Registration System (CPR), from which random individuals in the target group have been chosen.

What should I do if I do not want to participate?
Participation in the survey is entirely voluntary, but we hope that as many as possible will choose to participate. If you do not wish to participate, you do not need to do anything further, or you can click on the link to the survey and select "No" for the prompt on participation.

About the processing of your personal data

Who is responsible for the data?
The Competition and Consumer Authority is responsible for processing your personal data in connection with the survey. The Ministry of Children and Education will only receive the anonymous results of the survey and thus will not process your personal data. The analysis firm Kantar Public is responsible for the practical data collection as the data processor on behalf of the Competition and Consumer Authority.

If you have questions about our handling of your personal data, you can contact us or our Data Protection Officer at:

- The Danish Competition and Consumer Authority
  - Email: kfst@kfst.dk
  - Phone: +45 41 71 50 00
  - Mail: The Danish Competition and Consumer Authority, Carl Jacobsens Vej 35, 2500 Valby
- Data Protection Officer
  - Email: dpo@em.dk
  - Phone: +45 33 92 33 50
  - Mail: Ministry of Business, attn. Data Protection Officer, Slotsholmsgade 10-12, 1216 Copenhagen, DK

What is our basis for processing your personal data?
The processing of your personal data is necessary for performing a task carried out in the public interest in accordance with the General Data Protection Regulation Article 6, paragraph 1, letter e (cf. the Data Protection Act § 11, paragraph 1). You can read more about the legal basis at the Danish Data Protection Agency's website.

What categories of personal data do we process?
We process your CPR to send out the questionnaire and various general personal data, including the following:

» Name
» Age
» Gender
» Education
» Region
» Income
» School well-being data from national well-being measures
» Primary school grades

How long do we store your personal data?
When you respond to the survey, the project group at the Danish Competition and Consumer Authority and Kantar Public will process the personal data you provide in your responses to the survey. On the basis of your answers and those of other participants, the project group produces anonymous results, after which you can no longer be identified. Your personal data will be deleted by the end of the year 2026 at the latest.

How are the survey results used?
The anonymized results of the survey will be shared through the usual channels of the Competition and Consumer Authority and the Ministry of Children and Education, such as websites, newsletters, and articles. They may also be shared in the media.

Your rights.
Under certain circumstances, you have the right to request that we delete your personal data. You can read more about the right to deletion in the Danish Data Protection Agency's guide on the rights of the data subjects.

If you wish to exercise the right to deletion, you should contact the Competition and Consumer Authority.

Your options for complaint.
If you are dissatisfied with how process your personal data, you have the right to complain to the Danish Data Protection Agency or the courts. You can find the contact details for the Danish Data Protection Agency at datatilsynet.dk.

Contact

What should I do if I need help?
If you need help or have questions about completing the questionnaire, you can contact the project's hotline, which is operated by Kantar Public via email: hotline@kantarpublic.dk or phone: +31 13 62 87 (Monday to Friday from 09.00 to 16.00).

What should I do if I have further questions about the background of the survey?
If you have further questions about the survey itself, you can contact the Consumer Policy Center at the Competition and Consumer Authority via email: force@kfst.dk, attn. Special Consultant Sofie A. V. Gelskov.

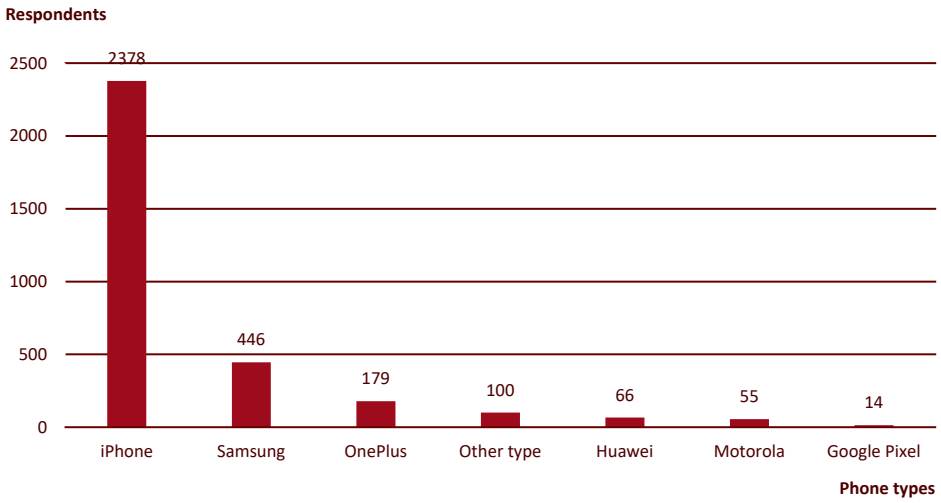
6.2 Appendix 2: Response Frequencies to the DCCA Survey

The following appendix presents the response distributions of the questions posed in the DCCA survey. The responses were collected between October 2023 and December 2023.

Unless otherwise specified, all response distributions include responses from children and young people aged 8 to 25 years. Parents' responses are not included. All graphs indicate the number of respondents for each response option.

Note that owing to the different filters and possible ways through the questionnaire, the number of respondents, n, varies between questions.

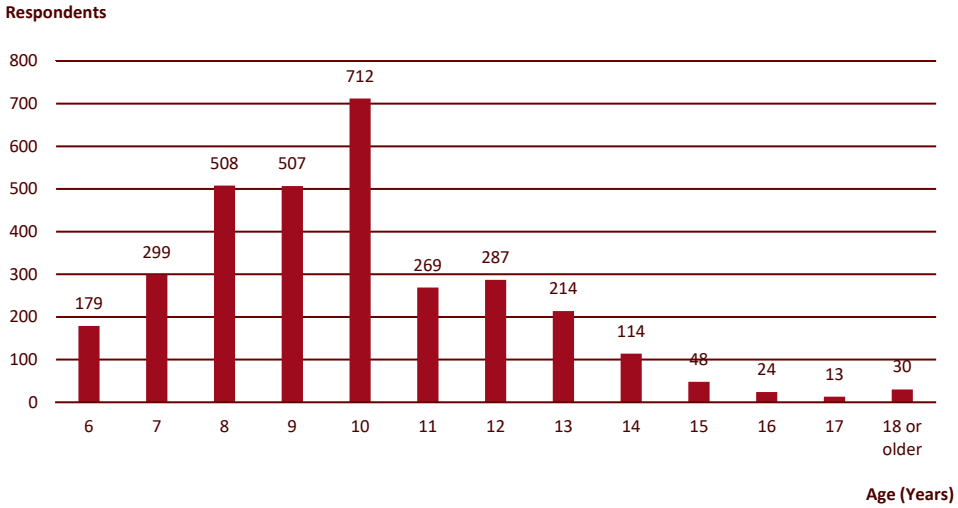
Figure 6.1 **Question 1: What type of phone do you have?**



Note: The figure shows the distribution of phone types (brands) among the survey participants (n = 3,238). If "Other type" is selected, a free text option appears. There was an option to answer "I do not have a phone" (n = 207). If the respondent answered that they did not have a phone and was between 8 and 10 years old, the child was given a modified version of the questionnaire that did not include questions about phone use. If the respondent without a phone was between 11 and 25 years old, they were screened out.

Source: DCCA Survey, 2023

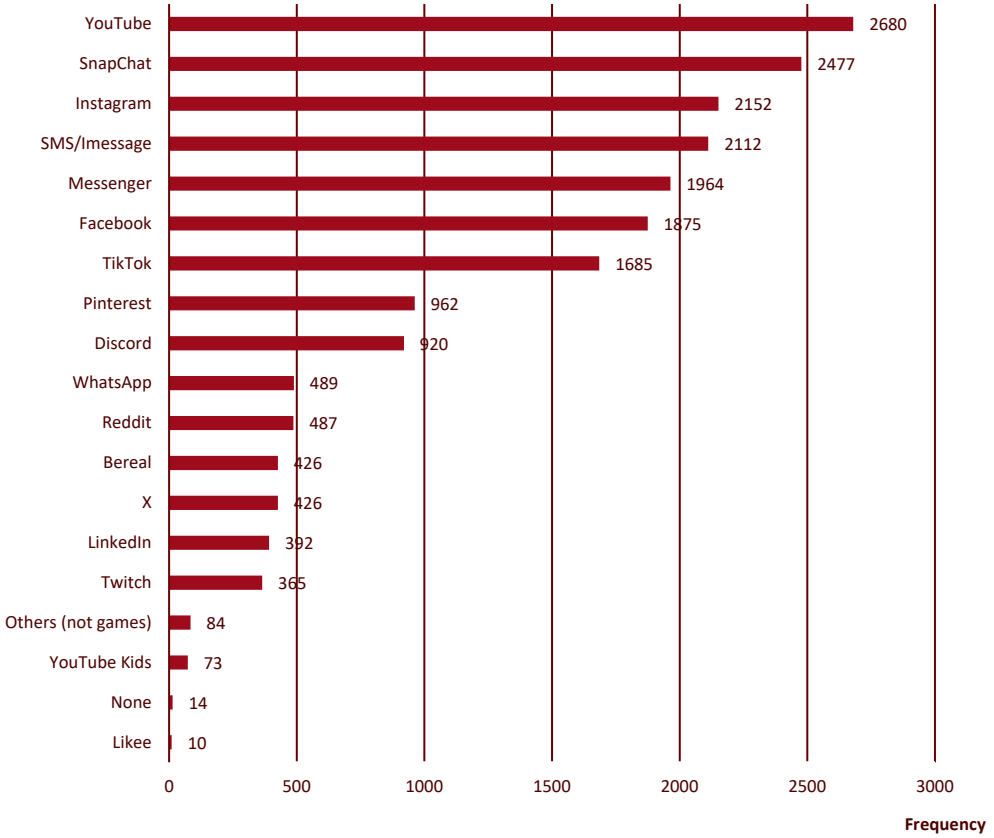
Figure 6.2 **Question 2: How old were you approximately when you got your first phone (smartphone)?**



Note: This figure shows the percent distribution of the respondents' ages when they got their first smartphone (N = 3,204). For the minimum data retrieval requirements from Statistics Denmark, the responses of the respondents within the age range of 18 to 25 years are combined with those of the respondents within the ages of 18 years or older. An option to answer "I can't remember" was provided (not included here).

Source: DCCA Survey, 2023

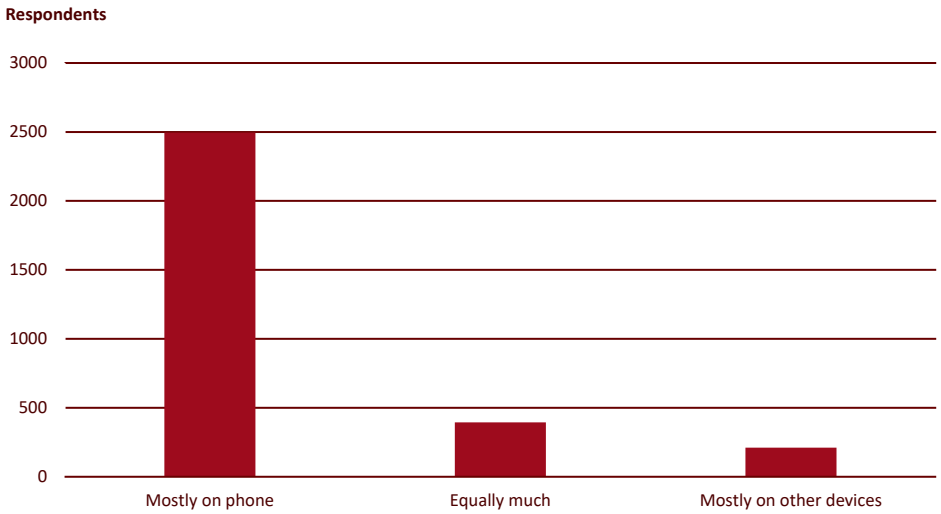
Figure 6.3 **Question 3: Here is a list of social media platforms. Select those you have used in the past month.**



Note: The figure shows which social media platforms the children and young adults reported having used during the last month (N = 3,392). The respondents could choose as many social media platforms as applicable to them. The phrasing of the question was different for the children who did not have a phone: "Here is a list of social media platforms. Select those you have used on a tablet/iPad, computer, or someone else's phone in the last month." The participants could also choose to answer "None" (either" None - I do not use any from the list" or "None - I use some from the list but have not used them in the last month"). Fourteen participants used one of the "None" options. If 8- to 10-year-olds responded that they had only used SMS/iMessage, YouTube, YouTube Kids, no social media, or no social media in the last month, they were given a modified questionnaire that accounted for them using no or very few social media. If the participants were between 11 and 25 years old, they were excluded from answering the questionnaire. Children between 8 and 10 years old were not given the option to choose "X," and children between 8 and 15 years old were not given the option to choose "LinkedIn." If they chose "Other (non-games)," they had the option to enter free text, but any entry could not be extracted as a favorite media further in the questionnaire.

Source: DCCA Survey, 2023

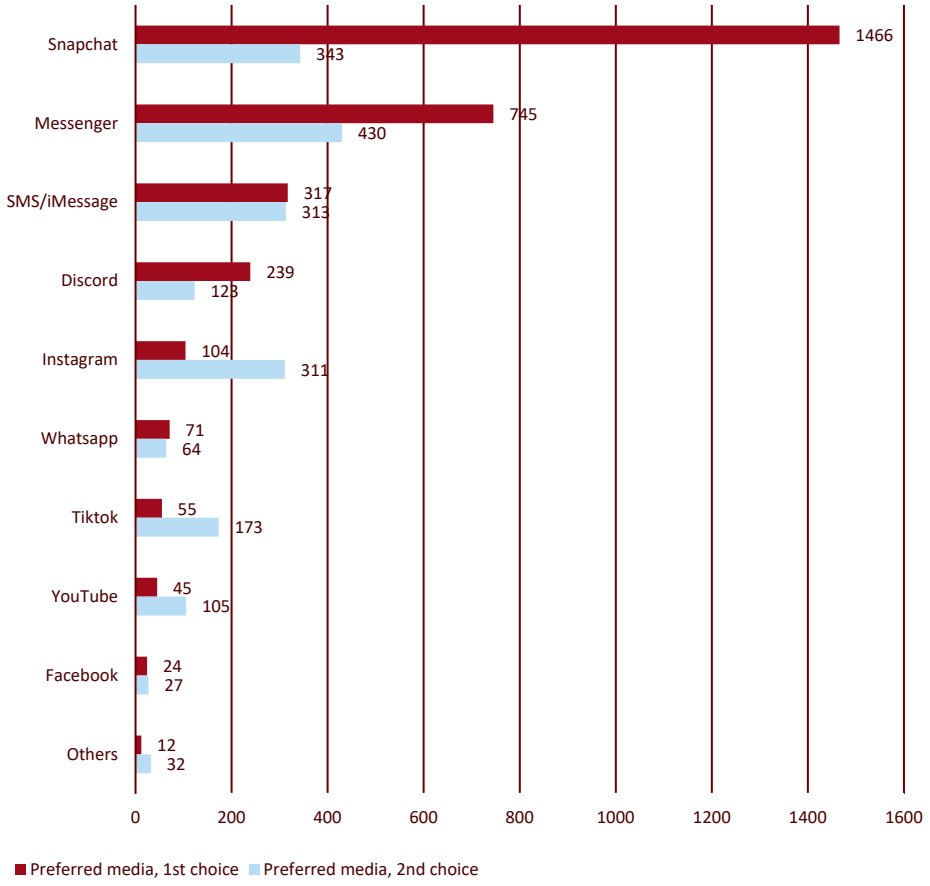
Figure 6.4 **Question 4: Where do you most frequently use social media?**



Note: The figure shows where the respondents most frequently used social media (N = 3,101). The full response options presented in the questionnaire were "Mostly on my phone," "Equally on my phone and iPad/tablet/computer," and "Mostly on my iPad/tablet/computer."

Source: DCCA Survey, 2023

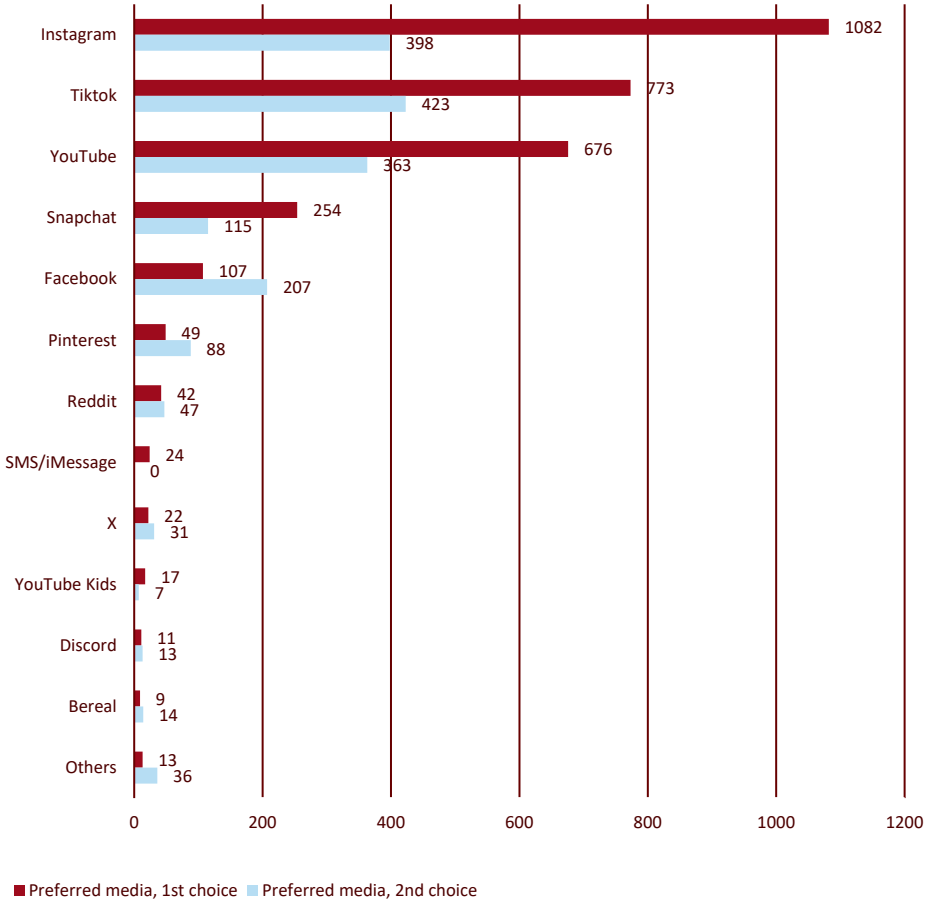
Figure 6.5 **Question 5: Which social media platforms do you use most frequently to send message and pictures and chat? Choose one or two favorites.**



Note: The figure shows the social media platforms most frequently chosen as preferred chat media (N = 3,078). The respondents could choose from the list of social media they selected themselves in question 3. They had the option to choose 1 or 2 favorites, but only one was mandatory (i.e., only some respondents chose a second favorite, n = 1,921). They also had the option to answer "I do not use social media to send messages or chat." If they answered yes to this question, questions 7 and 9 were omitted. "Other" is a combined category of the least chosen social media. They are combined because of the small number of respondents.

Source: DCCA Survey, 2023

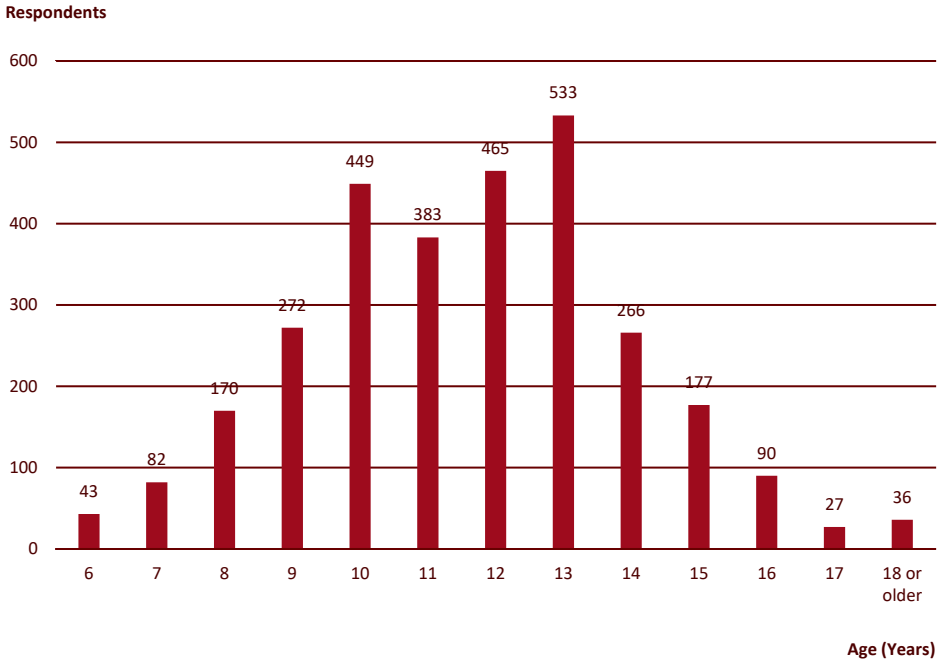
Figure 6.6 **Question 6: Which social media platforms do you use most frequently to view content (e.g., posts/photos/videos/stories/reels/shorts)? Choose one or two favorites.**



Note: The figure shows the social media platforms were most frequently used for viewing content (N = 3,079). The wording of the question was slightly different for the youngest children (aged 8–10 years): "Which social media do you use the most to view content (for example, posts/pictures/videos/stories/reels/shorts)? Choose one or two favorites." The respondents could choose from the list of social media they selected themselves in question 3. They had the option to choose 1 or 2 favorites, but only one was mandatory (i.e., only some of the respondents chose a second favorite, n = 1,742). They also had the option to answer, "I do not use social media to upload, post, or view content." If they answered yes to this, questions 8, 10, 11, and 33 were omitted. "Other" is a combined category of the least chosen social media. They are combined because of the small number of respondents.

Source: DCCA Survey, 2023

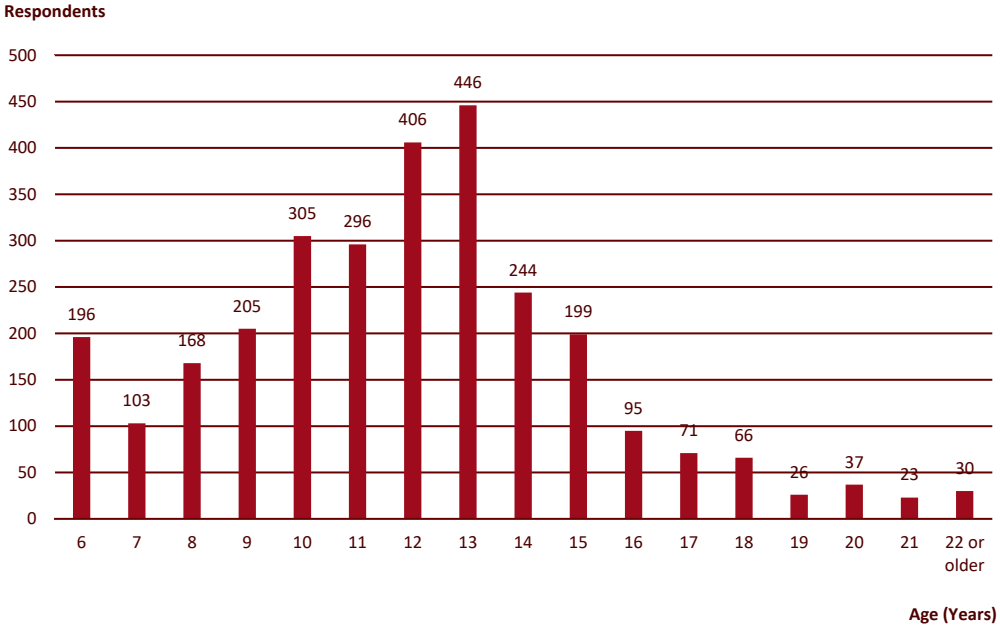
Figure 6.7 **Question 7: Do you remember approximately how old you were when you started using [preferred chat media platform]?**



Note: This figure shows how old the respondents were when they started using their preferred chat media platform (N = 2,993). Here, the respondents had the option to answer, "No, I can't remember" (not included). The category "18 years and older" is a consolidation of the few responses from the respondents within the age range of 18 to 25 years. They are combined for the anonymization of the results.

Source: DCCA Survey, 2023

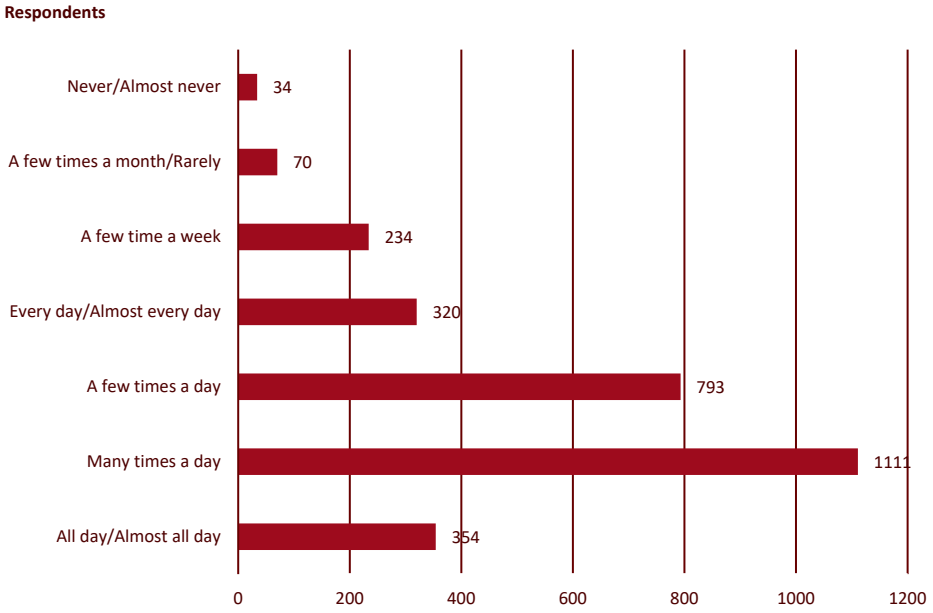
Figure 6.8 **Question 8: Do you remember approximately how old you were when you started using [preferred content media platform]?**



Note: The figure shows the respondents' ages when they started using their preferred content media platform (N = 2,916). Here, the respondents had the option to answer, "No, I can't remember" (not included). The category "22 years or older" is a consolidation of the few responses from the respondents within the age range of 22–25 years (n = 30). They are combined to fit in the figure and to anonymize the results.

Source: DCCA Survey, 2023

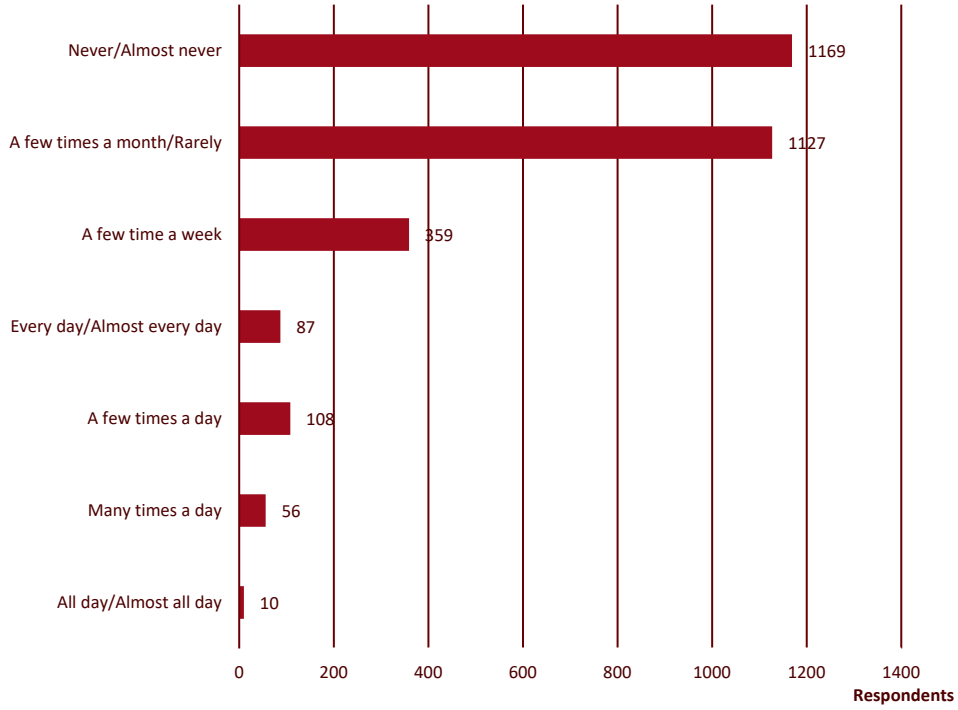
Figure 6.9 **Question 9: How often do you usually send messages and pictures and chat with others?**



Note: This figure shows how often the respondents sent messages and pictures and chat with each other (N = 2,916).

Source: DCCA Survey, 2023

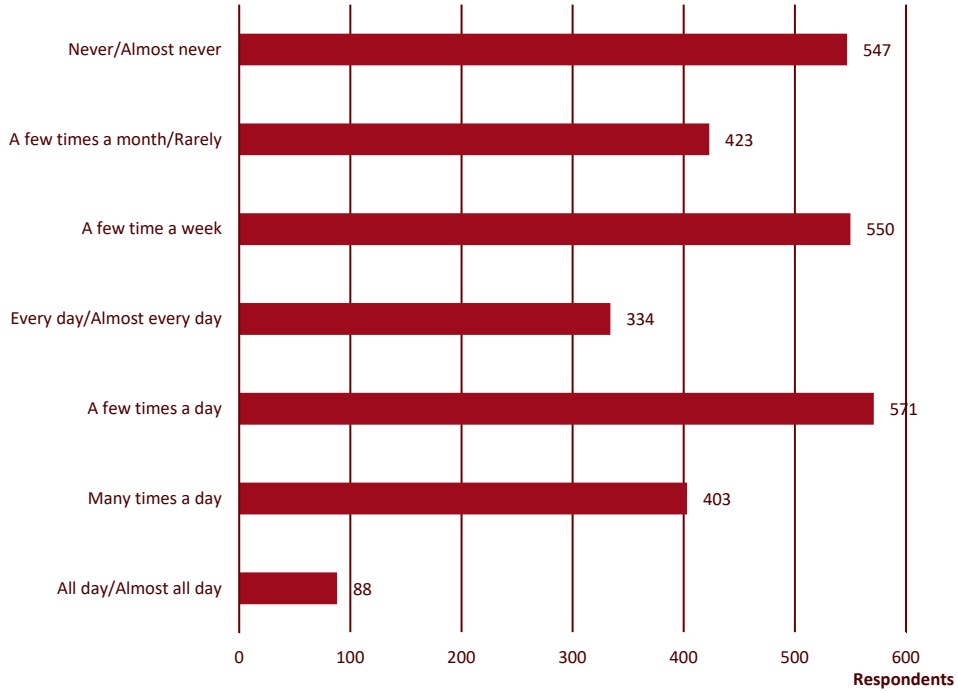
Figure 6.10 **Questions 10. How often do you usually post content (e.g., posts/pictures/videos/stories/reels/shorts) on social media?**



Note: This figure shows how often the respondents posted content on social media (N = 2,916). The following wording was adapted for the youngest children (aged 8–10 years): "How often do you usually upload/post content (e.g., posts/pictures/videos/stories/reels/shorts) on social media?"

Source: DCCA Survey, 2023

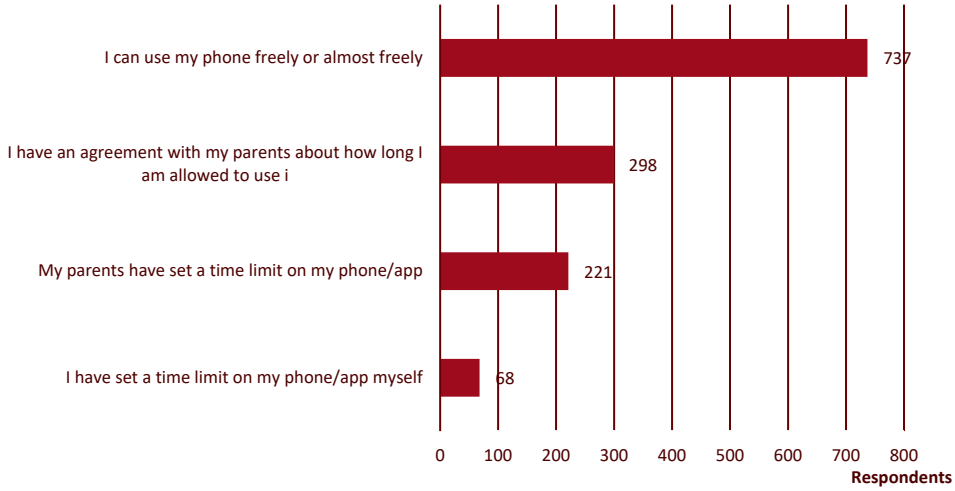
Figure 6.11 **Question 11. How often do you usually like or comment on content social media?**



Note: This figure shows how often the respondents commented on content on social media (N = 2,916).

Source: DCCA Survey, 2023

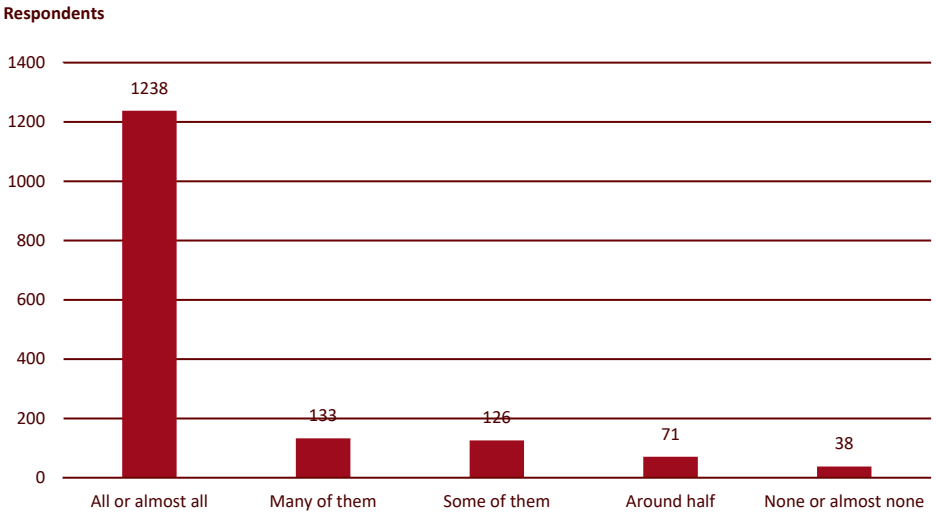
Figure 6.12 **Question 12. Do you have any screen time limits on your phone? Check which situations apply to you. You may choose multiple answers.**



Note: This figure shows whether the respondents had any restrictions imposed on their social media use (N = 1,324). Multiple responses were allowed, and adolescents aged 16 years and older did not get this particular question, as it was deemed unlikely that parents would control their screen time at this age.

Source: DCCA Survey, 2023

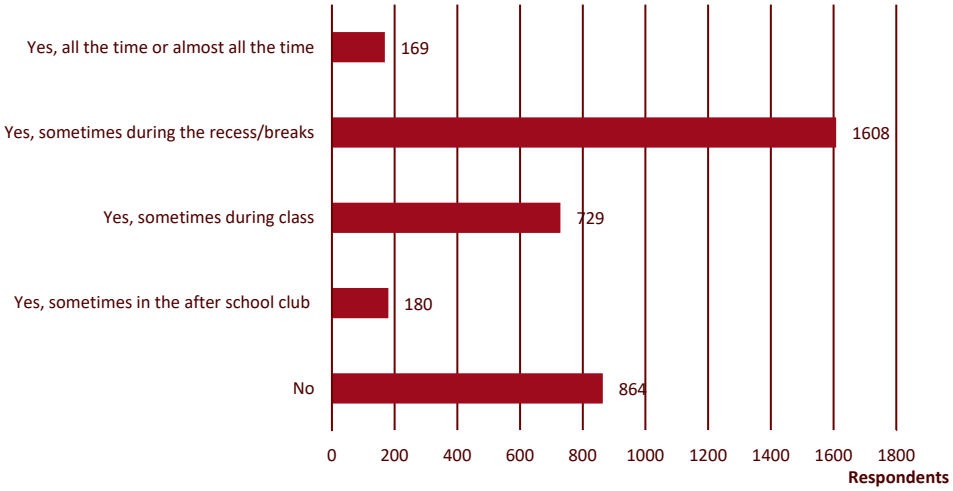
Figure 6.13 **Question 13. How many others in your class have a phone?**



Note: This figure shows the respondents' estimates of the number of other kids from their class who had a phone (N = 1,606). Only the younger age groups between 8 and 15 years were asked this question. It was deemed unlikely that there would be any variation in the response for the older age groups (i.e., everyone has a phone past the age of 16 years).

Source: DCCA Survey, 2023

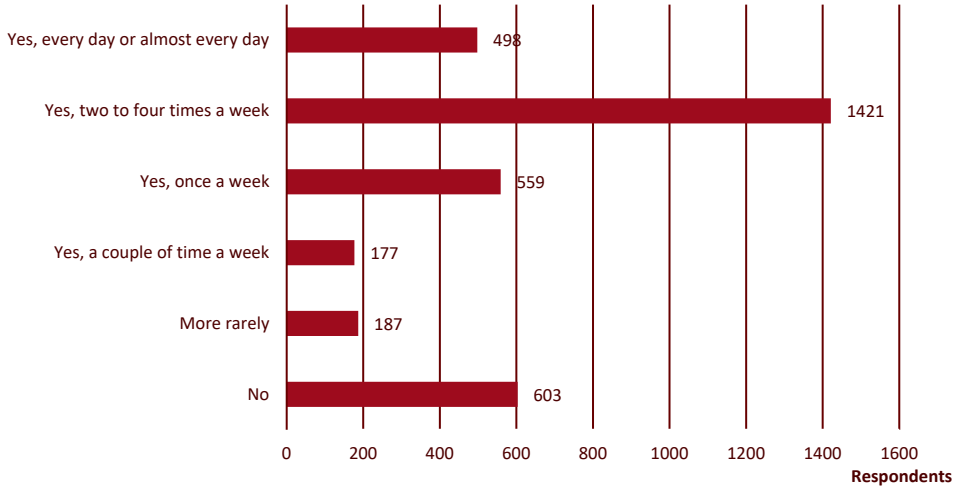
Figure 6.14 **Question 14. Do you use social media while you are at school? You may choose multiple answers.**



Note: This figure shows whether the respondents used their phones at school. The respondents could choose multiple answers. If "No" was selected, this excluded other response options. To address the possibility that young people were not "in school" but were instead working or in training, the question was adapted for the oldest children and young people aged 16 to 25 years with the following wording: "Do you use social media while you are at school/training/work? You may choose multiple answers." In light of the same issue, the response option was also changed to "Yes, sometimes during lessons/work hours," and this group did not have the response option "Yes, sometimes in after-school care/club." On the other hand, young people aged 16 to 25 years had the option to answer, "I am not in education or work," to accommodate different daily situations such as unemployment and a gap year. If "No" was selected, it excluded other response options.

Source: DCCA Survey, 2023

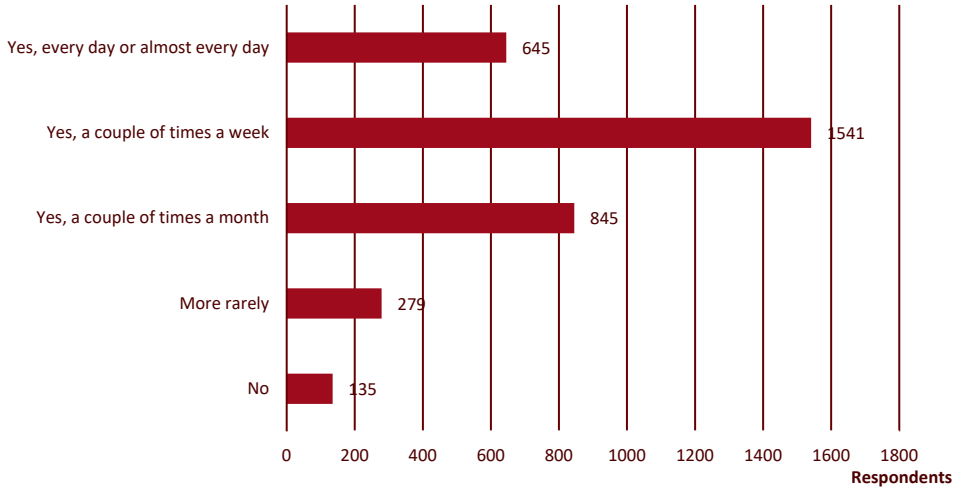
Figure 6.15 **Question 15. Do you participate in any activities in your free time? It could be sports, music, role-playing, or something else.**



Note: This figure illustrates whether the respondents had a regular after-school/work activity (N = 3,445). For the group of respondents aged 16 to 25 years, the question was formulated as follows: "Do you participate in leisure activities? This could be sports, music, hobbies, or other activities."

Source: DCCA Survey, 2023

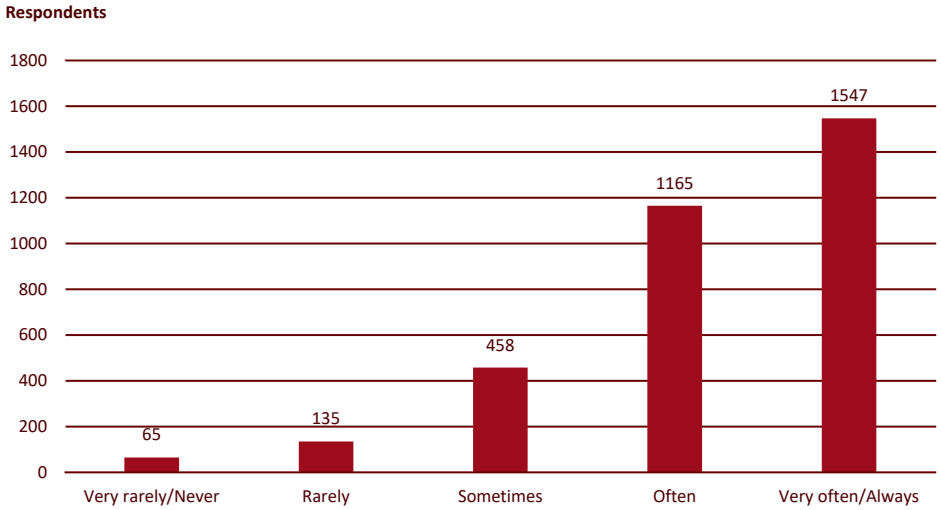
Figure 6.16 **Question 16: Do you spend time with classmates/friends outside school hours and after school club?**



Note: This figure shows whether the respondents spent time with school friends outside school hours (N = 3,445). For the group of respondents aged 16–25 years, the question was formulated as follows: "Do you spend time with friends outside school, education, or work hours?"

Source: DCCA Survey, 2023

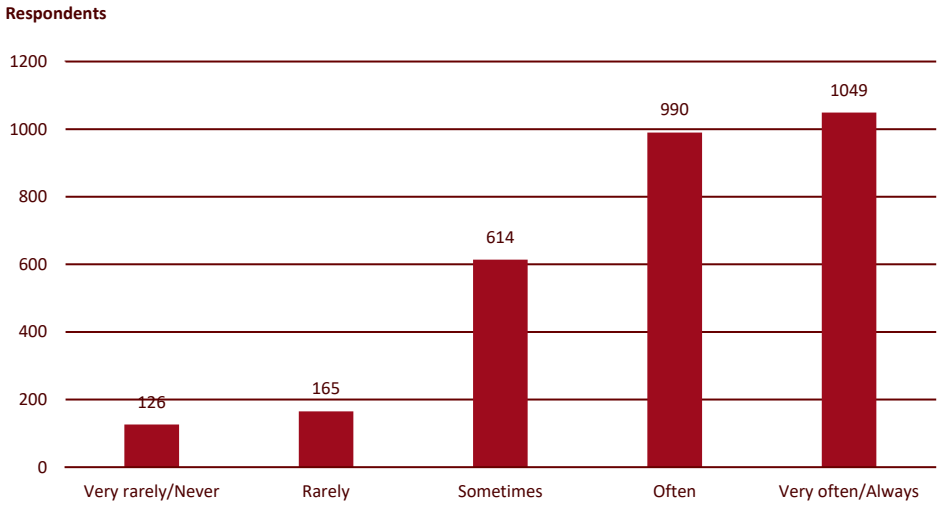
Figure 6.17 **Question 17. Do you feel that you are part of your school community?**



Note: The figure shows whether respondents felt like they were part of their school community (N = 3,370). For the youngest children (aged 8–10 years), the question was formulated as follows: "Do you feel that you have someone to be with at school?" For the oldest children and young people aged 16–25 years, the question was "Do you feel that you are part of the community at your school/education/work?" This group also had the response option "I am not in education or work" to accommodate different occupational situations such as unemployment and a gap year.

Source: DCCA Survey, 2023

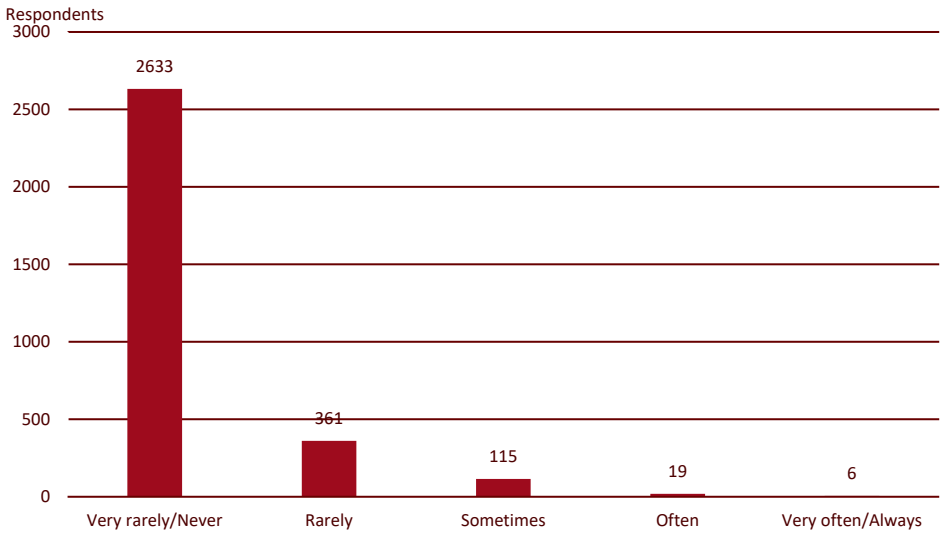
Figure 6.18 **Question 18. Do you use social media to talk or write with your classmates outside school hours?**



Note: This figure shows whether the respondents used social media to talk or write with classmates after school (N = 2,944). For the respondents aged 16–25 years, the question was formulated as follows: "Do you use social media to talk or write with your classmates, teammates, or colleagues about non-school/work-related matters outside school, education, or work hours?" This group of young people also had the following response options: "No, I only communicate with friends who are not from my school/education/work." They also had the option to answer, "I am not in education or work" to accommodate different daily situations such as unemployment and a gap year. The younger children had the option to answer, "No, I only talk or write with friends who do not go to my school."

Source: DCCA Survey, 2023

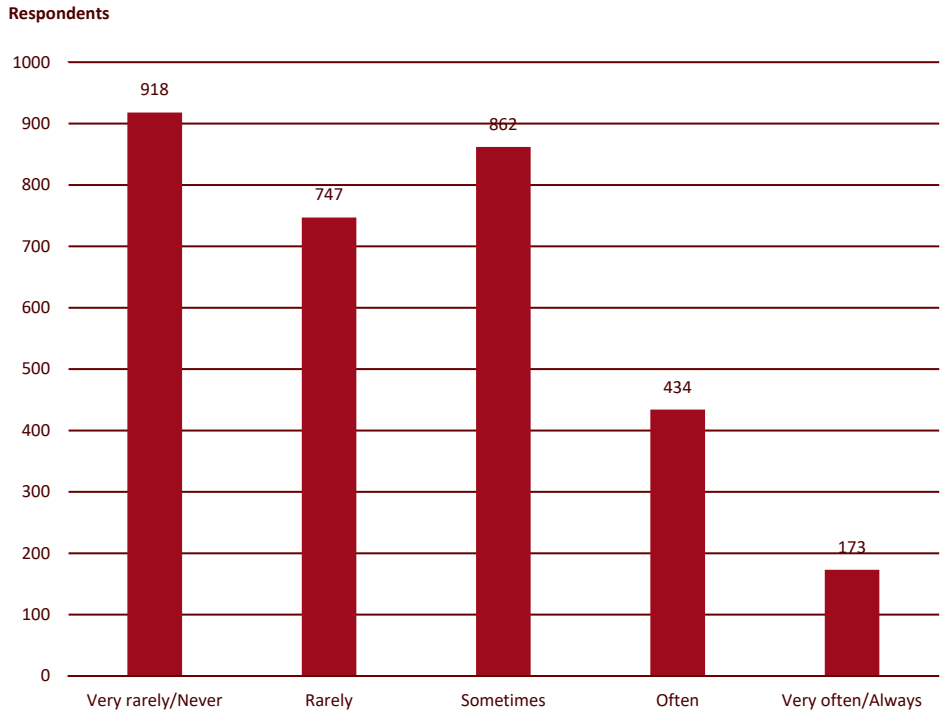
Figure 6.19 **Question 19. Do you experience being excluded or bullied on social media?**



Note: This figure shows whether the respondents felt excluded or bullied online (N = 3,134).

Source: DCCA Survey, 2023

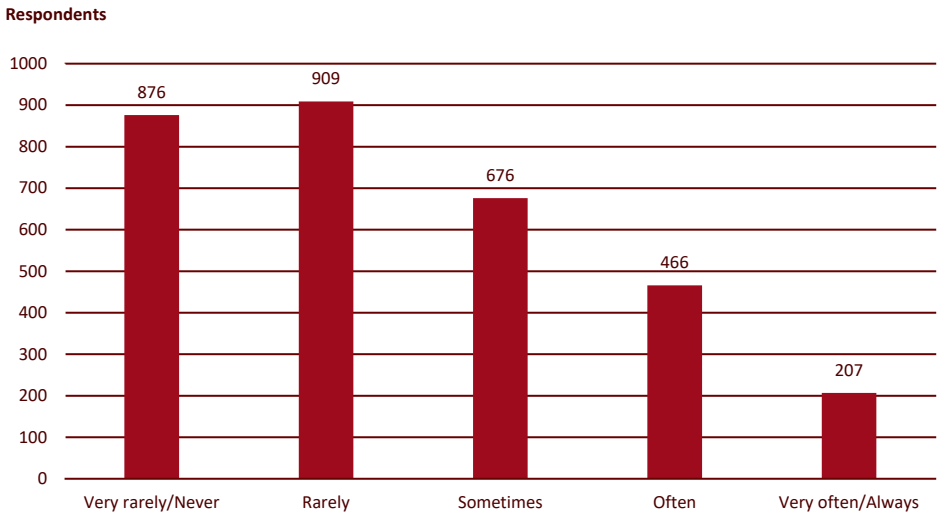
Figure 6.20 **Question 20. Do you feel that you are part of a community on social media that you don't have elsewhere?**



Note: This figure shows whether the respondents felt being part of an online community that they do not have in real life (N = 3,134). To assist the youngest respondents (aged 8–10 years) in understanding the question, it was formulated as follows: "Do you feel that you are part of a group or friendship that only exists on social media?"

Source: DCCA Survey, 2023

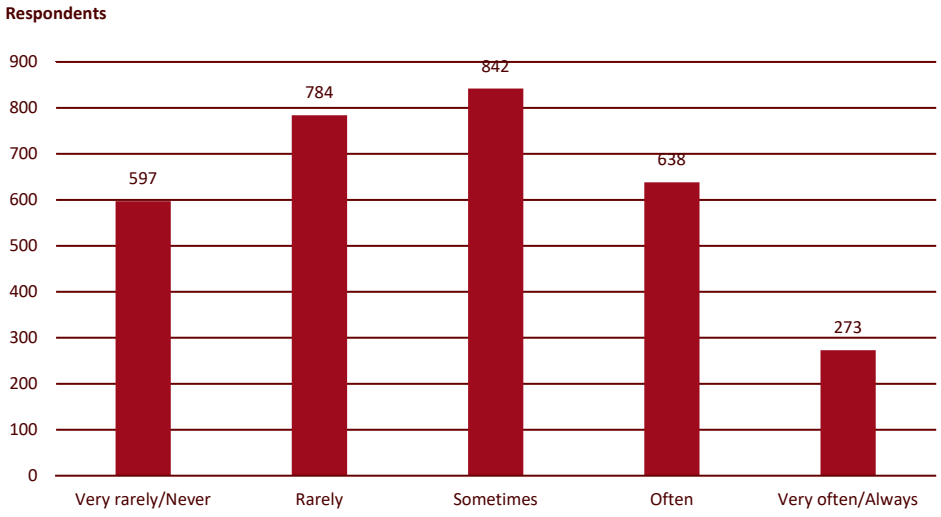
Figure 6.21 **Question 21. It can be difficult to close [preferred social media] once I get started.**



Note: The figure shows how difficult it was for the respondents to close their preferred chat or content media (N = 3,134). This question is included in the retention score.

Source: DCCA Survey, 2023

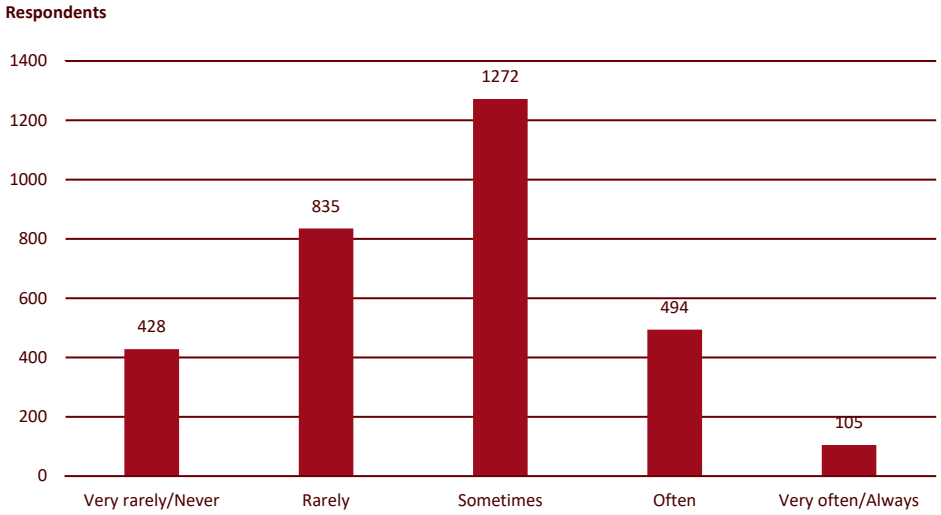
Figure 6.22 **Question 22. When I am on [preferred social media], I end up spending more time on it than I actually want to.**



Note: The figure shows whether the respondents reported spending more time than they actually wanted on their preferred social chat or content media platform (N = 3,134). This question is included in the retention score.

Source: DCCA Survey, 2023

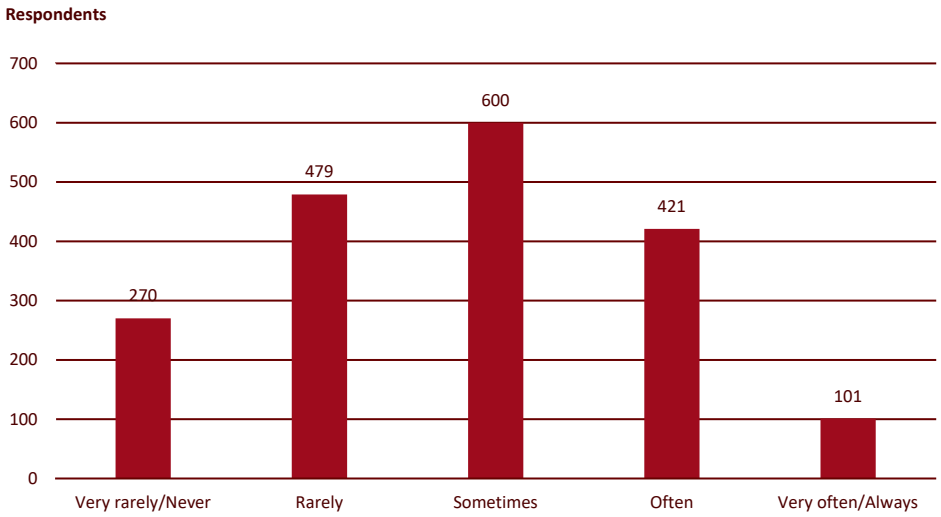
Figure 6.23 **Question 23. I can end up feeling bored when I am on [preferred social media].**



Note: The figure shows whether the respondents felt bored when on their preferred chat or content social media (N = 3,134).

Source: DCCA Survey, 2023

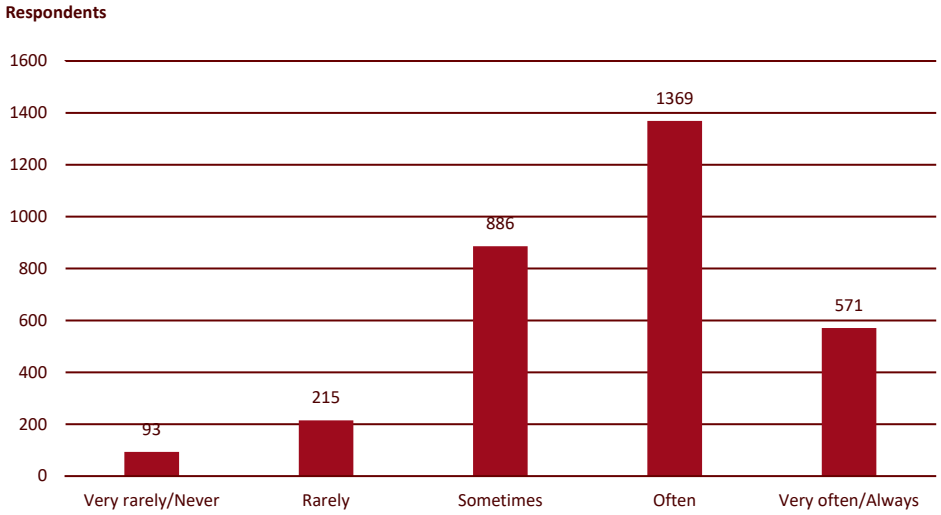
Figure 6.24 **Question 24. Even though I am bored, I continue to stay on [preferred social media].**



Note: The figure shows if the respondents stayed on their preferred chat or content social media even though they were bored. This question was contingent on having answered "Sometimes," "Often," or "Very often/always" in the previous question (N = 1,871).

Source: DCCA Survey, 2023

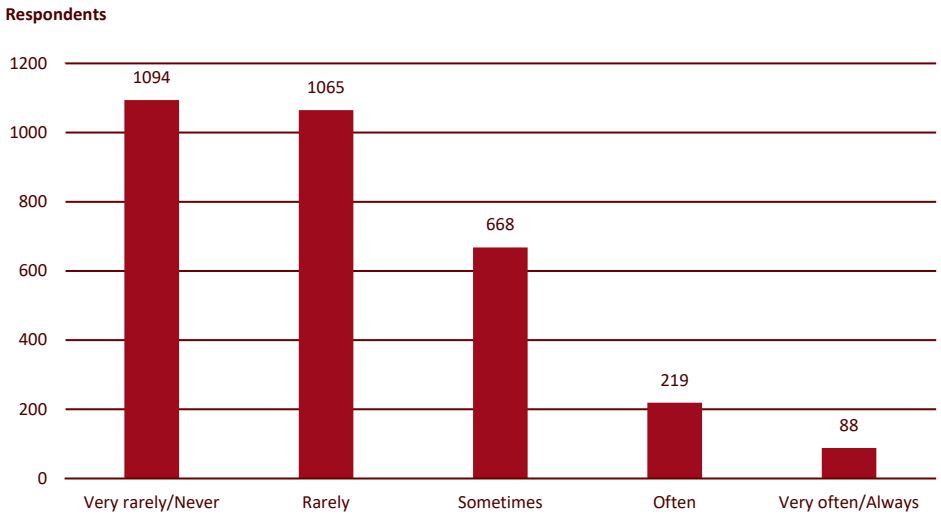
Figure 6.25 **Question 25. I enjoy the time I spend on [preferred social media platform].**



Note: The figure shows if the respondents enjoyed their time on their preferred chat or content social media (N = 3,134).

Source: DCCA Survey, 2023

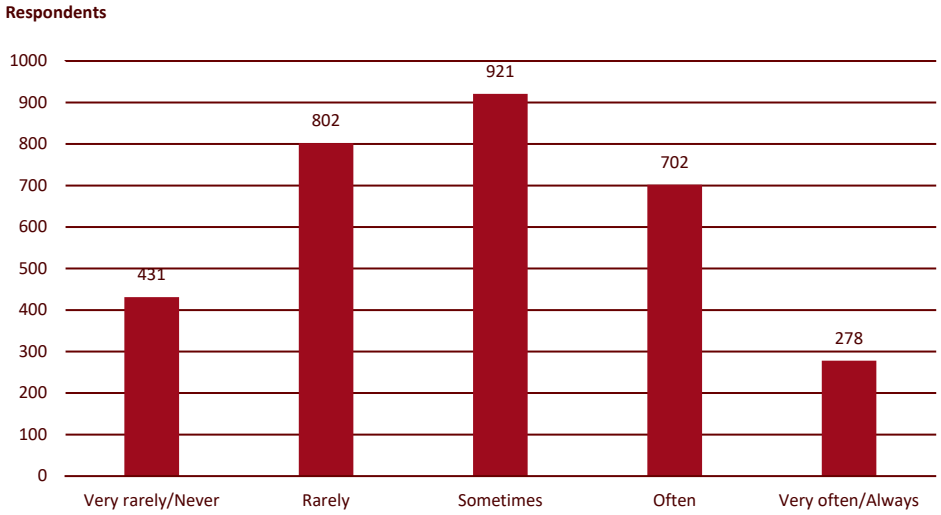
Figure 6.26 **Question 26. I regret the time I spend on [preferred social media platform].**



Note: The figure shows whether the respondents regretted the time they spent on their preferred chat or content social media (N = 3,134).

Source: DCCA Survey, 2023

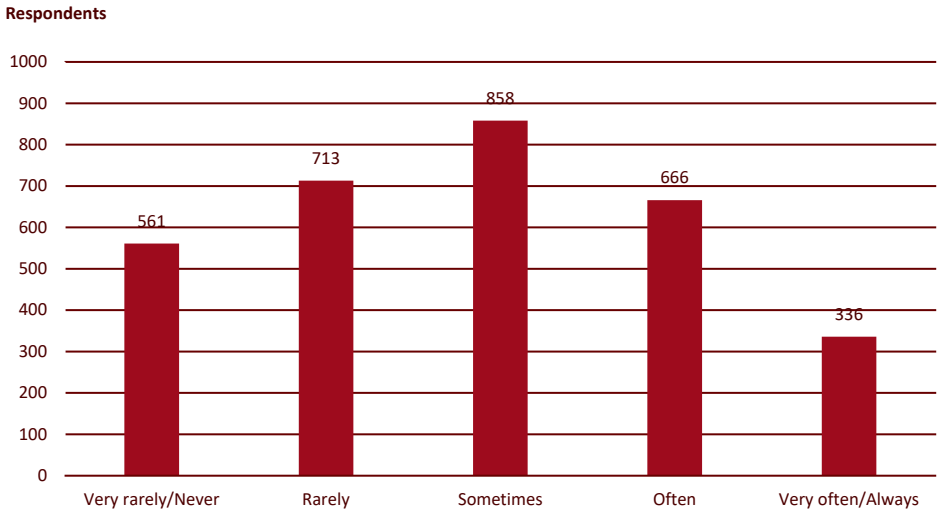
Figure 6.27 **Question 27. I am aware of the time when I am on [preferred social media platform].**



Note: The figure shows if the respondents were aware of the time they were on their preferred chat or content social media (N = 3,134).

Source: DCCA Survey, 2023

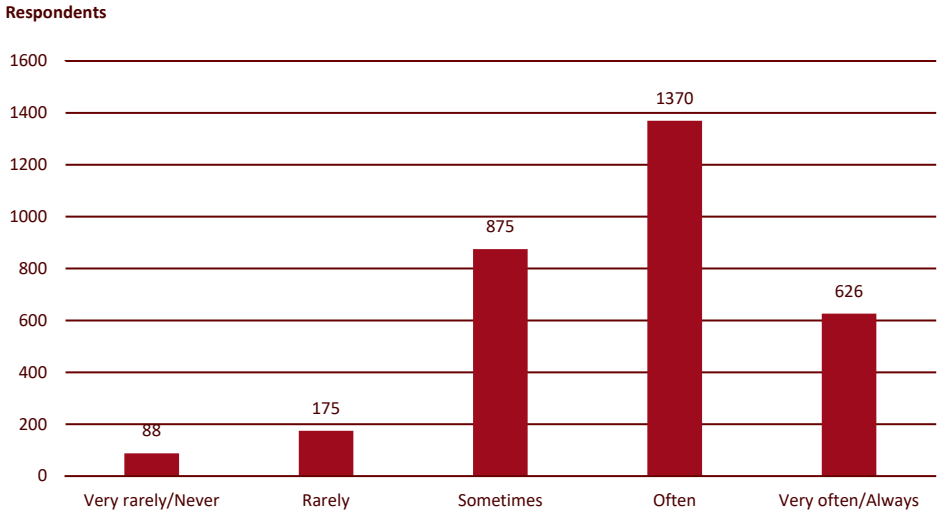
Figure 6.28 **Question 28. I am surprised by how quickly time passes when I am on [preferred social media platform].**



Note: The figure shows whether the respondents were surprised about how quickly time passed when they were on their preferred chat or content social media (N = 3,134).

Source: DCCA Survey, 2023

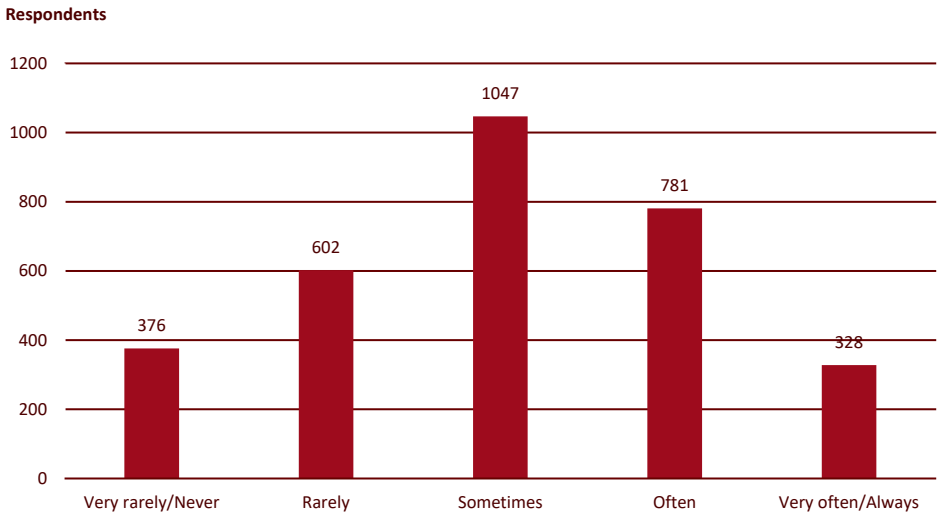
Figure 6.29 **Question 29. I have fun when I am on [preferred social media platform].**



Note: The figure shows if the respondents have fun when they are on their preferred chat or content social media (N = 3,134).

Source: DCCA Survey, 2023

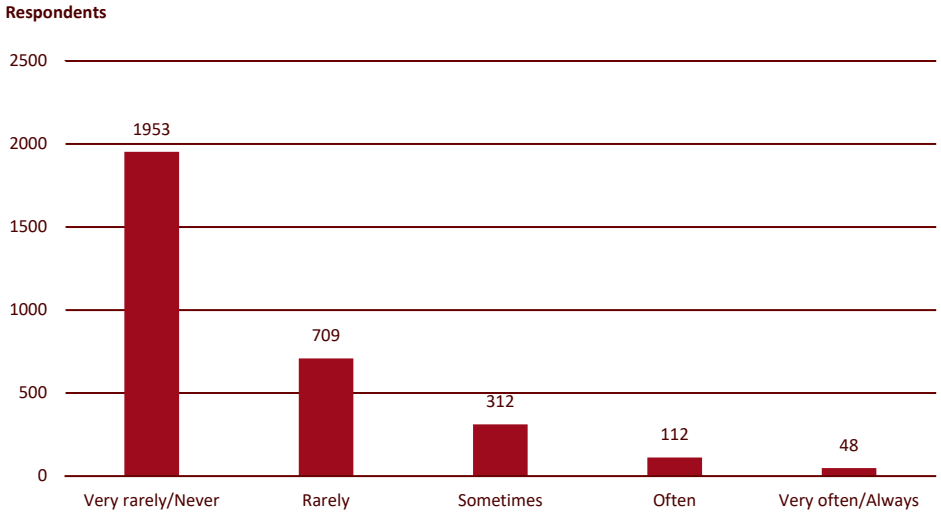
Figure 6.30 **Question 30. I learn something or get inspiration when I am on [preferred social media platform].**



Note: The figure shows the respondents' frequency of learning something or getting inspired on their preferred chat or content social media (N = 3,134). For the youngest age group (8–10 years old), the question was slightly simpler: "I learn something when on [preferred social media]."

Source: DCCA Survey 2023

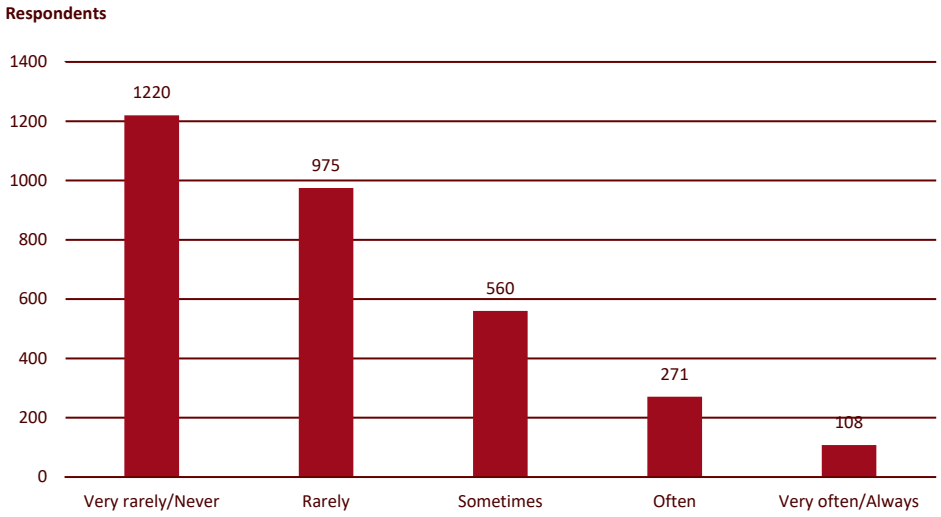
Figure 6.31 **Question 31. I am afraid of disappointing my friends if I am not present on [preferred social media].**



Note: The figure shows how often the respondents felt afraid of disappointing their friends if they are not present on their preferred chat or content social media (N=3,134).

Source: DCCA Survey, 2023

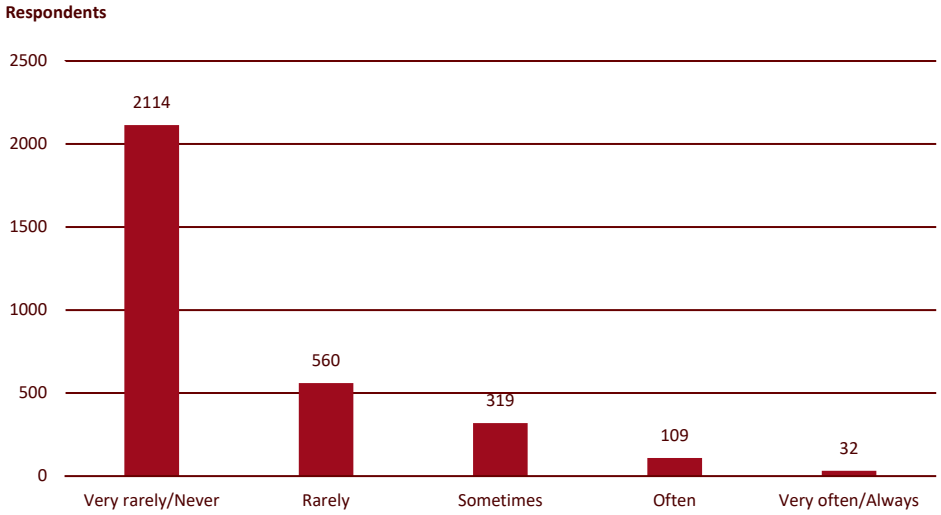
Figure 6.32 **Question 32. I am afraid of missing out on something fun, exciting, or important if I am not on [preferred social media].**



Note: The figure shows how often the respondents felt afraid of missing out on something fun, exciting, or important if they are not present on their preferred chat or content social media (N=3,134).

Source: DCCA Survey, 2023

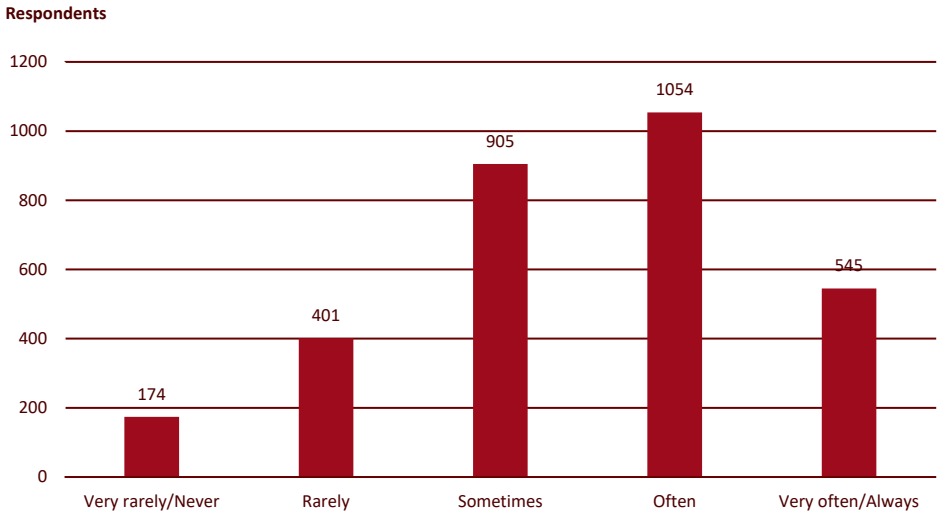
Figure 6.33 **Question 33. I have had conflicts with my parents or others because they think I have used [preferred social media] too much.**



Note: The figure shows how often the respondents had conflicts with their parents or others because of using their preferred chat or content social media too much (N = 3,134) The youngest children (aged 8–10 years) were only asked about parental conflicts: "I have had disagreements with my parents because they think I have used [favorite media] too much."

Source: DCCA Survey 2023

Figure 6.34 **Question 34. When I am on social media, for example [preferred content media], I experience looking at content (e.g., posts/pictures/videos/stories/reels/shorts) for longer than I had expected.**



Note: The figure shows how often the respondents thought they looked at content for longer than they expected (N = 3,079). The preferred social media referred to here is always a content media (never a chat media) because the question is about content.

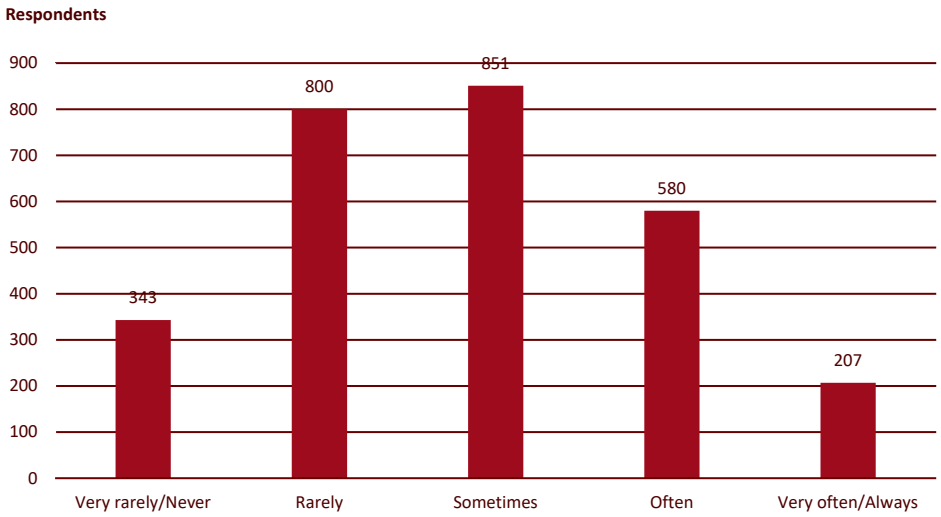
Source: DCCA Survey 2023

The following 6 questions relating to addiction are from the Bergen Social Media Addiction Scale. The questions were not given to the youngest respondents of ages 8–10 years, as the scale has not been validated for this age group.

The introduction text for the addiction battery was as follows:

> *Now there are some questions about your experiences with social media. Choose the answer that best fits you.*
>
> *During the past few months, I have…*

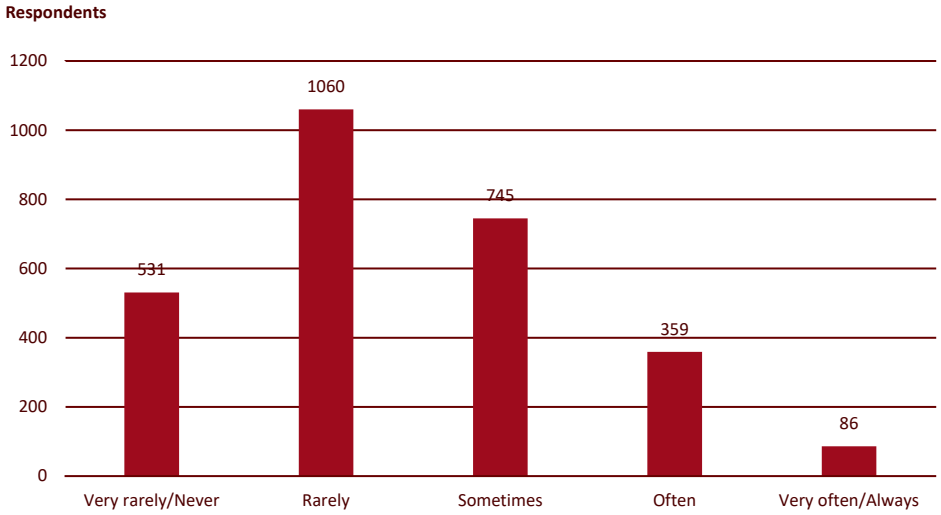
Figure 6.35 **Question 35. Spent a lot of time thinking about social media.**



Note: Social media addiction question 1. This figure shows how often the respondents spent time thinking a lot about social media (N = 2,781). Only the respondents aged 11 years or older answered the questions on social media addiction.

Source: DCCA Survey, 2023

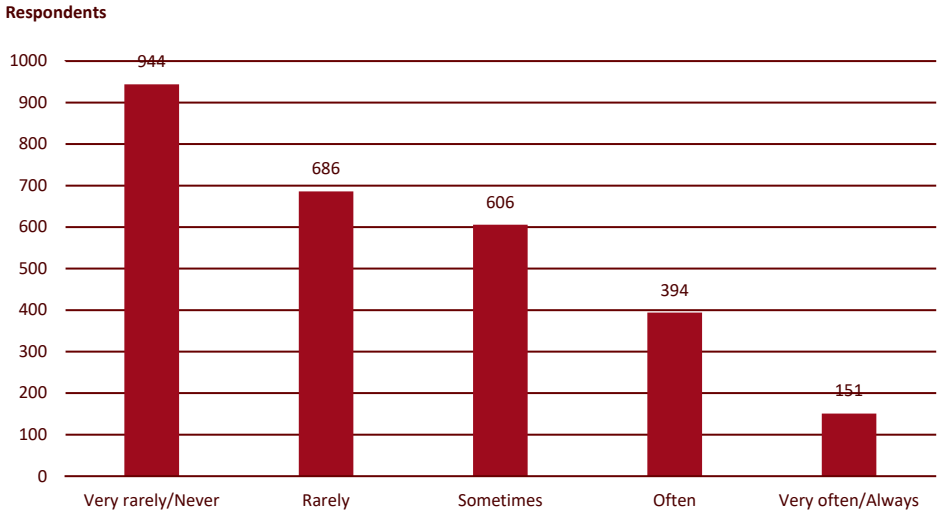
Figure 6.36 **Question 36. Felt the need to use social media more and more.**



Note: Social media addiction question 2. This figure shows how often the respondents felt the need to increase their use of social media (N = 2,781). Only the respondents aged 11 years or older answered the questions on social media addiction.

Source: DCCA Survey, 2023

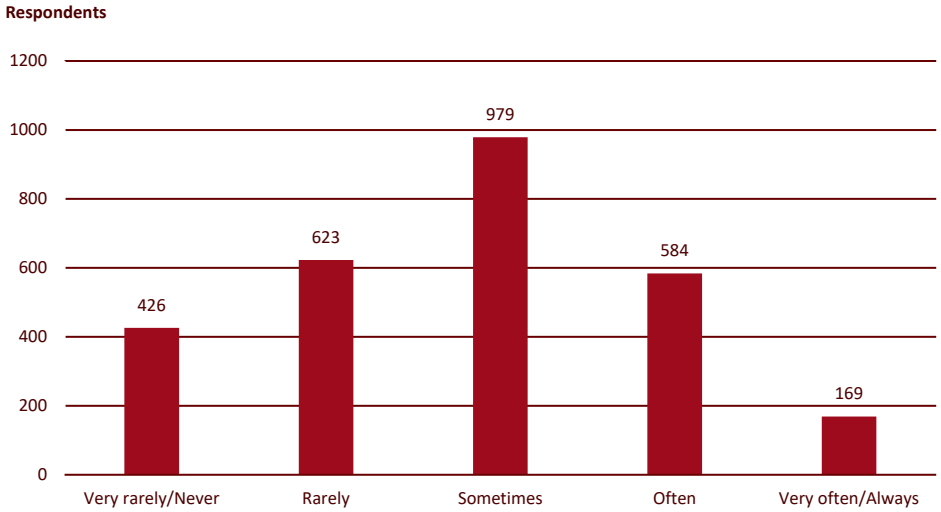
Figure 6.37 **Question 37. Used social media to forget about problems.**



Note: Social media addiction question 3. This figure shows how often the respondents used social media to forget problems (N = 2,781). Only the respondents aged 11 years or older answered the questions on social media addiction. For the older age group of 16- to 25-year-olds, the phrasing was "Used social media to forget about personal problems."

Source: DCCA Survey, 2023

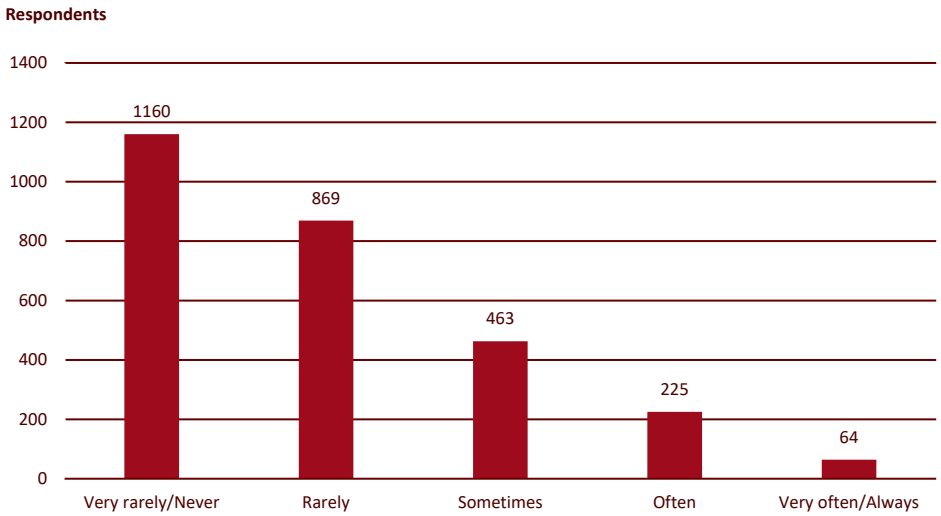
Figure 6.38 **Question 38. Tried to use social media less.**



Note: Social media addiction question 4. This figure shows how often the respondents tried to use social media less (N = 2,781). Only the respondents aged 11 years or older answered the questions on social media addiction. If the respondent chose "Very often or always," "Often," or "Sometimes," they were given a follow-up question: "Has it worked?" with three response options: "Yes," "Sometimes," and "No" (not shown here). They were then asked another question: "How have you tried to use social media less? You may choose multiple answers," with the following response options: "I have set reminders to take breaks," "I use 'Do not disturb'," "I use 'Turn off notifications'," "I have tried deleting or removing apps," "I put my phone out of sight," "I decided to do so," "Other (please elaborate) [with an option for free text]" (not shown here).

Source: DCCA Survey 2023

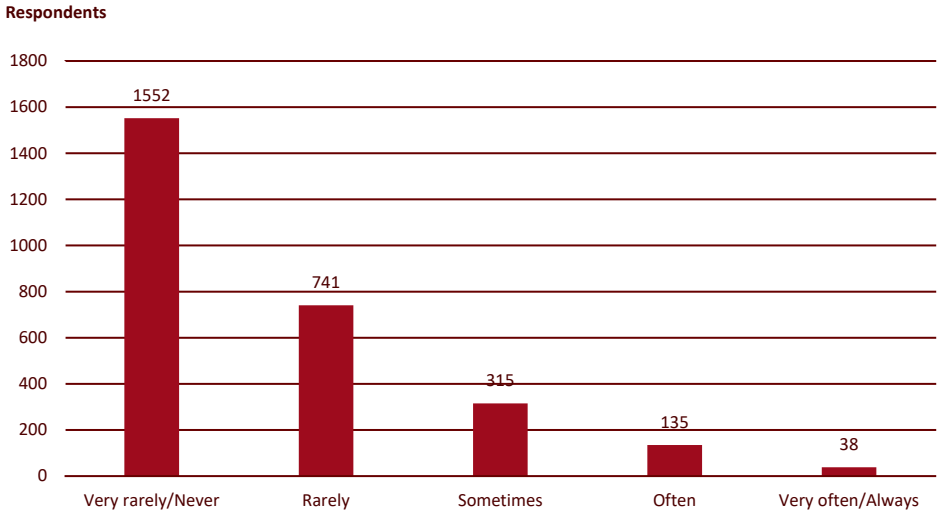
Figure 6.39 **Question 39. Experienced feeling unwell when I could't use social media.**



Note: Social media addiction question 5. This figure shows how often the respondents felt unwell when they could not use social media (N = 2,781). Only the respondents aged 11 years or older answered the questions on social media addiction.

Source: DCCA Survey, 2023

Figure 6.40 **Question 40. Used or thought about social media so much that it had a negative impact on my studies.**



Note: Social media addiction question 6. This figure shows how often the respondents thought about social media so much that it had a negative impact on their studies (N = 2,781). Only the respondents aged 11 years or older answered the questions on social media addiction.

Source: DCCA Survey 2023

The following ten questions are taken from the KIDSCREEN-10 Well-Being Scale.

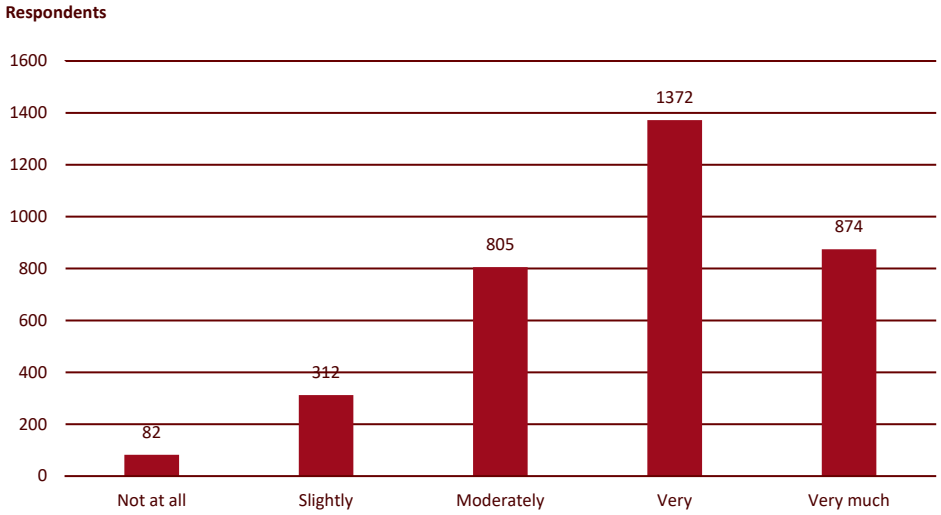
The introductory text for the well-being battery for younger children aged 8–15 years was as follows:

> *Now comes some questions about how you have been feeling in the past week.*

For older children and young adults aged 16–25 years, the introduction was as follows:

> *Now comes some general questions about how you have been feeling in the past week.*
>
> *The youngest children (aged 8–10 years) had the response option "Moderate" replaced with "In between."*

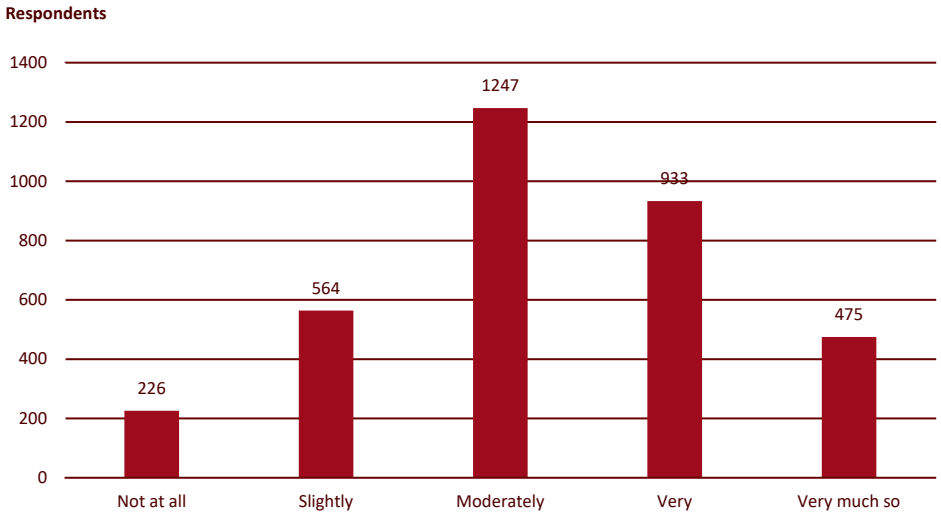
Figure 6.41 **Question 41. Have you felt fit and well?**



Note: Well-being question 1. This figure shows the respondents' degree of feeling fit and well in the past week (N = 3,445).

Source: DCCA Survey, 2023

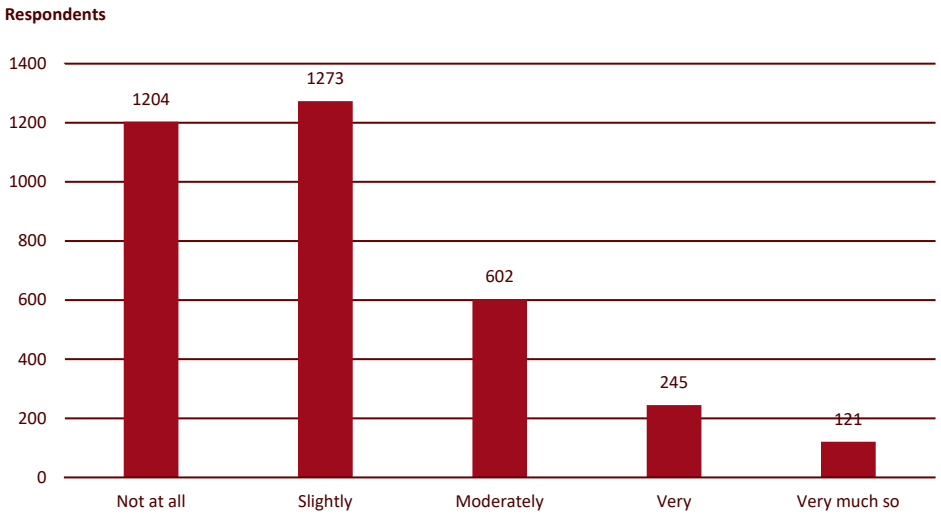
Figure 6.42 **Question 42. Have you felt full of energy?**



Note: Well-being question 2. This figure shows the respondents' degree of feeling full of energy in the past week (N = 3,445).

Source: DCCA Survey, 2023

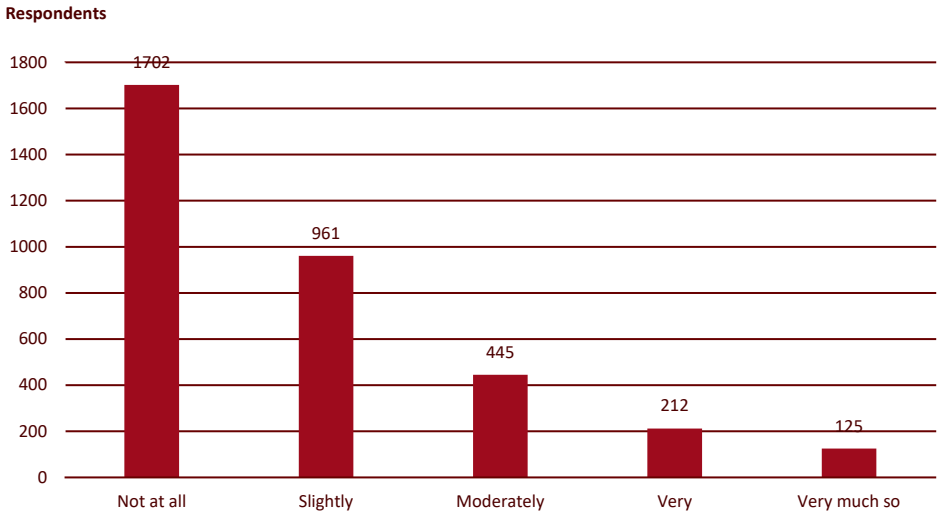
Figure 6.43 **Question 43. Have you felt sad?**



Note: Well-being question 3. This figure shows to the respondents' degree of sadness in the past week (N = 3,445).

Source: DCCA Survey, 2023

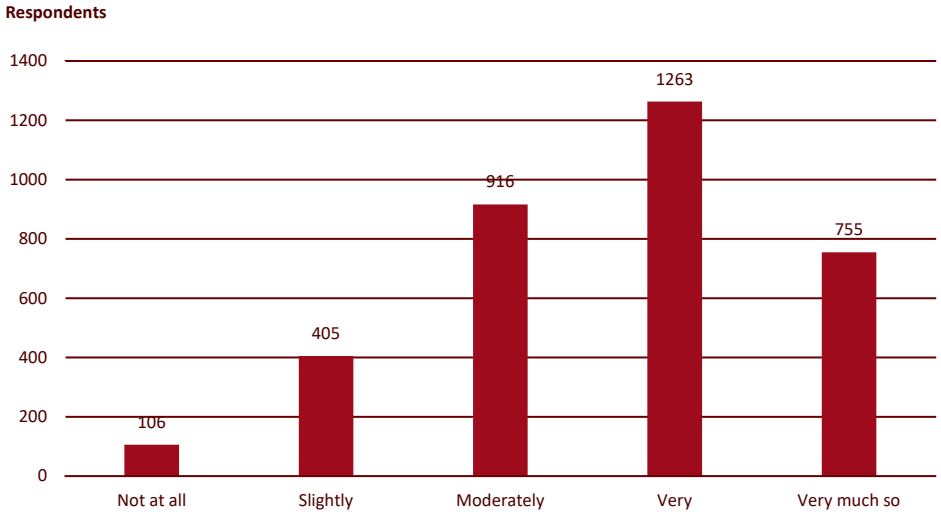
Figure 6.44 **Question 44. Have you felt lonely?**



Note: Well-being question 4. This figure shows the respondents' degree of loneliness in the past week (N = 3,445).

Source: DCCA Survey, 2023

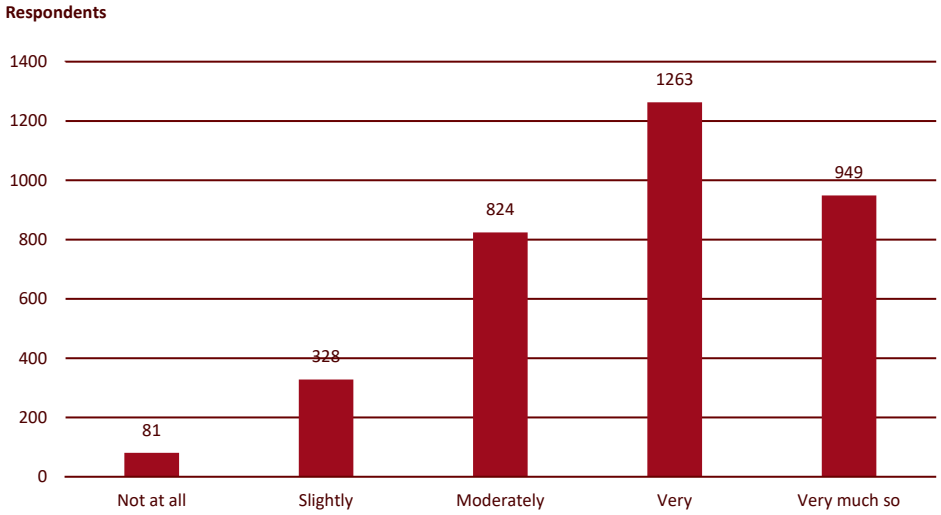
Figure 6.45 **Question 45. Have you had enough time for yourself?**



Note: Well-being question 5. This figure shows the extent to which the respondents had enough time for themselves in the past week (N = 3,445).

Source: DCCA Survey, 2023

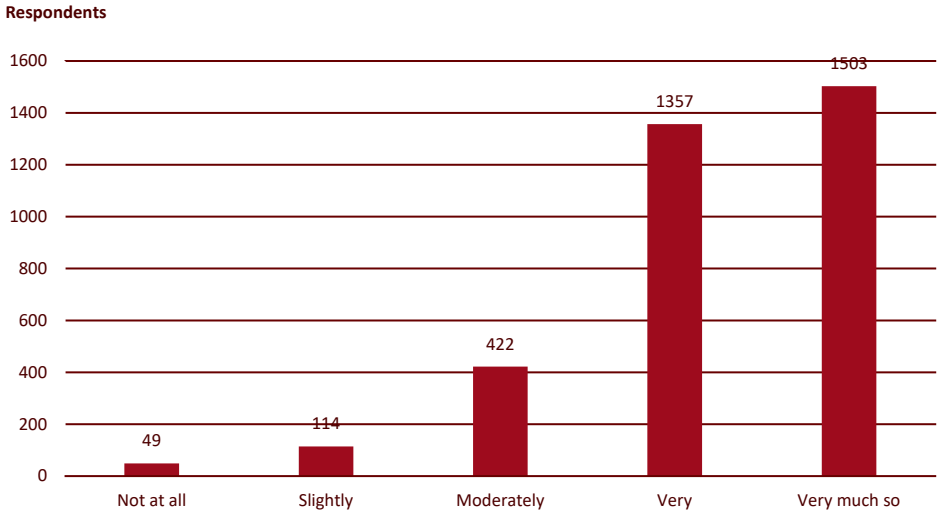
Figure 6.46 **Question 46. Have you been able to do the things that you want to do in your free time?**



Note: Well-being question 6. This figure shows the extent to which the respondents had been able to do the things they wanted to do in the past week (N = 3,445).

Source: DCCA Survey 2023

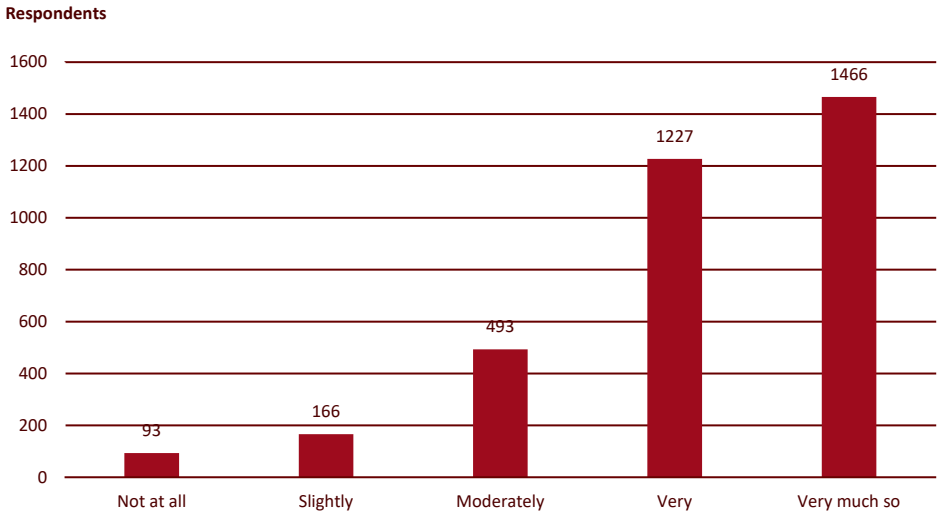
Figure 6.47 **Question 47. Have your parents treated you fairly?**



Note: Well-being question 7. This figure shows the extent to which the respondents felt that their parents treated them fairly in the past week (N = 3,445). For the older respondents aged 16 years and older, the question was phrased, "Have others treated you fairly/properly?"

Source: DCCA Survey, 2023

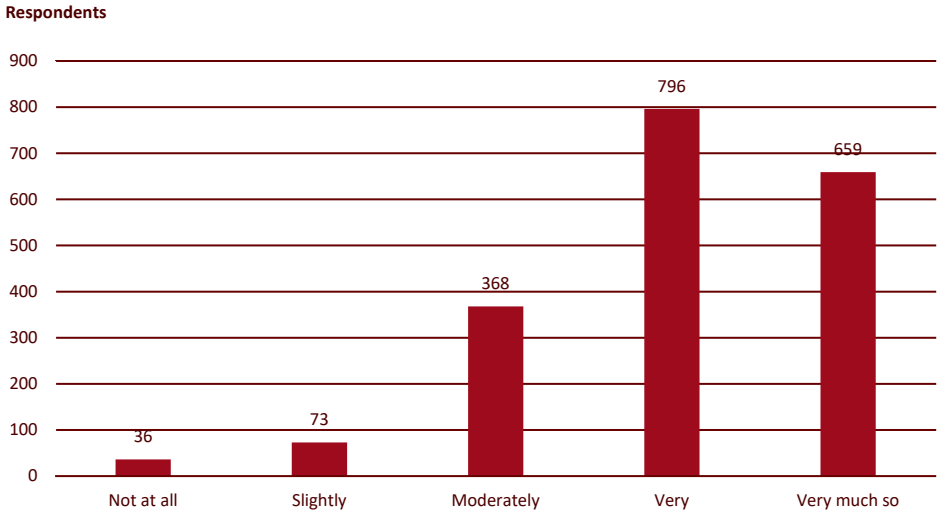
Figure 6.48 **Question 48. Have you had fun with your friends?**



Note: Well-being question 8. This figure shows to what degree the respondents had fun with their friends in the past week (N = 3,445).

Source: DCCA Survey, 2023

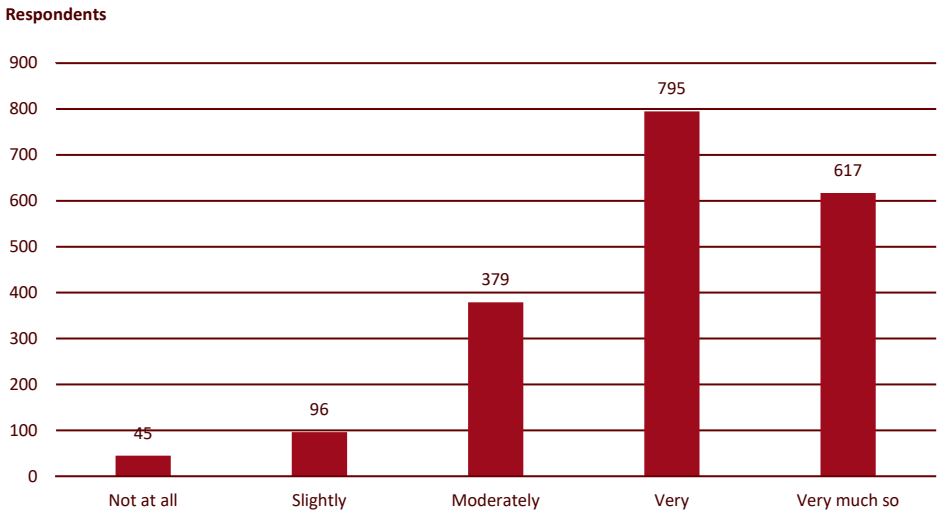
Figure 6.49 **Question 49. Have you gotten on well at school?**



Note: Well-being question 9. This figure shows to what degree the respondents gotten on well at school in the past week (N = 3,445)

Source: DCCA Survey, 2023

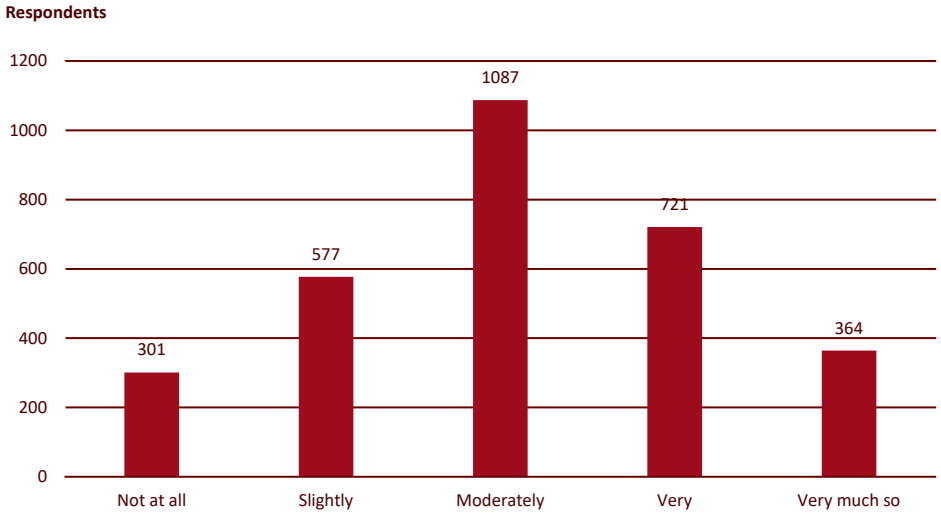
Figure 6.50 **Question 50. Have you been able to pay attention at school?**



Note: Well-being question 10. This figure shows to what degree the respondents paid attention at school in the past week (N = 1,932).

Source: DCCA Survey, 2023

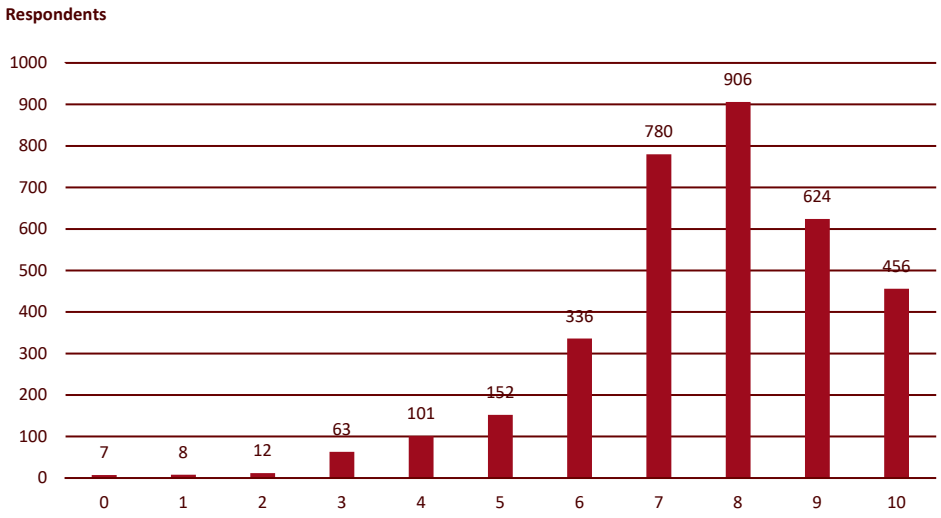
Figure 6.51 **Question 51. I woke up feeling fresh and rested.**



Note: Additional well-being question (not part of the individual well-being score). This figure shows the respondents' degree of feeling fresh and well rested after waking up in the past week (N = 3,050). This well-being question is taken from the World Health Organization Five Well-Being Index (WHO-5).

Source: DCCA Survey, 2023

Figure 6.52 **Question 52. How good do you think your life is? Answer using a scale from 0 to 10, where 10 represents the best possible life and 0 represents the worst possible life.**



Note: Life satisfaction question. This figure shows the distribution of the responses to the question of how good the respondents thought of their own life (N = 3,445), which is also called Cantrils Ladder and examines more generally how one views their own life.

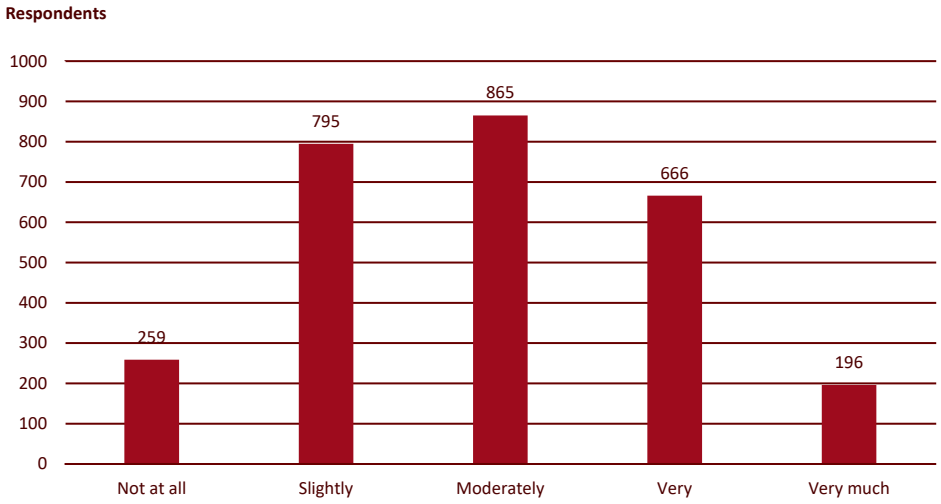
Source: DCCA Survey, 2023

The following are questions taken from the Brief Self-Control Scale.

The introductory text for the five questions of the self-control battery was as follows:

> *Below are some different situations that fit some people well and others less so. Think about how much each situation generally applies to you.*

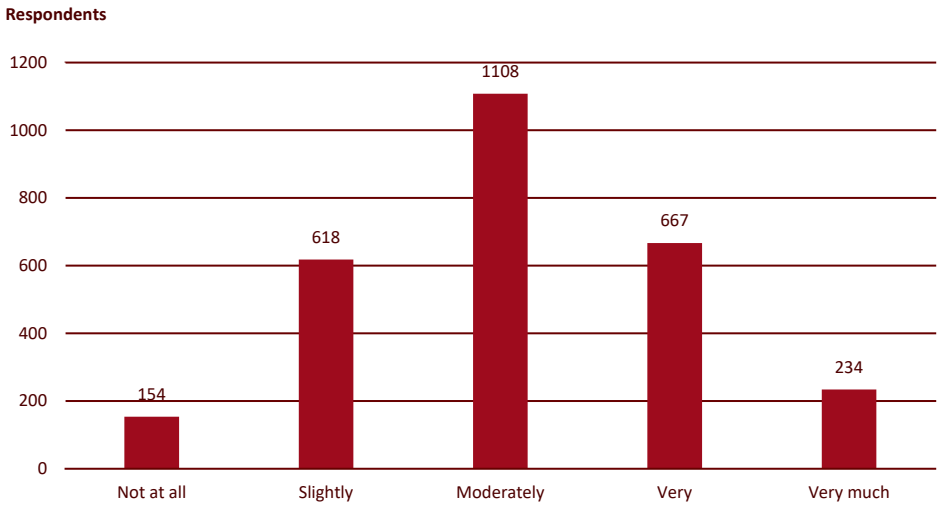
Figure 6.53 **Question 53. I have a hard time breaking bad habits.**



Note: Self-control question 1. This figure shows to what degree the respondents had a hard time breaking bad habits (N = 2,781).

Source: DCCA Survey, 2023

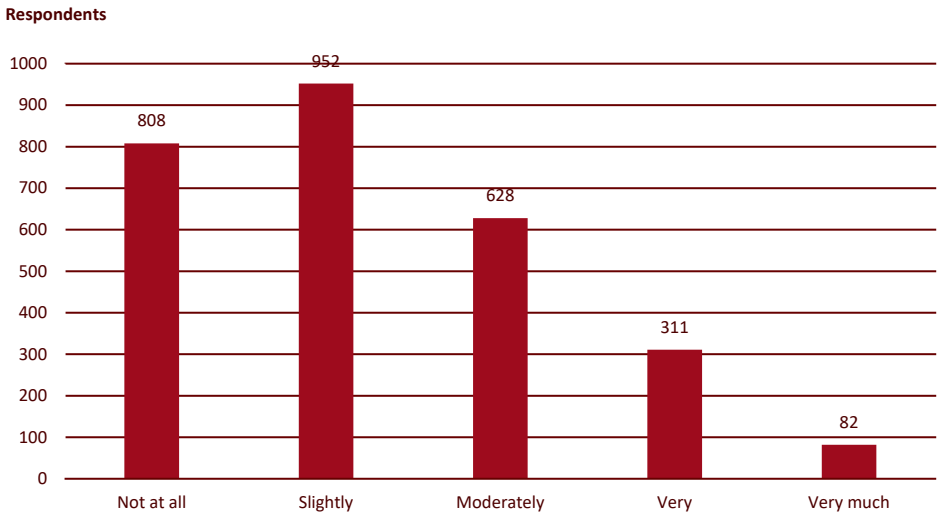
Figure 6.54 **Question 54. I am good at resisting temptation.**



Note: Self-control question 2. This figure shows the respondents' degree of resistance to temptations (N = 2,781).

Source: DCCA Survey, 2023

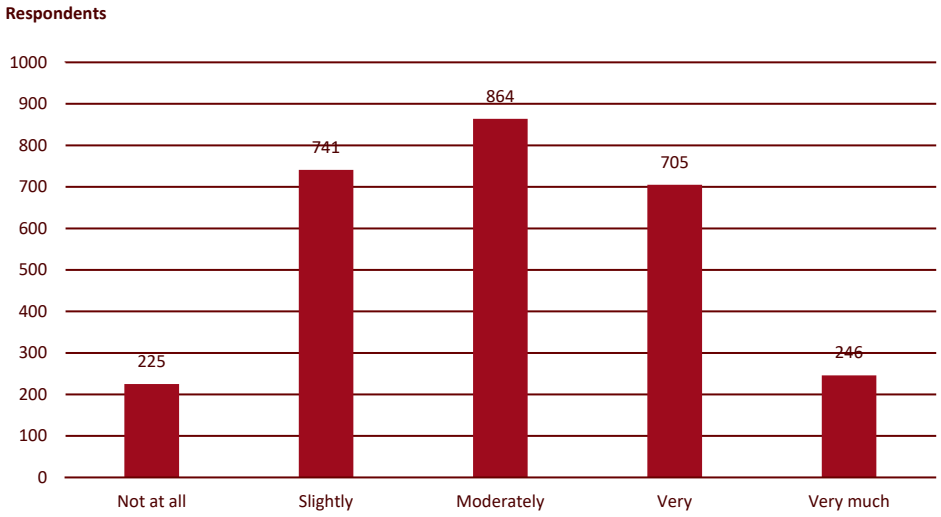
Figure 6.55 **Question 55. I can't stop myself from doing something even if I know it is wrong.**



Note: Self-control question 3. This figure shows the extent to which the respondents could not stop themselves from doing something even though they know it's wrong (N = 2,781).

Source: DCCA Survey, 2023

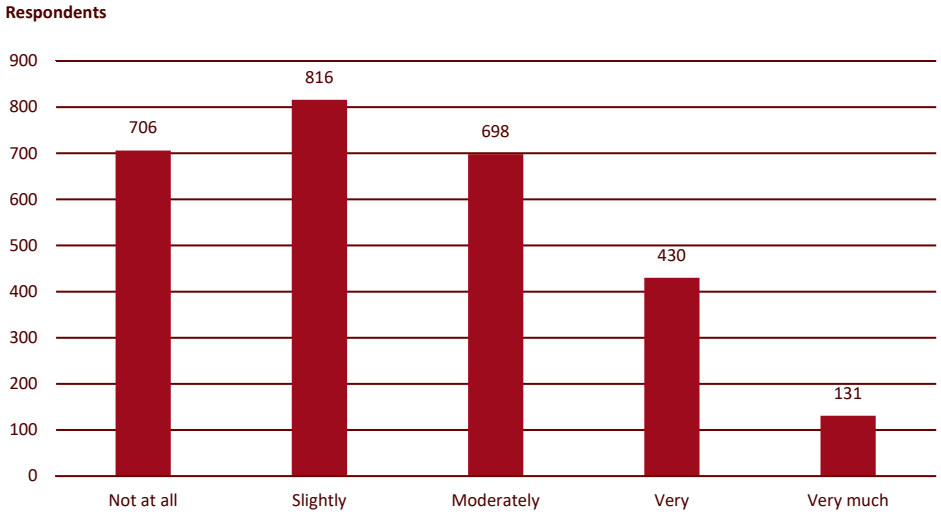
Figure 6.56 **Question 56. Entertaining and fun things keep me from getting work done.**



Note: Self-control question 4. This figure shows to what extent the respondents allowed entertaining and fun things to keep them from getting work done (N = 2,781).

Source: DCCA Survey, 2023

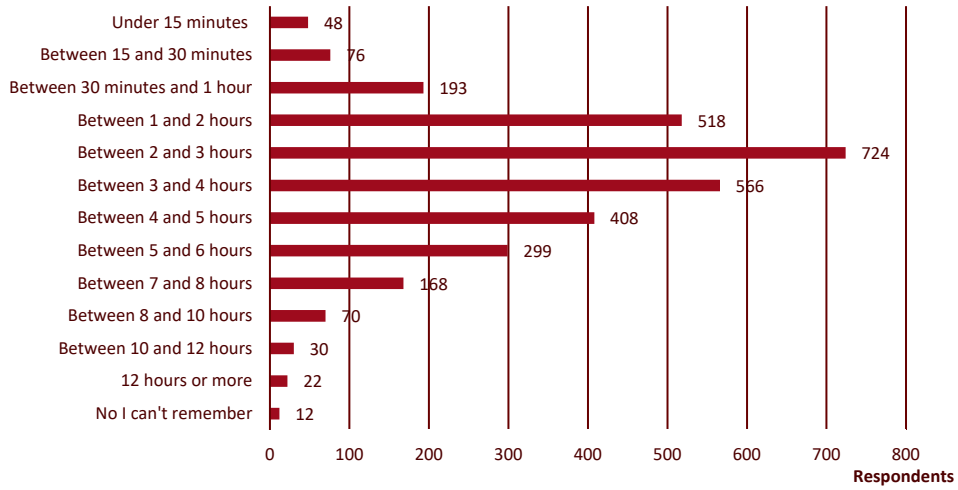
Figure 6.57 **Question 57. I may do certain things that are bad for me if they are fun.**



Note: Self-control question 5. This figure shows the respondents' extent of doing things that are bad for them if these things are fun (N = 2,781).

Source: DCCA Survey, 2023

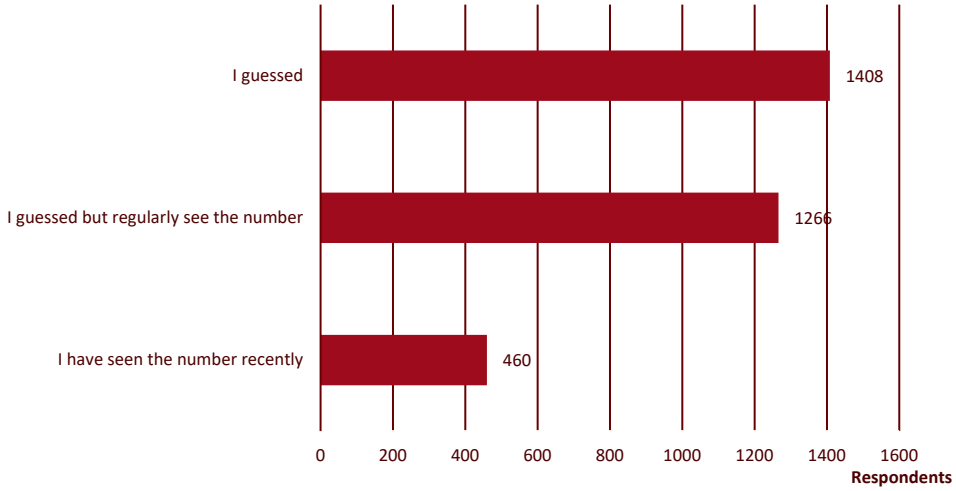
Figure 6.58 **Question 58. What is your estimated time spent daily on all social media platforms combined?**



Note: The figure shows the respondents' estimated time (in ranges) spent daily on social media (N = 3,134). The full introduction text for this question was "What is your estimated time spent daily on all social media platforms combined? It doesn't matter if the number is not accurate; you just need to write down what you think. (You should just guess and thus should not check on your phone.)." Note that one interval was missing: Between 6 and 7 hours is missing because of an error in the range provided in the response.

Source: DCCA Survey, 2023

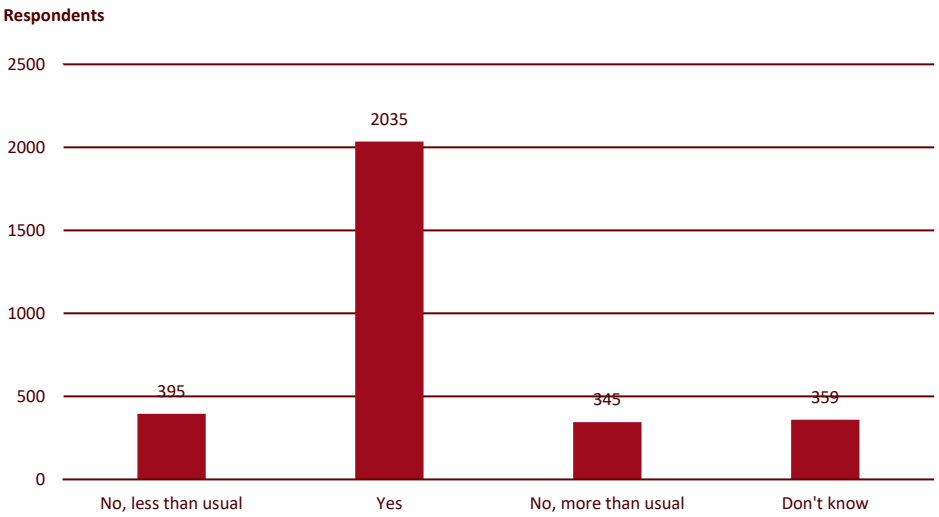
Figure 6.59 **Question 59. How did you reach that number?**



Note: The figure shows how the respondents reached their estimated time of using their phones, which they reported in response to the previous question (N = 3,134). The full response options for this question were "I guessed," "I guessed but have a pretty good idea of the number because I regularly see the number on my phone," and "I knew the number because I saw it recently."

Source: DCCA Survey, 2023

Figure 6.60 **Question 60. Was last week a typical week in terms of using your phone?**



Note: This figure shows whether the respondents reported that last week was a typical week in terms of using their phone (N = 3,134). The full response options for this question were "Yes," "No, I spent less time on social media last week than I usually do," "No, I spent more time on social media last week than I usually do," and "Don't know."

Source: DCCA Survey, 2023

6.3 Appendix 3: Expanded Regression Tables

Appendix 3a: Expanded Regression Tables from Chapter 3

Table 6.1 **Expanded Table A1 - Regression Coefficients - Model 1: Overuse**

Term	Estimate	Std. Error	Statistics	p Value
(Intercept)	0.324	0.055	5.849	< 0.001
Media Type: Content Media	Reference Group			
Media Type: Chat Media	-0.788	0.031	-25.644	< 0.001
Self-control (z-score)	-0.215	0.016	-13.685	< 0.001
Extrinsic Motivation (z-score)	0.296	0.016	18.504	< 0.001
Intrinsic Motivation (z-score)	-0.015	0.015	-0.983	0.326
Males	Reference Group			
Females	0.101	0.031	3.261	0.001
Age	-0.001	0.005	-0.13	0.897
Income: Highest	Reference Group			
Income: Mid-High	-0.004	0.044	-0.1	0.92
Income: Low-Mid	-0.022	0.046	-0.482	0.63
Income: Lowest	0.003	0.05	0.051	0.959
Income: Unknown	-0.329	0.22	-1.497	0.134
Employment Status: Working	Reference Group			
Employment Status: Outside Work	-0.026	0.084	-0.311	0.756
Employment Status: Unknown	0.084	0.141	0.591	0.554
Living Type: Both Parents	Reference Group			
Living Type: Without Parents	0.081	0.054	1.505	0.133
Living Type: Single Parent	0.004	0.044	0.081	0.936
Living Type: Parent & Partner	-0.064	0.064	-0.986	0.324
Ethnic Danes	Reference Group			
Descendants	0.408	0.089	4.568	< 0.001
Immigrants	0.218	0.145	1.504	0.133
Education: Category 3	Reference Group			
Education: Category 2	-0.022	0.038	-0.573	0.567
Education: Category 1	-0.085	0.073	-1.154	0.249
Education: Unknown	0.103	0.205	0.506	0.613
Citizenship: Danish	Reference Group			
Citizenship: Not Danish	-0.039	0.134	-0.294	0.769
Capital	Reference Group			
Zealand	-0.133	0.053	-2.523	0.012
Southern Denmark	-0.107	0.042	-2.525	0.012
Central Jutland	-0.038	0.042	-0.913	0.361
Northern Jutland	-0.085	0.058	-1.452	0.147

Table 6.2 **Expanded Table A2 - Regression Coefficients - Model 2: DTS-PM**

Term	Estimate	Std. Error	Statistics	p Value
(Intercept)	1.08	0.156	6.918	< 0.001
Overuse (z-score)	0.323	0.029	10.971	< 0.001
Media Type: Content Media	Reference Group			
Media Type: Chat Media	-0.255	0.057	-4.439	< 0.001
Self-control (z-score)	-0.02	0.026	-0.766	0.444
Extrinsic Motivation (z-score)	-0.097	0.028	-3.503	< 0.001
Intrinsic Motivation (z-score)	0.161	0.026	6.3	< 0.001
Males	Reference Group			
Females	0.029	0.051	0.563	0.574
Age	0.005	0.009	0.555	0.579
Income: Highest	Reference Group			
Income: Mid-High	-0.047	0.07	-0.669	0.504
Income: Low-Mid	0.207	0.073	2.838	0.005
Income: Lowest	0.081	0.081	1.001	0.317
Income: Unknown	0.19	0.366	0.518	0.605
Employment Status: Working	Reference Group			
Employment Status: Outside Work	0.139	0.158	0.881	0.378
Employment Status: Unknown	0.069	0.293	0.234	0.815
Living Type: Both Parents	Reference Group			
Living Type: Without Parents	-0.307	0.091	-3.38	0.001
Living Type: Single Parent	0.002	0.071	0.024	0.981
Living Type: Parent & Partner	0.062	0.11	0.56	0.575
Ethnic Danes	Reference Group			
Descendants	0.09	0.174	0.518	0.604
Immigrants	0.004	0.258	0.014	0.989
Education: Category 3	Reference Group			
Education: Category 2	0.073	0.061	1.206	0.228
Education: Category 1	0.27	0.123	2.192	0.028
Education: Unknown	0.079	0.353	0.225	0.822
Citizenship: Danish	Reference Group			
Citizenship: Not Danish	0.199	0.24	0.827	0.408
Capital	Reference Group			
Zealand	-0.038	0.083	-0.454	0.650
Southern Denmark	-0.032	0.07	-0.463	0.643
Central Jutland	-0.086	0.067	-1.28	0.201
Northern Jutland	-0.024	0.099	-0.242	0.809

Table 6.3 **Expanded Table A3 - Regression Coefficients - Model 3: Social Media Addiction**

Term	Estimate	Std. Error	Statistics	p Value
(Intercept)	-0.334	0.109	-3.07	0.002
Self-control (z-score)	-0.406	0.017	-24.257	< 0.001
Males	Reference Group			
Females	0.519	0.033	15.607	< 0.001
Age	0.005	0.006	0.893	0.372
Income: Highest	Reference Group			
Income: Mid-High	-0.016	0.049	-0.326	0.745
Income: Low-Mid	-0.012	0.05	-0.246	0.806
Income: Lowest	-0.082	0.055	-1.504	0.133
Income: Unknown	-0.56	0.239	-2.341	0.019
Employment Status: Working	Reference Group			
Employment Status: Outside Work	-0.061	0.091	-0.668	0.504
Employment Status: Unknown	0.252	0.153	1.645	0.100
Living Type: Both Parents	Reference Group			
Living Type: Without Parents	-0.065	0.059	-1.103	0.270
Living Type: Single Parent	-0.017	0.049	-0.357	0.721
Living Type: Parent & Partner	0.032	0.07	0.453	0.650
Ethnic Danes	Reference Group			
Descendants	0.353	0.096	3.669	< 0.001
Immigrants	0.376	0.158	2.382	0.017
Education: Category 3	Reference Group			
Education: Category 2	0.045	0.042	1.073	0.283
Education: Category 1	0.164	0.079	2.089	0.037
Education: Unknown	0.389	0.225	1.727	0.084
Citizenship: Danish	Reference Group			
Citizenship: Not Danish	-0.02	0.149	-0.134	0.893
Capital	Reference Group			
Zealand	-0.148	0.058	-2.557	0.011
Southern Denmark	-0.033	0.046	-0.722	0.470
Central Jutland	-0.135	0.045	-2.972	0.003
Northern Jutland	-0.19	0.065	-2.938	0.003

Table 6.4 **Expanded Table A4 - Regression Coefficients – Model 4: Daily Time Spent**

Term	Estimate	Std. Error	Statistics	p Value
(Intercept)	2.529	0.278	9.101	< 0.001
Addiction (z-score)	0.231	0.046	5.054	< 0.001
Self-control (z-score)	-0.166	0.044	-3.751	< 0.001
Males	Reference Group			
Females	0.409	0.085	4.827	< 0.001
Age	-0.014	0.016	-0.872	0.383
Income: Highest	Reference Group			
Income: Mid-High	0	0.113	0.001	0.999
Income: Low-Mid	0.157	0.118	1.327	0.185
Income: Lowest	0.136	0.131	1.035	0.301
Income: Unknown	0.125	0.589	0.212	0.832
Employment Status: Working	Reference Group			
Employment Status: Outside Work	0.411	0.257	1.602	0.109
Employment Status: Unknown	-0.399	0.501	-0.796	0.426
Living Type: Both Parents	Reference Group			
Living Type: Without Parents	-0.576	0.146	-3.942	< 0.001
Living Type: Single Parent	0.132	0.116	1.136	0.256
Living Type: Parent & Partner	0.211	0.17	1.243	0.214
Ethnic Danes	Reference Group			
Descendants	0.674	0.281	2.396	0.017
Immigrants	0.62	0.432	1.437	0.151
Education: Category 3	Reference Group			
Education: Category 2	0.441	0.098	4.482	< 0.001
Education: Category 1	1.118	0.201	5.569	< 0.001
Education: Unknown	0.85	0.605	1.405	0.160
Citizenship: Danish	Reference Group			
Citizenship: Not Danish	-0.163	0.399	-0.409	0.683
Capital	Reference Group			
Zealand	-0.074	0.136	-0.543	0.587
Southern Denmark	0.024	0.112	0.219	0.827
Central Jutland	-0.104	0.11	-0.953	0.341
Northern Jutland	-0.003	0.164	-0.021	0.983

Table 6.5 **Expanded Table A5 - Regression Coefficients - Model 4: Daily Time Spent with Child-Parent Pairs**

Term	Estimate	Std. Error	Statistics	p Value
(Intercept)	-3.069	0.467	-6.57	< 0.001
Parent DTS	0.294	0.085	3.445	0.001
Self-control (z-score)	-0.061	0.071	-0.854	0.394
Males (Children)	Reference Group			
Females (Children)	0.399	0.145	2.757	0.006
Males (Parents)	Reference Group			
Females (Parents)	0.185	0.156	1.192	0.234
Age	0.334	0.028	12.021	< 0.001
Income: Highest	Reference Group			
Income: Mid-High	-0.045	0.178	-0.252	0.801
Income: Low-Mid	0.262	0.21	1.246	0.213
Income: Lowest	-0.038	0.283	-0.134	0.894
Employment Status: Working	Reference Group			
Employment Status: Outside Work	1.475	0.75	1.968	0.05
Employment Status: Unknown	-1.626	0.921	-1.765	0.078
Living Type: Both Parents	Reference Group			
Living Type: Without Parents	1.938	1.13	1.715	0.087
Living Type: Single Parent	0.315	0.187	1.689	0.092
Living Type: Parent & Partner	-0.014	0.294	-0.046	0.963
Ethnic Danes	Reference Group			
Descendants	0.356	0.509	0.7	0.484
Immigrants	0.148	1.212	0.122	0.903
Education: Category 3	Reference Group			
Education: Category 2	0.346	0.166	2.081	0.038
Education: Category 1	1.646	0.457	3.603	< 0.001
Citizenship: Danish	Reference Group			
Citizenship: Not Danish	-0.494	1.091	-0.453	0.651
Capital	Reference Group			
Zealand	-0.35	0.251	-1.397	0.163
Southern Denmark	-0.198	0.194	-1.025	0.306
Central Jutland	-0.083	0.201	-0.412	0.680
Northern Jutland	-0.296	0.3	-0.986	0.325

Table 6.6 **Expanded Table A6 - Coefficient Estimates - Model 5: Well-being**

Term	Estimate	Std. Error	Statistics	p Value
(Intercept)	1.511	0.16	9.473	< 0.001
DTS	0.11	0.039	2.843	0.005
DTS2	-0.016	0.005	-3.112	0.002
Addiction (z-score)	-0.213	0.025	-8.372	< 0.001
Self-control (z-score)	0.223	0.024	9.129	< 0.001
Males (Children)	Reference Group			
Females (Children)	-0.352	0.047	-7.504	< 0.001
Age	-0.073	0.009	-8.46	< 0.001
Income: Highest	Reference Group			
Income: Mid-High	-0.015	0.062	-0.241	0.809
Income: Low-Mid	0.047	0.065	0.714	0.475
Income: Lowest	-0.078	0.072	-1.088	0.277
Income: Unknown	-0.308	0.324	-0.95	0.342
Employment Status: Working	Reference Group			
Employment Status: Outside Work	-0.019	0.142	-0.136	0.892
Employment Status: Unknown	0.289	0.276	1.05	0.294
Living Type: Both Parents	Reference Group			
Living Type: Without Parents	0.134	0.081	1.659	0.097
Living Type: Single Parent	0.004	0.064	0.058	0.954
Living Type: Parent & Partner	-0.047	0.093	-0.506	0.613
Ethnic Danes	Reference Group			
Descendants	0.052	0.155	0.333	0.740
Immigrants	0.069	0.237	0.29	0.772
Education: Category 3	Reference Group			
Education: Category 2	-0.127	0.055	-2.326	0.02
Education: Category 1	-0.341	0.111	-3.057	0.002
Education: Uknown	-0.055	0.333	-0.166	0.868
Citizenship: Danish	Reference Group			
Citizenship: Not Danish	0.115	0.219	0.522	0.602
Capital	Reference Group			
Zealand	-0.153	0.075	-2.047	0.041
Southern Denmark	0.021	0.061	0.337	0.736
Central Jutland	-0.053	0.06	-0.885	0.376
Northern Jutland	-0.1	0.09	-1.111	0.267

Appendix 3b: Expanded Regression Tables from Chapter 5

Table 6.7 **Expanded Table A1 - Coefficients of Chat Media LTE & Age Effects - Well-being**

Term	Estimate	Std. Error	Statistics	p Value
(Intercept)	1.8	0.611	2.948	0.003
Addiction (z-score)	-0.195	0.02	-9.618	< 0.001
Self-control (z-score)	0.239	0.02	12.241	< 0.001
Males	Reference Group			
Females	1.483	0.832	1.782	0.075
Income: Highest	Reference Group			
Income: Mid-High	-0.074	0.051	-1.452	0.147
Income: Low-Mid	-0.051	0.052	-0.973	0.330
Income: Lowest	-0.192	0.058	-3.322	0.001
Income: Unknown	-0.458	0.268	-1.707	0.088
Employment Status: Working	Reference Group			
Employment Status: Outside Work	0.066	0.097	0.677	0.498
Employment Status: Unknown	0.064	0.173	0.37	0.711
Living Type: Both Parents	Reference Group			
Living Type: Without Parents	0.049	0.064	0.76	0.447
Living Type: Single Parent	0.007	0.051	0.129	0.897
Living Type: Parent & Partner	0.034	0.073	0.465	0.642
Ethnic Danes	Reference Group			
Descendants	0.006	0.102	0.063	0.950
Immigrants	-0.037	0.171	-0.214	0.830
Education: Category 3	Reference Group			
Education: Category 2	-0.062	0.043	-1.427	0.154
Education: Category 1	-0.163	0.083	-1.962	0.050
Education: Unknown	0.277	0.251	1.102	0.271
Citizenship: Danish	Reference Group			
Citizenship: Not Danish	0.064	0.159	0.406	0.685
Capital	Reference Group			
Zealand	-0.042	0.06	-0.703	0.482
Southern Denmark	0.131	0.049	2.699	0.007
Central Jutland	0.045	0.048	0.943	0.346
Northern Jutland	-0.068	0.068	-0.995	0.320
Chat Exposure: Male	-0.059	0.043	-1.382	0.167
Chat Exposure: Female	-0.047	0.043	-1.094	0.274
Chat Exposure^2: Male	0.007	0.003	2.138	0.033
Chat Exposure^2: Female	0.003	0.003	0.889	0.374

Survey Age: Male	-0.084	0.074	-1.138	0.255
Survey Age: Female	-0.309	0.074	-4.188	< 0.001
Survey Age²: Male	0	0.002	0.007	0.995
Survey Age²: Female	0.007	0.002	3.325	0.001

Table 6.8 **Expanded Table A2 - Coefficients of Content Media LTE & Age Effects - Well-being**

Term	Estimate	Std. Error	Statistics	p Value
(Intercept)	2.708	0.622	4.354	< 0.001
Addiction (z-score)	-0.195	0.021	-9.261	< 0.001
Self-control (z-score)	0.222	0.02	10.88	< 0.001
Males	Reference Group			
Females	0.105	0.824	0.127	0.899
Income: Highest	Reference Group			
Income: Mid-High	-0.058	0.053	-1.083	0.279
Income: Low-Mid	-0.024	0.055	-0.432	0.666
Income: Lowest	-0.15	0.06	-2.478	0.013
Income: Unknown	-0.237	0.281	-0.845	0.398
Employment Status: Working	Reference Group			
Employment Status: Outside Work	0.111	0.103	1.078	0.281
Employment Status: Unknown	-0.126	0.181	-0.699	0.485
Living Type: Both Parents	Reference Group			
Living Type: Without Parents	0.024	0.067	0.355	0.723
Living Type: Single Parent	0.032	0.053	0.596	0.551
Living Type: Parent & Partner	0.053	0.076	0.693	0.488
Ethnic Danes	Reference Group			
Descendants	0.086	0.108	0.799	0.425
Immigrants	0.063	0.174	0.362	0.717
Education: Category 3	Reference Group			
Education: Category 2	-0.085	0.046	-1.855	0.064
Education: Category 1	-0.266	0.089	-2.988	0.003
Education: Unknown	0.226	0.272	0.833	0.405
Citizenship: Danish	Reference Group			
Citizenship: Not Danish	0.029	0.165	0.178	0.858
Capital	Reference Group			
Zealand	-0.003	0.064	-0.049	0.961
Southern Denmark	0.175	0.051	3.425	0.001
Central Jutland	0.107	0.05	2.135	0.033

Northern Jutland	0.006	0.072	0.085	0.932
Content Exposure: Male	0.044	0.041	1.063	0.288
Content Exposure: Female	-0.095	0.039	-2.408	0.016
Content Exposure^2: Male	-0.003	0.003	-1.041	0.298
Content Exposure^2: Female	0.008	0.003	2.366	0.018
Survey Age: Male	-0.223	0.072	-3.097	0.002
Survey Age: Female	-0.245	0.068	-3.624	< 0.001
Survey Age^2: Male	0.004	0.002	2.187	0.029
Survey Age^2: Female	0.005	0.002	2.694	0.007

Table 6.9 **Expanded Table A3 - Coefficients of Smartphone LTE & Age Effects - Well-being**

Term	Estimate	Std. Error	Statistics	p Value
(Intercept)	1.981	0.535	3.704	< 0.001
Addiction (z-score)	-0.178	0.019	-9.222	< 0.001
Self-control (z-score)	0.23	0.019	12.32	< 0.001
Males	Reference Group			
Females	0.796	0.716	1.112	0.266
Income: Highest	Reference Group			
Income: Mid-High	-0.074	0.049	-1.507	0.132
Income: Low-Mid	-0.056	0.05	-1.118	0.264
Income: Lowest	-0.207	0.055	-3.748	< 0.001
Income: Unknown	-0.457	0.244	-1.87	0.062
Employment Status: Working	Reference Group			
Employment Status: Outside Work	0.01	0.094	0.111	0.911
Employment Status: Unknown	-0.053	0.158	-0.338	0.735
Living Type: Both Parents	Reference Group			
Living Type: Without Parents	0.041	0.061	0.663	0.508
Living Type: Single Parent	-0.014	0.048	-0.293	0.77
Living Type: Parent & Partner	0.041	0.069	0.585	0.559
Ethnic Danes	Reference Group			
Descendants	0.019	0.096	0.194	0.846
Immigrants	0.036	0.162	0.222	0.825
Education: Category 3	Reference Group			
Education: Category 2	-0.057	0.042	-1.369	0.171
Education: Category 1	-0.116	0.08	-1.454	0.146
Education: Unknown	0.334	0.227	1.466	0.143
Citizenship: Danish	Reference Group			
Citizenship: Not Danish	0.021	0.152	0.14	0.889

Capital	Reference Group			
Zealand	-0.06	0.058	-1.033	0.302
Southern Denmark	0.121	0.046	2.599	0.009
Central Jutland	0.067	0.046	1.459	0.145
Northern Jutland	-0.014	0.066	-0.212	0.832
Phone Exposure: Male	-0.074	0.03	-2.463	0.014
Phone Exposure: Female	-0.103	0.032	-3.276	0.001
Phone Exposure^2: Male	0.004	0.002	2.287	0.022
Phone Exposure^2: Female	0.006	0.002	3.057	0.002
Survey Age: Male	-0.104	0.064	-1.622	0.105
Survey Age: Female	-0.218	0.061	-3.595	< 0.001
Survey Age^2: Male	0.001	0.002	0.67	0.503
Survey Age^2: Female	0.004	0.002	2.556	0.011

Table 6.10 **Expanded Table A4 - Coefficients of Chat Media LTE & Age Effects - Social Media Addiction**

Term	Estimate	Std. Error	Statistics	p Value
(Intercept)	-1.248	0.621	-2.009	0.045
Self-control (z-score)	-0.406	0.018	-22.504	0
Males	Reference Group			
Females	-0.272	0.847	-0.321	0.748
Income: Highest	Reference Group			
Income: Mid-High	-0.008	0.052	-0.156	0.876
Income: Low-Mid	-0.019	0.053	-0.364	0.716
Income: Lowest	-0.056	0.059	-0.956	0.339
Income: Unknown	-0.405	0.273	-1.481	0.139
Employment Status: Working	Reference Group			
Employment Status: Outside Work	-0.142	0.099	-1.44	0.15
Employment Status: Unknown	0.15	0.176	0.852	0.394
Living Type: Both Parents	Reference Group			
Living Type: Without Parents	0.013	0.065	0.191	0.848
Living Type: Single Parent	-0.031	0.051	-0.599	0.549
Living Type: Parent & Partner	0.005	0.074	0.064	0.949
Ethnic Danes	Reference Group			
Descendants	0.355	0.104	3.416	0.001
Immigrants	0.483	0.174	2.781	0.005
Education: Category 3	Reference Group			
Education: Category 2	0.031	0.044	0.697	0.486
Education: Category 1	0.072	0.085	0.855	0.393

Education: Unknown	0.125	0.256	0.488	0.625
Citizenship: Danish	Reference Group			
Citizenship: Not Danish	-0.016	0.162	-0.101	0.919
Capital	Reference Group			
Zealand	-0.105	0.061	-1.714	0.087
Southern Denmark	-0.03	0.05	-0.597	0.551
Central Jutland	-0.138	0.049	-2.816	0.005
Northern Jutland	-0.173	0.07	-2.486	0.013
Chat Exposure: Male	-0.032	0.043	-0.749	0.454
Chat Exposure: Female	0.068	0.044	1.539	0.124
Chat Exposure^2: Male	0.005	0.003	1.44	0.15
Chat Exposure^2: Female	-0.005	0.003	-1.569	0.117
Survey Age: Male	0.129	0.075	1.706	0.088
Survey Age: Female	0.186	0.075	2.477	0.013
Survey Age^2: Male	-0.004	0.002	-1.894	0.058
Survey Age^2: Female	-0.005	0.002	-2.391	0.017

Table 6.11 **Expanded Table A5 - Coefficients of Content Media LTE & Age Effects - Social Media Addiction**

Term	Estimate	Std. Error	Statistics	p Value
(Intercept)	-0.746	0.634	-1.177	0.239
Self-control (z-score)	-0.406	0.019	-21.538	0
Males	Reference Group			
Females	-0.799	0.84	-0.952	0.341
Income: Highest	Reference Group			
Income: Mid-High	-0.011	0.054	-0.212	0.833
Income: Low-Mid	-0.015	0.056	-0.27	0.787
Income: Lowest	-0.083	0.062	-1.339	0.181
Income: Unknown	-0.251	0.286	-0.877	0.381
Employment Status: Working	Reference Group			
Employment Status: Outside Work	-0.039	0.105	-0.371	0.711
Employment Status: Unknown	0.194	0.184	1.05	0.294
Living Type: Both Parents	Reference Group			
Living Type: Without Parents	0.034	0.068	0.495	0.62
Living Type: Single Parent	-0.006	0.054	-0.118	0.906
Living Type: Parent & Partner	0.037	0.078	0.474	0.636
Ethnic Danes	Reference Group			
Descendants	0.336	0.11	3.055	0.002

Immigrants	0.361	0.178	2.034	0.042
Education: Category 3	Reference Group			
Education: Category 2	0.021	0.047	0.451	0.652
Education: Category 1	0.073	0.091	0.808	0.419
Education: Unknown	0.028	0.277	0.101	0.92
Citizenship: Danish	Reference Group			
Citizenship: Not Danish	0.072	0.168	0.429	0.668
Capital	Reference Group			
Zealand	-0.125	0.065	-1.921	0.055
Southern Denmark	-0.03	0.052	-0.577	0.564
Central Jutland	-0.161	0.051	-3.151	0.002
Northern Jutland	-0.182	0.073	-2.491	0.013
Content Exposure: Male	0.023	0.042	0.549	0.583
Content Exposure: Female	0.062	0.04	1.531	0.126
Content Exposure^2: Male	-0.002	0.003	-0.453	0.65
Content Exposure^2: Female	-0.003	0.003	-1.046	0.296
Survey Age: Male	0.054	0.073	0.742	0.458
Survey Age: Female	0.195	0.069	2.838	0.005
Survey Age^2: Male	-0.002	0.002	-0.799	0.424
Survey Age^2: Female	-0.006	0.002	-3.001	0.003

Table 6.12 **Expanded Table A6 - Coefficients of Smartphone LTE & Age Effects - Social Media Addiction**

Term	Estimate	Std. Error	Statistics	p Value
(Intercept)	-1.288	0.539	-2.392	0.017
Self-control (z-score)	-0.405	0.017	-23.768	0
Males	Reference Group			
Females	-0.67	0.722	-0.928	0.353
Income: Highest	Reference Group			
Income: Mid-High	-0.006	0.049	-0.132	0.895
Income: Low-Mid	0	0.051	-0.001	0.999
Income: Lowest	-0.039	0.056	-0.693	0.488
Income: Unknown	-0.405	0.246	-1.644	0.1
Employment Status: Working	Reference Group			
Employment Status: Outside Work	-0.068	0.095	-0.724	0.469
Employment Status: Unknown	0.214	0.159	1.342	0.18
Living Type: Both Parents	Reference Group			
Living Type: Without Parents	0.013	0.062	0.216	0.829
Living Type: Single Parent	-0.026	0.049	-0.531	0.596

Living Type: Parent & Partner	0.02	0.07	0.279	0.78
Ethnic Danes	Reference Group			
Descendants	0.324	0.097	3.353	0.001
Immigrants	0.336	0.163	2.06	0.04
Education: Category 3	Reference Group			
Education: Category 2	0.032	0.042	0.762	0.446
Education: Category 1	0.13	0.081	1.607	0.108
Education: Unknown	0.237	0.229	1.032	0.302
Citizenship: Danish	Reference Group			
Citizenship: Not Danish	-0.005	0.153	-0.032	0.975
Capital	Reference Group			
Zealand	-0.127	0.059	-2.159	0.031
Southern Denmark	-0.024	0.047	-0.521	0.602
Central Jutland	-0.129	0.046	-2.809	0.005
Northern Jutland	-0.152	0.066	-2.287	0.022
Phone Exposure: Male	-0.058	0.03	-1.912	0.056
Phone Exposure: Female	0.04	0.032	1.274	0.203
Phone Exposure^2: Male	0.004	0.002	1.883	0.06
Phone Exposure^2: Female	-0.002	0.002	-0.997	0.319
Survey Age: Male	0.138	0.065	2.131	0.033
Survey Age: Female	0.241	0.061	3.954	0
Survey Age^2: Male	-0.004	0.002	-2.111	0.035
Survey Age^2: Female	-0.007	0.002	-4.057	0

Table 6.13 **Expanded Table A7 - Coefficients of the Smartphone LTS Model**

	Smartphone Exposure			
Term	**Estimate**	**Std. Error**	**Statistics**	**p Value**
(Intercept)	0.94	0.385	2.44	0.015
Males	Reference Group			
Females	0.36	0.373	0.965	0.335
Income: Highest	Reference Group			
Income: Mid-High	-0.122	0.05	-2.437	0.015
Income: Low-Mid	-0.083	0.053	-1.556	0.12
Income: Lowest	-0.11	0.06	-1.829	0.068
Income: Unknown	-1.029	0.656	-1.568	0.117
Employment Status: Working	Reference Group			
Employment Status: Outside Work	-0.12	0.099	-1.208	0.227
Employment Status: Unknown	0.155	0.193	0.805	0.421

Living Type: Both Parents	Reference Group			
Living Type: Without Parents	-0.208	0.072	-2.909	0.004
Living Type: Single Parent	-0.145	0.047	-3.114	0.002
Living Type: Parent & Partner	-0.124	0.07	-1.784	0.075
Ethnic Danes	Reference Group			
Descendants	-0.171	0.104	-1.649	0.099
Immigrants	-0.147	0.171	-0.861	0.39
Education: Category 3	Reference Group			
Education: Category 2	-0.122	0.043	-2.861	0.004
Education: Category 1	-0.058	0.088	-0.66	0.509
Education: Unknown	0.01	0.419	0.025	0.98
Citizenship: Danish	Reference Group			
Citizenship: Not Danish	0.24	0.152	1.581	0.114
Capital	Reference Group			
Zealand	-0.026	0.063	-0.422	0.673
Southern Denmark	0.138	0.049	2.796	0.005
Central Jutland	0.073	0.048	1.518	0.129
Northern Jutland	0.175	0.069	2.554	0.011
Education Level: 0-3rd Grade	Reference Group			
Education Level: 4-9th Grade	0.336	0.039	8.631	0
Education Level: Secondary Education	0.771	0.082	9.442	0
Test Year	-0.07	0.009	-7.933	0
Age (Male)	-0.002	0.048	-0.046	0.963
Age (Female)	-0.057	0.049	-1.166	0.244
Age^2 (Male)	-0.003	0.002	-1.525	0.127
Age^2 (Female)	0.001	0.002	0.266	0.79
Pre-Content (Male)	Reference Group			
Post-Content (Male)	0.012	0.059	0.2	0.842
Pre-Content (Female)	Reference Group			
Post-Content (Female)	-0.043	0.05	-0.866	0.387
Content Exposure - Pre-Content (Male)	0.051	0.03	1.702	0.089
Content Exposure - Post-Content (Male)	-0.059	0.032	-1.852	0.064
Content Exposure - Pre-Content (Female)	-0.003	0.028	-0.092	0.926
Content Exposure - Post-Content (Female)	-0.018	0.029	-0.619	0.536

Table 6.14 **Expanded Table A8 - Random Effect Components of the Smartphone LTS Model**

Random Effect Component	Estimate
SD of Intercept (child_id)	0.061
Cor(Intercept, Smartphone Acquisition)	-0.252
SD Smartphone Acquisition	0.363
SD Smartphone Exposure	0.065
SD of Residual	0.672

Table 6.15 **Expanded Table A9 - Coefficients of the Chat Media LTS Model**

	Chat Media Exposure			
Term	**Estimate**	**Std. Error**	**Statistics**	**p Value**
(Intercept)	0.614	0.372	1.648	0.099
Males	Reference Group			
Females	0.248	0.476	0.521	0.602
Income: Highest	Reference Group			
Income: Mid-High	-0.123	0.053	-2.306	0.021
Income: Low-Mid	-0.07	0.057	-1.244	0.214
Income: Lowest	-0.136	0.065	-2.08	0.038
Income: Unknown	-0.613	1.091	-0.562	0.574
Employment Status: Working	Reference Group			
Employment Status: Outside Work	-0.207	0.114	-1.827	0.068
Employment Status: Unknown	0.124	0.22	0.564	0.573
Living Type: Both Parents	Reference Group			
Living Type: Without Parents	-0.156	0.075	-2.068	0.039
Living Type: Single Parent	-0.177	0.05	-3.515	0
Living Type: Parent & Partner	-0.08	0.075	-1.068	0.286
Ethnic Danes	Reference Group			
Descendants	-0.168	0.117	-1.432	0.152
Immigrants	-0.173	0.199	-0.867	0.386
Education: Category 3	Reference Group			
Education: Category 2	-0.146	0.046	-3.174	0.002
Education: Category 1	-0.058	0.098	-0.593	0.553
Education: Unknown	-0.075	0.43	-0.174	0.862
Citizenship: Danish	Reference Group			
Citizenship: Not Danish	0.28	0.182	1.534	0.125
Capital	Reference Group			

Zealand	-0.067	0.067	-0.992	0.321
Southern Denmark	0.134	0.053	2.511	0.012
Central Jutland	0.068	0.052	1.304	0.192
Northern Jutland	0.126	0.075	1.685	0.092
Education Level: 0-3rd Grade	Reference Group			
Education Level: 4-9th Grade	0.343	0.041	8.404	0
Education Level: Secondary Education	0.849	0.085	9.942	0
Test Year	-0.066	0.011	-6.048	0
Age (Male)	-0.004	0.056	-0.067	0.946
Age (Female)	-0.037	0.056	-0.671	0.502
Age^2 (Male)	-0.004	0.002	-1.734	0.083
Age^2 (Female)	-0.002	0.002	-0.8	0.424
Pre-Chat (Male)	Reference Group			
Post-Chat (Male)	0.076	0.056	1.348	0.178
Pre-Chat (Female)	Reference Group			
Post-Chat (Female)	-0.13	0.053	-2.473	0.013
Chat Exposure - Pre-Chat (Male)	0.007	0.032	0.21	0.834
Chat Exposure - Post-Chat (Male)	0.024	0.033	0.728	0.467
Chat Exposure - Pre-Chat (Female)	0.039	0.032	1.219	0.223
Chat Exposure - Post-Chat (Female)	-0.049	0.032	-1.517	0.129

Table 6.16 **Expanded Table A10 - Random Effect Components of the Chat Media LTS Model**

Random Effect Component	Estimate
SD of Intercept (child_id)	0.69
Cor(Intercept, Chat Acquisition)	-0.273
SD Chat Acquisition	0.432
SD Chat Exposure	0.086
SD of Residual	0.648

Table 6.17 **Expanded Table A11 - Coefficients of the Content Media LTS Model**

	Content Media Exposure			
Term	**Estimate**	**Std. Error**	**Statistics**	**p Value**
(Intercept)	0.94	0.385	2.44	0.015
Males	Reference Group			
Females	-0.346	0.482	-0.718	0.473
Income: Highest	Reference Group			
Income: Mid-High	-0.151	0.056	-2.7	0.007
Income: Low-Mid	-0.102	0.06	-1.696	0.09
Income: Lowest	-0.139	0.069	-2.007	0.045
Income: Unknown	-1.506	0.956	-1.575	0.116
Employment Status: Working	Reference Group			
Employment Status: Outside Work	-0.221	0.119	-1.847	0.065
Employment Status: Unknown	0.242	0.258	0.937	0.349
Living Type: Both Parents	Reference Group			
Living Type: Without Parents	-0.187	0.079	-2.373	0.018
Living Type: Single Parent	-0.186	0.054	-3.47	0.001
Living Type: Parent & Partner	-0.131	0.078	-1.677	0.094
Ethnic Danes	Reference Group			
Descendants	-0.094	0.129	-0.725	0.468
Immigrants	-0.161	0.215	-0.75	0.453
Education: Category 3	Reference Group			
Education: Category 2	-0.138	0.049	-2.807	0.005
Education: Category 1	-0.078	0.105	-0.741	0.459
Education: Unknown	0.152	0.65	0.234	0.815
Citizenship: Danish	Reference Group			
Citizenship: Not Danish	0.23	0.197	1.168	0.243
Capital	Reference Group			
Zealand	-0.088	0.073	-1.217	0.224
Southern Denmark	0.148	0.057	2.594	0.01
Central Jutland	0.089	0.054	1.634	0.102
Northern Jutland	0.118	0.08	1.479	0.139
Education Level: 0-3rd Grade	Reference Group			
Education Level: 4-9th Grade	0.312	0.044	7.101	0
Education Level: Secondary Education	0.712	0.089	7.961	0
Test Year	-0.072	0.012	-6.077	0
Age (Male)	-0.051	0.058	-0.887	0.375
Age (Female)	-0.008	0.055	-0.147	0.883
Age^2 (Male)	-0.001	0.002	-0.381	0.703

Age^2 (Female)	-0.002	0.002	-1.047	0.295
Pre-Content (Male)	Reference Group			
Post-Content (Male)	0.012	0.059	0.2	0.842
Pre-Content (Female)	Reference Group			
Post-Content (Female)	-0.043	0.05	-0.866	0.387
Content Exposure - Pre-Content (Male)	0.051	0.03	1.702	0.089
Content Exposure - Post-Content (Male)	-0.059	0.032	-1.852	0.064
Content Exposure - Pre-Content (Female)	-0.003	0.028	-0.092	0.926
Content Exposure - Post-Content (Female)	-0.018	0.029	-0.619	0.536

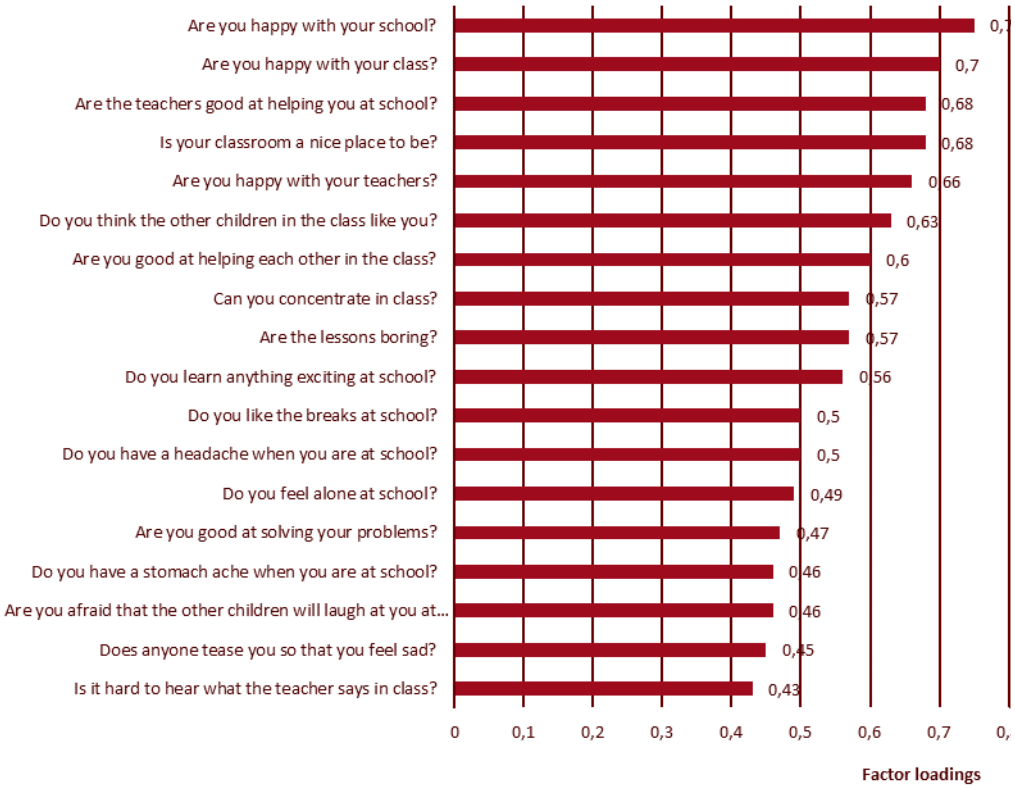
Table 6.18 **Expanded Table A12 Random Effect Components of the Content Media LTS Model**

Random Effect Component	Estimate
SD of Intercept (child_id)	0.674
Cor(Intercept, Content Acquisition)	-0.18
SD Content Acquisition	0.409
SD Content Exposure	0.088
SD of Residual	0.648

6.4 Appendix 4: School Factor Loadings for Well-Being

This appendix shows the factor loadings calculated for the three sets of school well-being questionnaires: 0–3rd grade (between 5 and 10 years old), 4th–9th grade (between 9 and 16 years old), and secondary education (between 15 and 20 years old). Data were provided from the National Agency for IT and Learning (in Danish: STIL) and were linked with the DCCA survey data and demographic information using Denmark's CPR to create a comprehensive measure of student well-being. A polychoric factor analysis with varimax rotation was applied across the three educational stages, with one factor extracted per group.

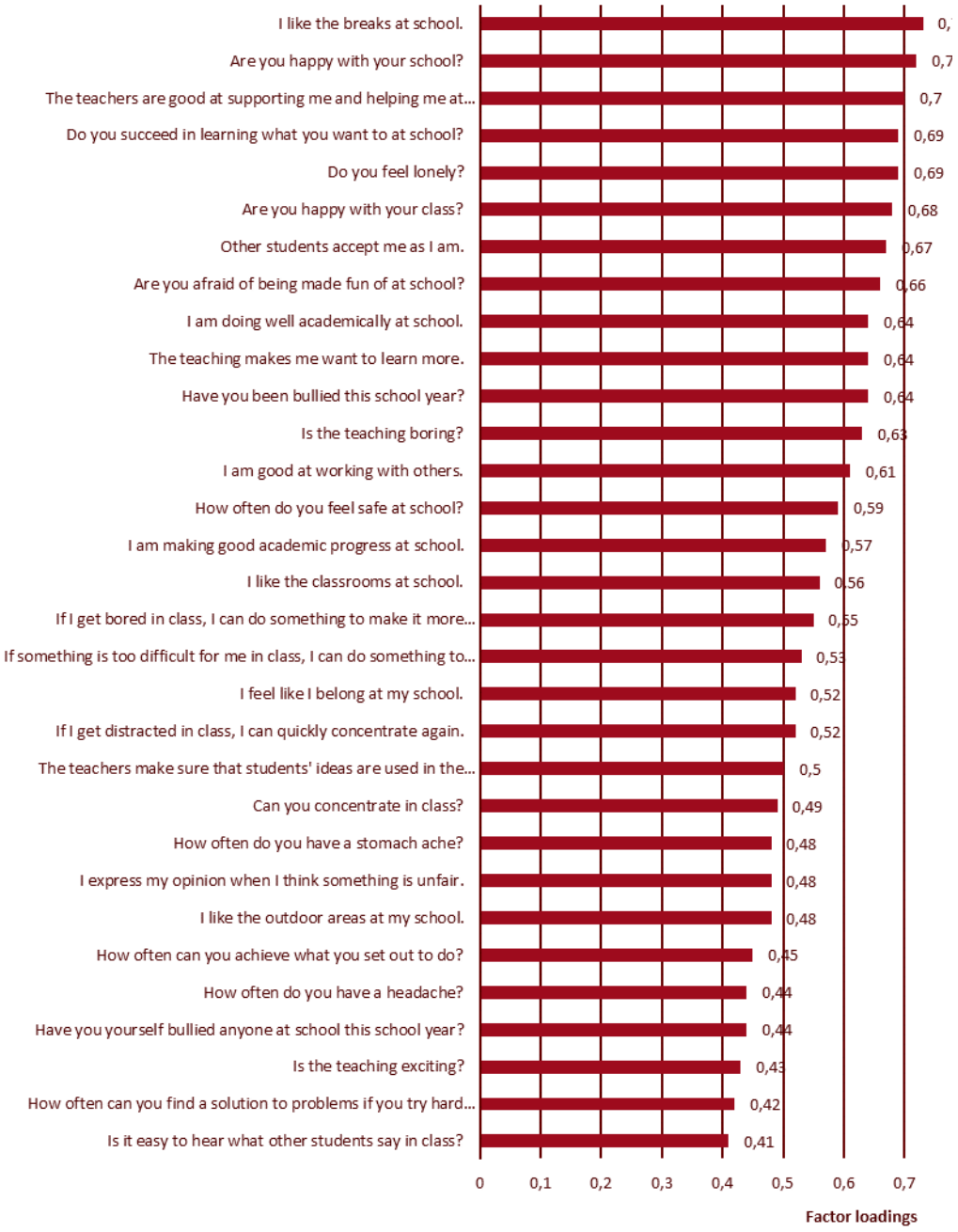
Figure 6.61 **Questions on school well-Being for grades 0 to 3**



Note: This figure shows the list of included questions on school well-being for the zero to 3rd grade dataset. The sample comprised 2,775 entries from the survey participants. Two questions were omitted because the factor loading was too low (0.28–0.32).

Source: STIL, National Agency for IT and Learning

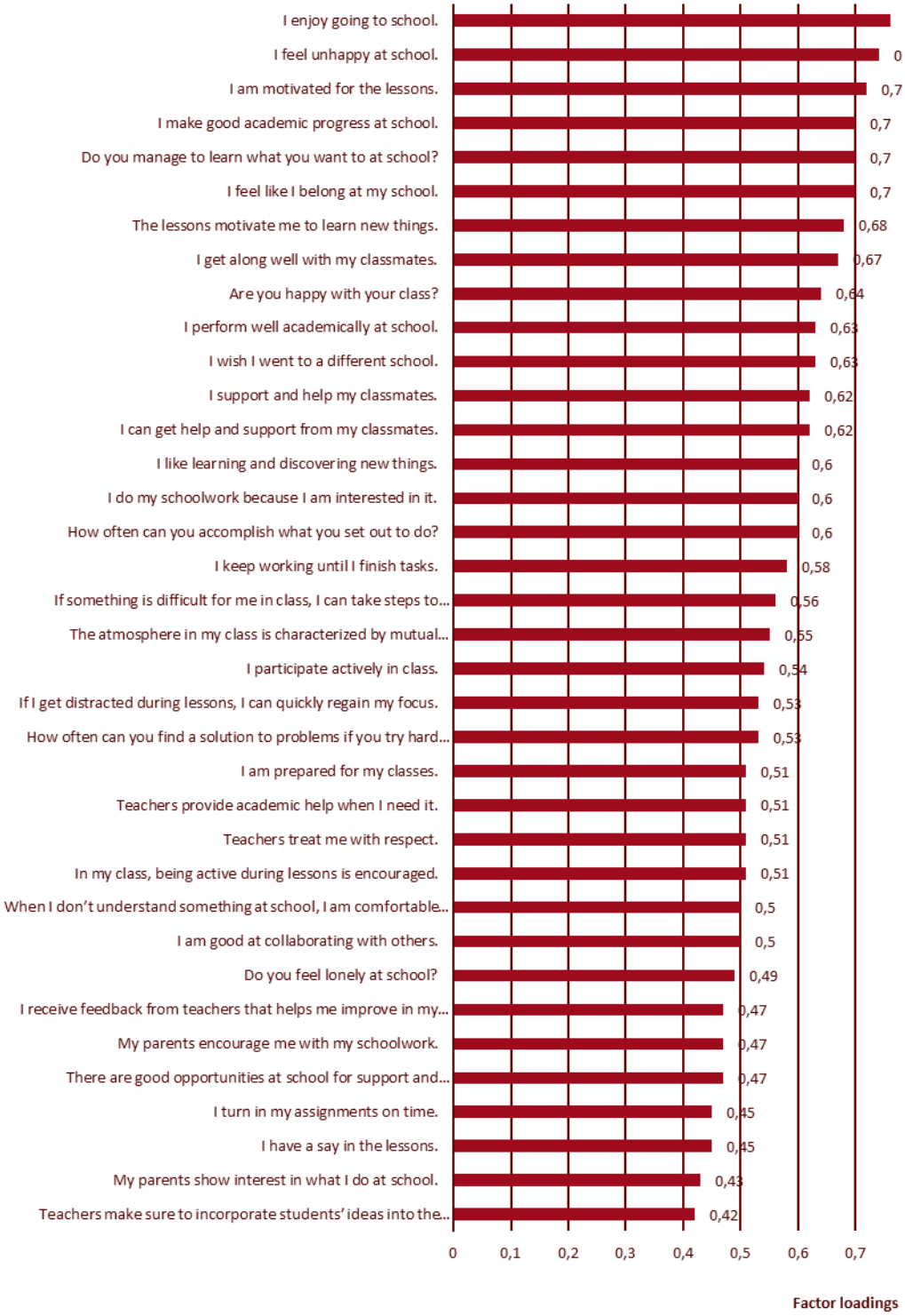
Figure 6.62 **Questions on school well-being for grades 4 to 9**



Note: This figure shows the list of included questions of school well-being for the 4th to 9th grade dataset. The sample comprised 3,443 entries from the survey participants. Nine questions were omitted because of lack of use across response categories (n = 1), extreme median values, and high skewness (n = 2), with a factor loading of <0.4 (n = 5).

Source: National Agency for IT and Learning

Figure 6.63 **Questions on secondary education well-being**



Note: This figure shows the list of included questions on school well-being for the secondary education dataset. The sample comprised 1,625 entries from the survey participants. Five questions were omitted because of the low factor loading of <0.4.

Source: STIL, National Agency for IT and Learning

6.5 Appendix 5: Model Comparison

Understanding Model Comparison Using AIC and Log-Likelihood
The Akaike Information Criterion (AIC) is a statistical tool used to evaluate how well a model fits the data it was generated from. It helps in comparing different models to determine which one provides the best fit for the data, with lower AIC values indicating a better model. The AIC considers both the goodness of fit and the complexity of the model, thus balancing model accuracy and overfitting. In addition to AIC, the log-likelihood measures how well a model explains the observed data, with higher values suggesting a better fit. Comparing nested models using a chi-square test based on the difference in their log-likelihoods helps assess whether adding new terms significantly improves the model's explanatory power.

Smartphone Model Comparison
The comparison between two models - one without smartphone exposure and acquisition terms (Model 1) and another with these terms (Model 2) - demonstrates the importance of incorporating these variables. Model 1, serving as the baseline, has 28 parameters and an AIC of 18245.8. Model 2, which includes smartphone exposure and acquisition interaction terms specific to gender, shows an improved fit with an AIC of 18232.7. The chi-square test ($\chi^2 = 25.1$, $p < 0.001$) confirms the enhanced fit, indicating that these terms significantly contribute to understanding how smartphones impact pupil well-being, even after accounting for age, survey year, demographic factors, and other controls.

Table 6.19 **A4.1: Model Comparison with and without Smartphone Exposure/Acquisition Terms**

Model	Number of Parameters	AIC	Log-Likelihood	Deviance	Chi-Square	Df	P-value
Model 1: Without ITS Terms	33	18245.773	-9089.886	18179.773			
Model 2: With ITS Terms	33	18232.702	-9077.351	18154.702	25.071	6	< 0.001

Chat Media Model Comparison
The analysis of chat media exposure indicates that including gender-specific interaction terms significantly improves model performance. Model 1, without ITS terms, has an AIC of 15613.5, whereas Model 2, which incorporates these terms, shows a lower AIC of 15611.5. The chi-square test ($\chi^2 = 14.034$, $p = 0.029$) demonstrates that these additional terms significantly enhance the model's explanatory power. This suggests that analyzing the interaction between content media exposure and gender provides a deeper understanding of its impact on school well-being.

Table 6.20 **A4.2 Model Comparison with and without Chat Media Exposure/Acquisition Terms**

Model	Number of Parameters	AIC	Log-Likelihood	Deviance	Chi-Square	Df	P-value
Model 1: Without ITS Terms	33	15613.504	-7773.752	15547.504			
Model 2: With ITS Terms	39	15611.47	-7766.735	15533.47	14.034	6	0.029

Chat Media Model Comparison
The comparison for chat media exposure shows that adding interaction terms does not substantially improve the model fit. Model 1 (without ITS terms) and Model 2 (with ITS terms) have similar AICs: 13782.6 and 13786.4, respectively. The chi-square test result ($\chi^2 = 8.215$, $p = 0.223$) suggests that these additional terms do not significantly enhance the explanatory power of the model, indicating that incorporating gender-specific interaction terms for chat media exposure is not necessary in this context.

Table 6.21 **A4.3: Model Comparison with and without Content Media Exposure/Acquisition Terms**

Model	Number of Parameters	AIC	Log-Likelihood	Deviance	Chi-Square	Df	P-value
Model 1: Without ITS Terms	33	13782.631	-6858.316	13716.631			
Model 2: With ITS Terms	39	13786.416	-6854.208	13708.416	8.215	6	0.223

6.6 Appendix 6: Demographic Variables and Well-Being in School

Demographic Variables and Their Effects on School Well-Being
The demographic variables included in the model reveal important trends in school well-being across various factors, particularly in terms of test year, age, and educational level.

Test Year: Decline in School Well-Being Over Time
The models show a general trend of decreasing school well-being over time. This is a consistent negative effect on all three, with estimates of -0.075 and $p < 0.001$, indicating that school well-being decreased over the surveyed years. This pattern aligns with broader observations that school well-being among children has declined in recent years. This decline could reflect increased academic pressures, social dynamics, or external factors that impact youth mental health and satisfaction at school.

Age: Lower Level of School Well-Being Among Older Students
Age also plays a notable role in school well-being across models, with older students generally reporting lower levels of school well-being. In all three models, higher age demonstrates a significant negative impact on school well-being, with estimates of -0.202, -0.182, and -0.27, each with strong statistical significance ($p < 0.001$). This trend might reflect the increased academic and social pressures that often accompany age progression in school, such as preparation for exams, heightened social awareness, and developmental changes.

Educational Level: Higher Level of Well-Being in Middle and Secondary Schools
Educational level had a strong effect on school well-being, with both the 4th to 9th graders and students in secondary education (gymnasium) reporting significantly higher levels of well-being than the youngest students in 0 to 3rd grade. For instance, the estimates for gymnasium range from 0.636 to 0.788 across the models, all with high statistical significance ($p < 0.001$). This might be attributed to the differences in how well-being is measured at different educational levels or to genuine differences in student experiences; thus, controlling for these differences is essential for accurate model interpretation.

Even after accounting for these important demographic controls - age, test year, and educational stage - smartphone exposure and content media acquisition still had an observable effects, particularly for girls. The inclusion of these terms in the models is validated by the model selection process, confirming their importance in explaining school well-being.