CHAPTER 1

Is Leisure Activity Engagement Good for Health? Prevalence in Activities and the Correlation Between Engagement and Mental Health: The Young–HUNT Study, Norway

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Abstract: Today's young people report having poorer mental health and well-being than ever before; this situation indicates that there is a need for creating new knowledge-based preventive public health strategies. Both school and leisure activities are important arenas where young people can experience a sense of well-being and learn essential life skills. This study therefore aims to explore Norwegian adolescents' engagement within a broad spectre of leisure activities over time, studying both gender and age differences in the correlation between their engagement in activities, sense of life satisfaction and feelings of loneliness.

Using cross-sectional data of 25,245 adolescents (ages 13–19) from the Norwegian Young–HUNT Study (1995–2019), our study found that over a span of three decades, participation in leisure activities had changed. For instance, spectator activities, online activities and gaming increased with sex-specific variations; a larger proportion of boys reported gaming than did girls, who generally spent more time online and watching TV. The proportion of adolescents engaged in social activities remained unchanged over time. From 2017 to 2019, leisure activities showed a lower level of engagement in 16–19-year-olds compared to 13–15-year-olds; the exceptions to this were contacting others online, spending time with friends, and attending concerts/going to see movies. Social activities like being at spectator events, having online contact and spending time with friends correlated with higher levels of life satisfaction and less loneliness. Creative and screen–based activities such as gaming and internet usage correlated with lower levels of life satisfaction and more loneliness.

This knowledge is important for professionals who work with adolescents and for public health initiatives to improve adolescents' mental health and well-being.

Keywords: leisure activity, adolescent mental health, loneliness, life satisfaction, public health

1.1 Introduction

A society that facilitates good health choices for individuals is of great importance for public health. "Coping with life at school" has been implemented in Norway as a new interdisciplinary topic in primary and lower secondary education (Core curriculum, 2017), where Norwegian schools are required to facilitate learning within the following three interdisciplinary topics; health and life skills, democracy and citizenship and sustainable development: "The school's interdisciplinary topic health

and life skills shall give the pupils competence which promotes sound physical and mental health, and which provides opportunities for making responsible life choices. In the childhood and adolescent years, the development of a positive self-image and confident identity is particularly important" (Core curriculum, 2020). Coping with life is about being able to both understand and influence factors that are important for managing one's own life. The aim of the interdisciplinary topic is to contribute to pupils' learning how to handle success and adversity as well as personal and practical challenges in the best possible way (Core curriculum, 2017). In the *Norwegian Strategy on Public Health*, it is stated that a governmental measure to support and evaluate the interdisciplinary theme "health and life skills" as a means to even out social differences (White Paper 15, 2023). School is an important arena for learning life skills and implementing universal public health measures. Likewise, leisure time is an important arena for experiencing a sense of well-being and learning life skills. There is a need for updating knowledge related to what takes place during leisure time in the lives of adolescents and how this affects their mental health and well-being.

Leisure time activities comprise social and cultural activities that may be facilitated in everyday life, including performance events that can contribute to societal entertainment, enjoyment and/or recreation (Davies et al., 2016). It is innate to human lifestyle and reflects other important traditions. Although there is no agreement on how to classify leisure activities, "the majority of people would list it as television watching, participating in sports or exercise, reading, seeing movies and so on. It may be defined as a state of mind, meaning engaging in enjoyable or pleasurable activities" (OECD, 2009). A recent article that reviews how leisure activities affect health defines this term as "voluntary, enjoyable non-work activities, such as hobbies, arts, volunteering, community group membership, sports and socialising" (Fancourt & Steptoe, 2021). Furthermore, activities can be categorized into passive or active forms, specified by "receptive" attendance (being an attendee or spectator) or "creative" participation (doing or performing) (Fancourt & Finn, 2019; Løkken, 2023). As such, both physical and social engagement may impact mental health and major chronic diseases in a population (Fancourt &

Finn, 2019). Conversely, a lack of engagement and social behaviour is a predictor of adolescents' negative health (Rew et al., 2013). Research suggests that engagement in the arts is important for mental health and well–being throughout life (Jensen et al., 2020). Further, a recent scoping review shows growing evidence concerning the health benefits of engagement in leisure activities (Fancourt & Finn, 2019). While there is a general agreement that cultural activity among adults affects their mental health and life satisfaction (Cuypers et al., 2012; Fancourt & Finn, 2019), there is less consensus regarding such significance among adolescents.

While it was common only a few decades ago to think of adolescents as healthy and fit both physically and psychologically, it is now widely accepted that many adolescents are struggling mentally (Krokstad et al., 2022; Rangul & Kvaløy, 2020). This situation has also been observed globally (Labs, 2023). Nowadays, mental health problems are common; they can also be a great burden. Adolescence is a critical stage of life (WHO, 2023); indeed, the onset of half of mental health disorders occurs before reaching the age of 14 (Solmi et al., 2022; WHO, 2021b). Elevated levels of psychological problems are common among Norwegian adolescents, and more upper secondary pupils (11^{th}–13^{th} grade) compared to lower secondary pupils (8^{th}–10^{th} grade) experience them (NIPH, 2023). As for mental health problems, there are social gradients across engagement as well (Fancourt & Finn, 2019; NIPH, 2023; WHO, 2021a). Mental health is one of six prioritized areas in a recent Norwegian Public Health White Paper where one of the aims is to reduce low levels of life satisfaction among the population (White Paper 15, 2023). Research shows that social support and social participation have a beneficial effect on people's mental health, coping skills and life satisfaction (Bang Nes & Clench-Aas, 2016). Moreover, loneliness is significant to health and life satisfaction and has been observed as increasing during adolescence (Mahon et al., 2006). The number of pupils who say they are lonely has increased in recent decades both nationally (Rangul & Kvaløy, 2020) and internationally (Twenge et al., 2022).

Based on the assumption that societal engagement improves young people's mental health, and leisure activities can be a stimulus for this improvement, it is important to study adolescents' leisure time activities from a holistic perspective. Knowing what pupils are doing in their

leisure time and how this correlates with their levels of life satisfaction and loneliness is important knowledge for the stakeholders who develop public health strategies in addition to professionals who work with adolescents, including teachers and other adults in charge of extracurricular activities. Currently, while a few epidemiological studies on adolescents (Fancourt & Finn, 2019) have examined the importance of leisure activities, longitudinal follow-up studies are rare.

In order to obtain an overview of the prevalence and distribution of leisure time activities, this chapter summarizes recent estimates of a broad spectre of these activities and explores the correlation with life satisfaction and loneliness. Identifying prevalence and correlates is an important component in public health planning, as it points out the magnitude of problems in populations and focuses on identifying characteristics of those reporting engagement in leisure time activities.

1.2 Material and methods

1.2.1 The study population

Data was obtained from the adolescent section of The Trøndelag Health Study (The HUNT Study), which is a large Norwegian population-based cohort study comprised of observational data gathered from four cross-sectional surveys of the northern part of Trøndelag County (Krokstad et al., 2013; Åsvold et al., 2022). Data has been collected during four consecutive periods of data collection. In the adolescent section (The Young–HUNT Study), all pupils aged 13–19 were invited to participate (Holmen et al., 2014). The present study includes data from: Young–HUNT1 (YH1) collected in 1995–97, Young–HUNT3 (YH3) in 2006–08 and Young–HUNT4 (YH4) in 2017–19. Overall, 25,245 adolescents participated in the study; an overview of this sample is presented in figure 1.

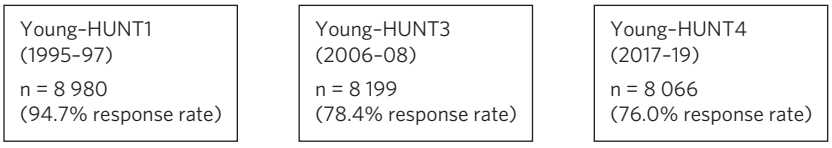

Figure 1. An overview of the The Young-HUNT Study.

Data was collected through a self-reported questionnaire and an interview, both of which included questions concerning socio-demographic characteristics, health behaviours, diseases (both physical and mental), participation in various leisure activities and social relationships. The self-reported collection of a wide range of leisure activities repeated in the same geographically located population, enabled studies of the prevalence of leisure time engagement over time to be performed.

1.2.2 Ethics

This study was approved by the Regional Committees for Medical and Health Research Ethics (REC) in Norway (566344, REK–Nord). Informed written consent was obtained from all adolescents prior to participation. Parents co-signed a consent form for adolescents under the age of 16. Participants could withdraw their personal data from the study at any time.

1.2.3 Exposure variables – leisure time activity measurements

Measurements of leisure time activities vary to some extent in YH1, YH3 and YH4; as a result, the types of activities that are included from these three cross-sectional surveys are presented as supplementary information (Table S1). An overview of the questions and response options regarding "leisure time and friends" from the questionnaire used in the YH4 Survey (2017–19) (translated to English) are presented as supplementary information (Table S2). For further information about the HUNT Study and corresponding data, see www.ntnu.no/hunt.

In YH1 and YH3, participation in leisure activities was assessed by the main question: "How often have you done any of these activities in the past week?" with the frequency response options; "Not once (YH1)/none (YH3)", "Once", "2–3 times" and "4 times or more". These were dichotomized into "never" (Not once/none) and "once a week or more often" (the other response options).

Participation in leisure activities was assessed in YH4 by the main question: "How often have you done any of these activities in the last week?" (Table S2): where the five response options were: "Never," "1–3 times a month or less," "About once a week," "2–3 times a week" and "4 times a week or more." These responses were combined and dichotomized into 'never' ("never" and "1–3 times a month or less") and 'once or more often a week' ("About once a week," "2–3 times a week" and "4 times a week or more"). The other questions asked how much time was spent on "Watch TV/other screen-based devices," "Internet use" and "Electronic games" (Table S2) separately for weekdays and weekends. The response options were: "not at all," "less than half an hour a day," "1/2–1 hour a day," "2–3 hours a day," "4–6 hours a day" and "approx. 7 hours or more a day." The response to the variables measuring time duration in hours was dichotomized into 'one hour or less' ("not at all," "less than half an hour a day," and "1/2–1 hour a day") and 'two hours or more' ("2–3 hours a day," "4–6 hours a day" and "approx. 7 hours or more a day"). Further, these two variables for weekday and weekend were combined into a variable showing the total amount of daily activity. For instance, if both the weekday and weekend scores are "one hour or less per day," then the total is 'one hour or less per day,' and if one or both of them is "two hours or more per day," then the total is 'two hours or more per day'.

Participants who responded to having done any of these activities were then asked to respond to the duration of each activity (Table S1). In YH3, the response options were: "Less than half an hour a day," "1/2–1 hour a day" and "more than one hour." These were dichotomized into: 'never' ("Less than half an hour a day") and 'half an hour or more a day' ("1/2–1 hour a day" and "more than one hour"). In YH4 the response options were: "not at all," "less than half an hour a day," "1/2–1 hour a day," "2–3 hours a day," "4–6 hours a day" and "approx. 7 hours a day." These were dichotomized into: 'never' ("Less than half an hour a day") and 'half an hour or more a day' ("1/2–1 hour a day," "2–3 hours a day," "4–6 hours a day" and "approx. 7 hours a day"). Frequency and duration were combined for a score of hours per day: 'never' (includes "never" on the frequency and duration variable) and 'two hours or more' (the remaining combinations).

Overall, we created 15 different leisure activity categories for prevalence: seven from the YH1 Survey, 13 from the YH3 Survey and 11 from the YH4 Survey (Table S1). Thirteen activity categories were included in the association analysis of the YH4 Survey (Table S2).

1.2.4 Outcome variables – life satisfaction and loneliness

Life satisfaction was measured by the Inventory of Life Quality (ILC–28), an instrument that is based on a Norwegian context. Due to its subjective nature, it is an effective scoring tool (Aanondsen et al., 2021). ILC–28 was operationalized according to Jozefiak et al. (Jozefiak et al., 2008).

Loneliness was assessed by the question: "At school or during your spare time. How often do you feel that you are lonely?". Response alternatives were: "very rarely or never," "rarely," "sometimes," "often" and "very often." These were further dichotomized into: 'not lonely' ("very rarely or never," "rarely," "sometimes") and 'lonely' ("often" and "very often").

1.2.5 Covariates

The following socio-demographic characteristics were considered confounders: age, sex, and socioeconomics – measured by family affluence. Age was categorized into two categories; 13 to 15 years and 16 to 19 years, both of which reflected school level (secondary and upper secondary school). Family affluence was assessed by the question: "How well off do you think your family is compared to most others?" Response alternatives were: "about the same as most others," "better financial situation" and "worse financial situation," which were further dichotomized into: 'better' ("about the same as most others" and "better financial situation") and 'worse' ("worse financial situation").

1.2.6 Statistics

In the prevalence analyses, categories of leisure time activities from YH1, YH3 and YH4 (Table S1) were cross tabulated by sex, and leisure

activities from YH4 (Table S2). Moreover, leisure activity data from YH4 was cross-tabulated with sex- and age categories. Based on YH4 data, the relationships between leisure participation and life satisfaction were analysed using linear regression models and the relationship between leisure participation and loneliness using logistic regression. All analyses were done after having been stratified by age categories and adjusted for sex and family affluence. We developed estimates for each leisure activity measured in YH4, and all estimates are reported with 95 % confidence intervals (95% CI). For the linear regression analysis, we report beta coefficients (β) for life satisfaction; for the logistic regression analysis, we report the odds ratio (OR). The β`s represent the difference in average life satisfaction between the engaged group and the non-engaged group. More specifically, a negative β coefficient means higher levels of life satisfaction; conversely, a positive β coefficient represents lower levels of life satisfaction. The OR (Bland & Altman, 2000) represents the ratio of the odds of feeling lonely in the engaged group compared with the non-engaged group. P-values <0.05 were considered statistically significant. IBM SPSS version 28.0.1.1 (SPSS, inc., Chicago, Illinois) (15) was used for all analysis. Forest plots were created in Stata (Release 17, College Station, TX:StataCorp LLC).

1.3 Prevalence of leisure activities

1.3.1 Comparing the prevalence estimates of leisure-time activities over the last three decades

The proportion of adolescents that reported visiting someone or being visited once or more often a week was relatively stable for both boys and girls from 1995–1997 to 2006–2008 (Figure 2A, B). Spending time with friends dropped slightly from 1995–1997 to 2006–2008 and increased during the period from 2006–2008 to 2017–2019. A high proportion were spending time with friends once a week or more, and slightly more girls reported spending time with friends (95.2%), compared to boys (92.7%) in 2017–2019. Playing an instrument once or more a week

increased in proportion in girls between 2006–2008 and 2017–2019 and dropped among boys. Both spectators at concert/cinema (20.0 % vs. 61.9% among girls and 28.1% vs. 51.7% in boys), and attendance at sports events more than doubled in proportions among both sexes from 2006–2008 to 2017–2019 (26.3% vs. 54.8% among girls and 24.6% vs. 55.3% boys). Engagement in activity organization increased from 1995–1997 to 2006–2008 for both sexes and showed a clear drop in proportion from 2006–2008 to 2017–2019 (60.1 % vs. 18.6% among girls and 58.1% vs. 16.5% in boys). The proportion that was engaged in a hobby increased for both sexes from 1995–1997 to 2006–2008, and more boys than girls were engaged in a hobby (56.5% vs. 63.3% among girls and 67.0% vs. 71.9% in boys).

There was a higher increase in the proportion who visited a cafe or other meeting place between 2006–2008 and 2017–2019 among girls compared to boys (37.0% vs. 59.5% among girls and 33.0% vs. 44.3% in boys). The proportion who engaged in theater/play or danced with others once or more often per week increased from 2006–2008 to 2017–2019, and the numbers reported in 2017–2019 were more than three times larger for girls than boys (24.2% vs. 7.8%). In 2006–2008 this proportion was significantly lower and relatively equal (6.0% girls and 5.2% boys). In 2006–2008 and 2017–2019, a large proportion watched TV; this was fairly equal between the sexes (41.1% vs. 67.3% girls and 40.1% vs. 57.3% boys). However, the shares of adolescents who watched TV increased considerably in 2017–2019; 10% more girls than boys were watching two hours or more per day. Time spent online, social media and chatting increased considerably from 2006–2008 to 2017–2019 for both, and in 2017–2019 a greater proportion of the girls (83.7%) spent more than two hours per day online compared to 66.0% of the boys. The greatest difference identified between the sexes concerns gaming, as almost twice as many boys report gaming more than two hours per day compared to girls. In 2006–2008, 16.8% girls and 39.0% boys reported this situation, compared to 49.9% girls and 66.0% boys in 2017–2019.

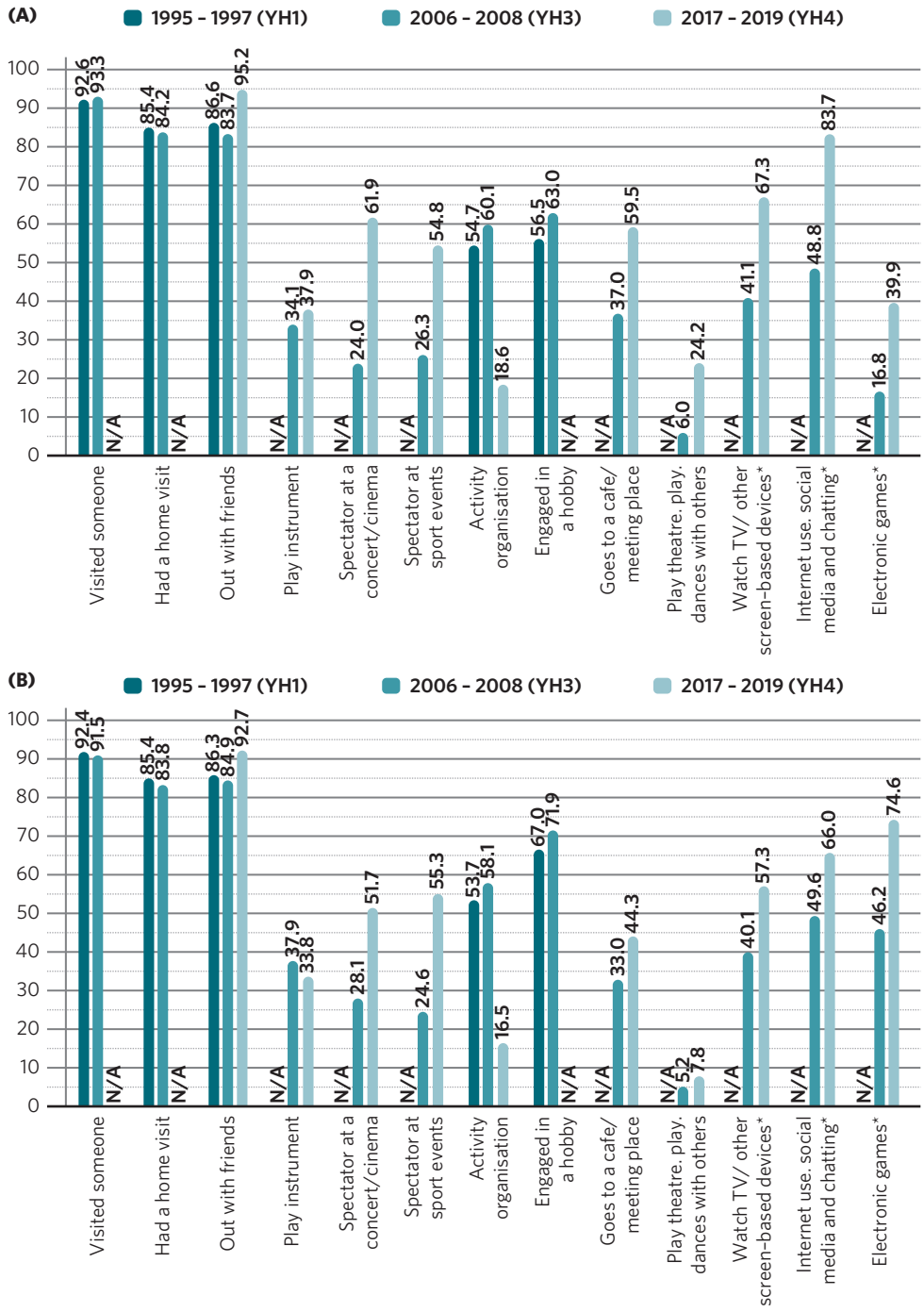

Figure 2. Distribution of leisure activities among girls (A) and among boys (B) over the three time points 1995–1997, 2006–2008 and 2017–2019 (YH1, YH3, and YH4, respectively). The proportions are presented in percentages once per week or more often or *two hours or more per day. N/A: not available.

1.3.2 The prevalence of participation in leisure-time activities in 2017–2019 (YH4)

The proportion of adolescents spending time with friends having contact with friends online or being engaged in organizational activity once or more a week were high and relatively equal in both sexes and age-groups (figure 3). A higher percentage in both sexes from age 13–15 played an instrument compared to 16–19 year–olds (46.2% vs. 31.4% among the girls and 40.4% vs. 29.2% among the boys). A similar pattern was observed for attending a concert and/or cinema (61.5% vs. 50.5% among the girls and 58.8% v.s 53.8% among the boys). The proportion that attended sports events was lower in the oldest age group (50.5% girls and 53.8% boys) compared to the youngest group (61.2% girls and 58.8% boys). A considerable higher proportion among the youngest were engaged in religious activities (20.5% girls and 19.8% boys) compared to the older adolescents (6.7% girls and 6.3% boys). More girls compared to boys visited a café or other meeting places for both age groups, and a lower proportion among the older (50.4% girls and 41.7% boys) compared to the youngest (61.5% girls and 51.0% boys). In total, a significantly larger proportion of girls than boys reported being engaged in theatre or dancing with others (31.4% vs 8.0% in ages 13–15 and 18.5% vs. 8.5% in ages 16–19), and in creative activities (35.4% vs. 16.2% in ages 13–15 and 25.2% vs. 13.5% in ages 16–19).

In the oldest age group, a higher share of the girls compared to boys spent more than two hours a day watching TV or other screen–based devices (61.9% vs. 52.6% in ages 13–15 and 71.8% vs. 61.4% in ages 16–19) and being online (social media and chatting) (78.3% vs. 58.8% in ages 13–15 and 88.2% vs. 72.0% in ages 16–19). There was a marked gender difference regarding reported gaming more than two hour a day; this difference was more than twice in the older age group (47.6% vs. 79.8% aged 13–15 and 33.2% vs. 70.6% aged 16–19).

1.4 Discussion of leisure-time activity prevalence estimates

This study provides new knowledge concerning leisure activities among adolescents and describes changes in proportion and types of engagement

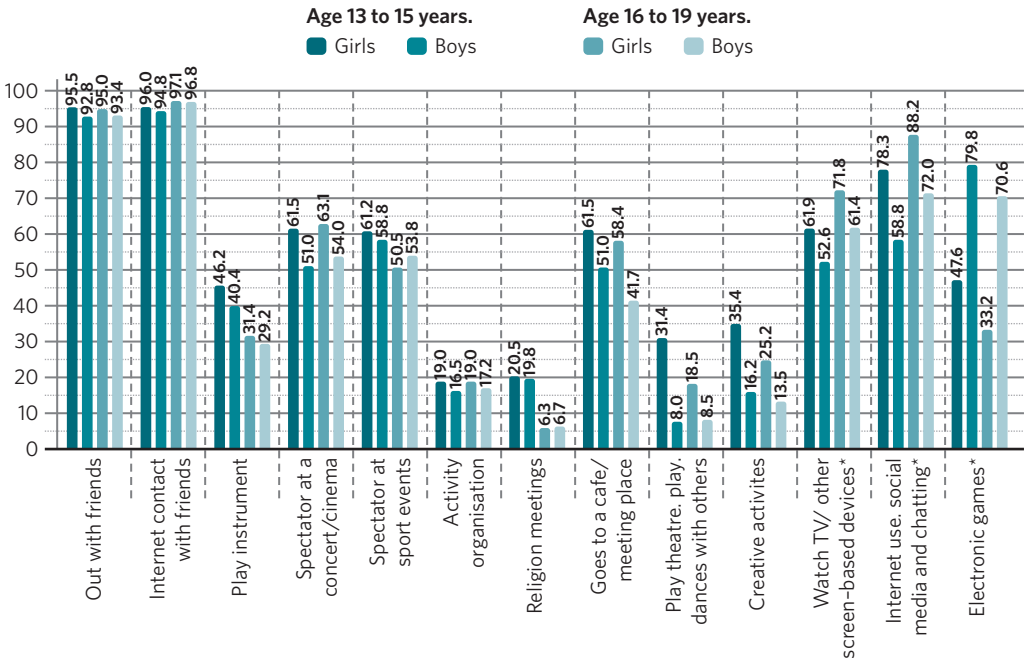

Figure 3. Sex-specific distribution of participation in leisure activities (% once per week or more often, or *two hours or more per day) among adolescents ages 13 to 15 and 16 to 19 during the period 2017–2019, The Young-HUNT-4 Survey, Norway.

over time. Interestingly, social engagement such as visiting someone or having a visitor was shown to be relatively stable for both sexes during the three decades studied. The proportions who reported being out with friends decreased between 1995–1997 and 2006–2008, but then increased to the highest proportion in 2017–2019. From 2006–2008 to 2017–2019, playing an instrument became less common, whereas being a spectator at concert/cinema/sports event increased over time. While participation in organized activities (associations, meeting or training with a club/team) increased from 1995–1997 to 2006–2008, it decreased considerably up to 2017–2019. The number of individuals that reported being social at cafes/ meeting places increased from 2006–2008 to 2017–2019, especially among girls. A significant increase was observed with respect to being online, social media, gaming and chatting from 2006–2008 to 2017–2019 among both sexes. Gaming more than doubled among girls by 23.1%, whereas the proportion of boys increased by 28.4% during this period.

In 2017–2019 (YH4), there were considerably fewer boys who participated in any activity compared to girls with the exception of gaming, where the younger boys were more active than the older ones. For many activities the younger girls were more engaged than the older ones. Being engaged in social activities such as online contact or hanging out with friends and being a spectator (concert, cinema and sports events) were similar in both age groups and sexes. Proportions of young adolescents being engaged in creative activities (playing an instrument/performing theatre/dance with others) was higher compared to the older age group. More girls than boys were engaged in creative activities (more than twice a week) than boys. The most distinct sex and age differences observed were those regarding screen-based activities, with more boys than girls engaged in gaming and more girls watching TV or being social online. In particular, TV-watching, internet use, social media use and chatting were more common in the older age groups compared to the younger age groups with regard to both sexes. However, the opposite was observed with regard to gaming, as the younger boys were more engaged in this activity than the older boys. Findings from another Norwegian adolescent study, the *Ungdata* survey (data collection in 2021) show that 55% of all adolescents in both lower secondary and upper secondary school use social media two–three hours or more every day (Bakken, 2021). The time spent flattens out from 10th grade and on. While this supports our data for boys, we found a higher prevalence among girls. This report further shows that there is variation between activities girls and boys participate in: girls spend more time on social media than boys, but boys spend more time gaming (Bakken, 2021). However, our measurement is not directly comparable to the measures in the *Ungdata* survey, as our variable measures internet use, social media and chatting in combination.

1.5 Correlates of leisure-time activities

Characteristics concerning the YH4 cross sectional sample (2017–19) are presented in Table 1.

Table 1. Characteristics of participants in Young-HUNT4 (YH4) stratified by sex and age groups, presented as numbers, percentage (%), mean and standard deviation (std.).

		YH4			
		13 to 15 (n = 3 704)		16 to 19 (n = 3 832)	
		Girls (51.0 %)	Boys (49.0 %)	Girls (52.9 %)	Boys (47.1 %)
		1 889	1 815	2 026	1 806
Mean age 4 std.		14.44 4 0.8	14.40 4 0.9	17.49 4 0.9	17.47 4 0.9
SES*	Low	131 7.0 %	78 4.4 %	228 11.4 %	145 8.1 %
	Medium**	1 733 93.0 %	1 703 95.6 %	1 780 88.6 %	3 420 90.2 %
Lonely	Often	205 11.2 %	79 4.6 %	329 16.7 %	139 8.0 %
	Seldom/ never	1 619 88.8 %	1 644 95.4 %	1 638 83.3 %	1 604 92.2 %
Life satisfaction, mean 4 std.		0.91 4 0.64	0.75 4 0.59	1.13 4 0.65	0.80 4 0.59

*SES: socioeconomic status (family affluence) **Medium: Better/about the same as the others

Slightly more girls than boys participated in the study in both age groups, of which the average age was fairly even. The family affluence factor was rated higher in the older age group, and higher for the girls compared to the boys in each age group. Reported loneliness equaled about 5–17% of the population. More girls than boys reported loneliness and lower levels of life satisfaction. For both sexes, a higher prevalence of loneliness and poor life satisfaction was observed in the older age group compared to the younger one.

1.5.1 Correlation between leisure-time activities and life satisfaction

The relationship between leisure time activities and life satisfaction was investigated through regression analyses stratified by sex and age groups (Figure 4, 5).

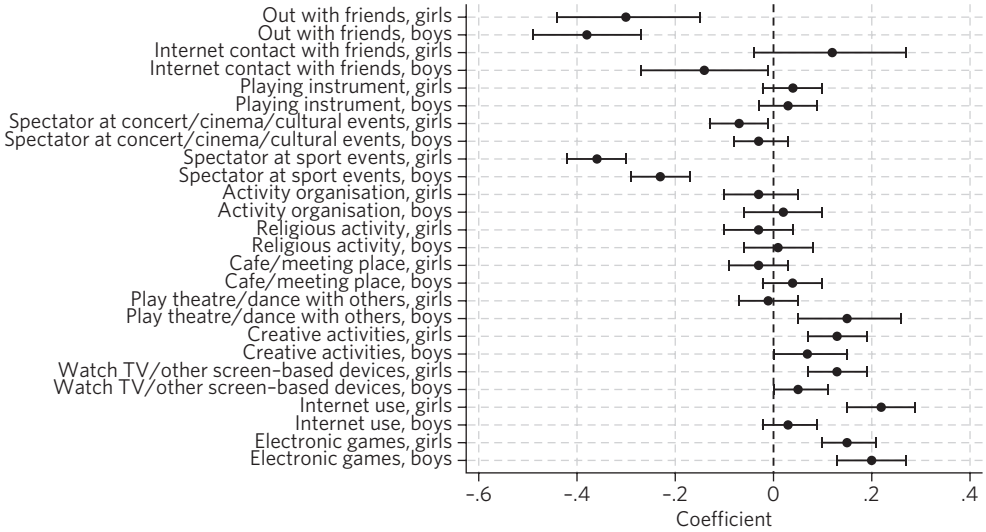

Figure 4. Sex-specific correlations between participation in leisure activities and life satisfaction for 13-15-year-olds. Beta coefficients and 95 percent confidence intervals (95% CI) adjusted for family affluence. Reference group was the non-engaged.

The results for the 13–15-year-olds adjusted for family affluence are presented in figure 4. Two activities were correlated with better life satisfaction for both sexes; hanging out with friends (girls ß = –0.30 and boys ß = –0.38); spectator at sports events (girls ß = –0.36 and boys ß = –0,23), when comparing those engaged to those who did not engage.

Sex–differences were revealed; among girls, attending a concert, cinema, or cultural event (girls ß = –0.07) and for boys, online contact with friends (ß = –0.14) was correlated with better life satisfaction. The analyses revealed that being engaged in electronic games was correlated with lower levels of life satisfaction among both girls and boys (ß = 0.15 and ß = 0.20, respectively), compared to those who did not participate. Engaging in theatre and/or dance with others was also correlated with lower levels of life satisfaction among boys (ß = 0.15). Among girls, three more activities were correlated with lower levels of life satisfaction; creative activities among the girls (ß = 0.13), screen-based devices (ß = 0.13); as well as being online (ß = 0.22).

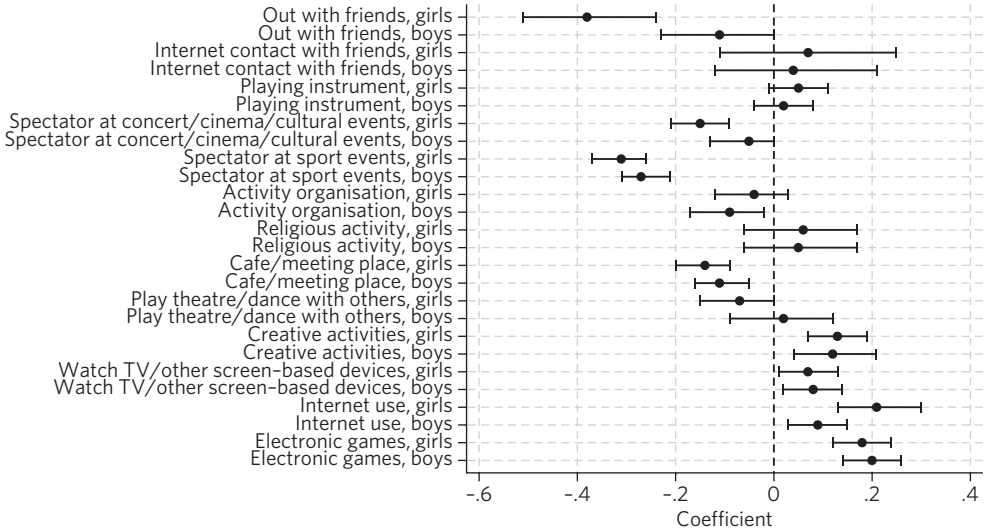

Figure 5. Sex-specific correlations between participation in leisure activities and life satisfaction for 16–19-year-olds (right). Beta coefficients and 95 percent confidence intervals (95% CI) adjusted for family affluence. Reference group was the non-engaged.

The results for 16–19-year-olds adjusted for family affluence are presented in figure 5. Several activities were correlated with better life satisfaction for both sexes: attending sports events (girls (ß = –0.31 and boys ß = –0,27); café or other meeting places (girls ß = –0.14 and boys ß = –0.11). Among girls, two more activities were correlated with higher levels of life satisfaction; being out with friends (ß = –0.38); attending concert, cinema, or cultural events (ß = –0.15). Among boys, participating in organized activities was also positively correlated to the likelihood of higher levels of life satisfaction (ß = –0.09), compared to those who did not participate.

Four different activities were correlated with lowering levels of life satisfaction; creative activities (girls ß = 0.13 and boys ß = 0.12); TV or other screen-based activities (girls ß = 0.07 and boys ß = 0.08); internet use (girls ß = 0.21 and boys ß = 0.09); and electronic games (girls ß = 0.18 and boys ß = 0.20).

1.5.2 Correlations of leisure-time activities and loneliness

Among adolescents aged 13 to 15 years, 11.2% girls and 4.6% boys reported feeling lonely. Among those aged 16 to 19 years, 16.7% girls and 8.0% boys reported feeling lonely (table 1).

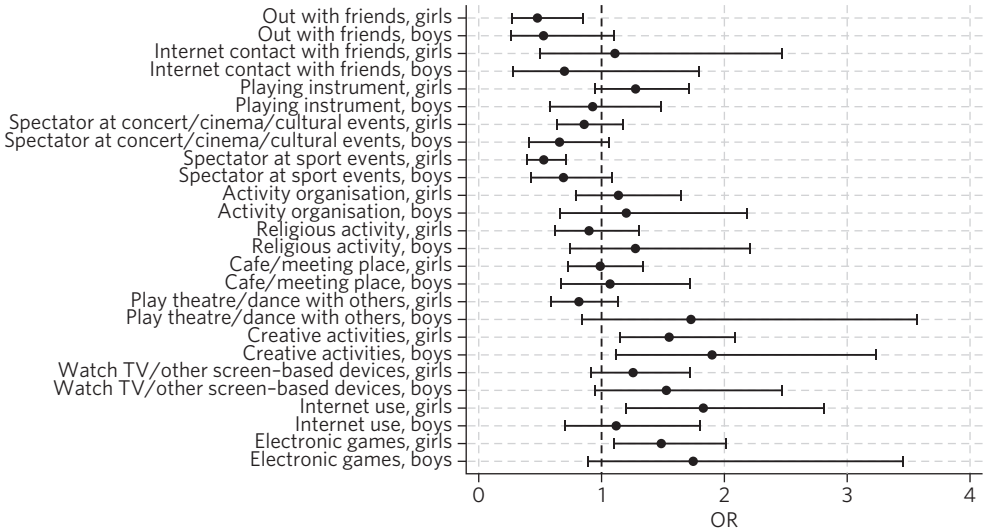

Figure 6. Sex-specific correlations between participation in leisure activities and loneliness for 13–15-year-olds. Odds ratio (OR) and 95 percent confidence intervals (95% CI) adjusted by family affluence.

The results for 13–15-year-olds adjusted for family affluence were presented in figure 6. Girls who spent time with friends and attended sports events had lower odds of feeling lonely (OR = 0.48 and OR = 0.53, respectively) compared with those reporting not spending time with friends and attending sports events. Participating in creative activities was correlated with a higher risk of feeling lonely among both girls (OR = 1.55) and boys (OR = 1.90). Among girls, internet use and gaming were also correlated with a higher risk of feeling lonely (OR = 1.83 and OR = 1.49, respectively), compared to those girls not engaged in these activities.

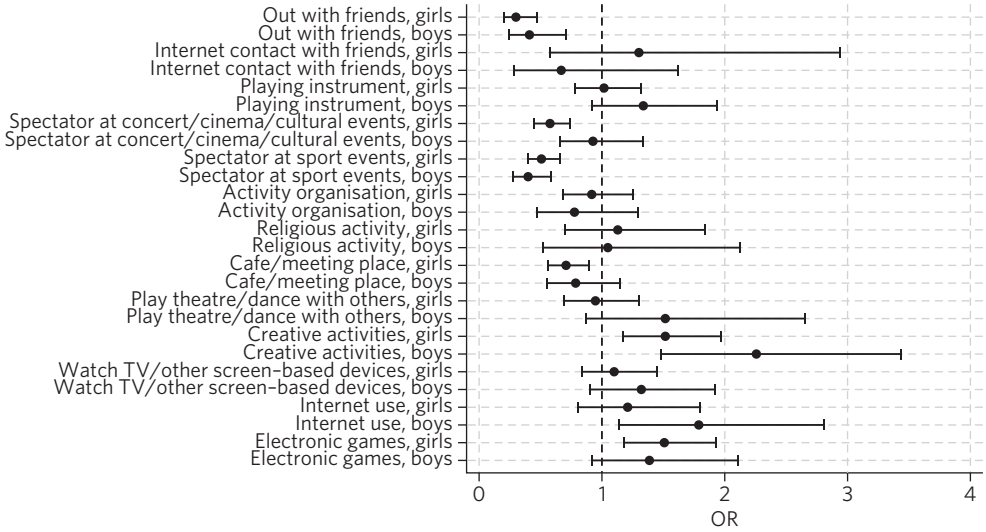

Figure 7. Sex-specific correlations between participation in leisure activities and loneliness for 16–19-year-olds. Odds ratio (OR) and 95 percent confidence intervals (95% CI) adjusted by family affluence.

The results for 16–19-year-olds adjusted for family affluence were presented in figure 7. Among both girls and boys, two activities were correlated with lower odds of feeling lonely; hanging out with friends (girls OR = 0.30 and boys OR = 0.41); watching a sports event (girls OR = 0.51 and boys OR = 0.40). Girls who visited a café or other meeting places or attended a cinema and/or concerts, also had lower odds of feeling lonely (OR = 0.71 and OR = 0.58, respectively), compared to those who did not. Creative activities were correlated with higher odds of feeling lonely among both girls (OR = 1.52) and boys (OR = 2.26), when compared to those who did not participate in these types of activities. Internet use among boys was also correlated with higher odds of being lonely (OR = 1.79) and, likewise, gaming among girls (OR = 1.51).

1.6 Discussion of the correlates of leisure-time activities

Compared to the girls aged 13–15 years old, the older girls (16–19 years old) were less satisfied with life and reported more loneliness; generally, boys

reported higher life satisfaction and less loneliness than girls in both age groups. For some types of activities (with emphasis on social activities), our findings suggest that for girls, the odds are higher for lower life satisfaction and more loneliness if you are less active. Being a spectator at sports events positively predicts better life satisfaction and less loneliness among both sexes and age groups. Interestingly, higher odds for reporting loneliness and life dissatisfaction were found among both sexes and age categories for those engaged in creative activities. In addition, higher levels of internet use and gaming among girls were correlated with a higher risk of feeling lonely and less satisfied with life. Since these results are based on cross-sectional data, it is not possible to conclude whether the highlighted activities predict more loneliness or less life satisfaction – or vice versa.

There are suggestions by some studies that the increase in reported mental health problems among young people is related to the increase in social media usage (Krokstad et al., 2022; Twenge et al., 2022). In alignment with our findings, Twenge et al. revealed consistent and substantial associations among girls' mental health and social media use. Furthermore, a negative association between several screen–based activities and life satisfaction was shown for both sexes (Twenge et al., 2022). A systematic review by Hoare et al. revealed that leisure screen time among adolescents showed strong and consistent associations between time spent and depressive symptomatology and psychological distress (Hoare et al., 2016). This agrees with our findings, showing that increased time spent on screen-based activities, such as gaming and internet usage, were negatively correlated with loneliness and life satisfaction. Although both cross-sectional studies and longitudinal studies show an association between screen time and poorer mental health, not all studies show only negative associations (Hoare et al., 2016). Since both measurement methods and operationalization vary, studies are not directly comparable.

The period of adolescence is an important time for young people to develop both social and emotional living habits, which are essential for mental well-being (WHO, 2021b). The importance of leisure-related cultural participation might have been overlooked in the perspective of public health among adolescents, and in the clinical setting in the context of

treatment (Knudtsen et al., 2005). Epidemiological studies using population data on life satisfaction have provided valuable information concerning both health services and public health (Jozefiak et al., 2008). Several factors influence leisure time behaviour, and engagement in leisure activities may directly influence health through substituting health-compromising behaviours. The social network is important for health behaviour (Montgomery et al., 2020); consequently, engagement may also facilitate the development of social networks, which can improve health and the dissemination of social health norms (Thiel, 2015). Family and friends (relationships with peers) as well as school and the wider community are important for life satisfaction (WHO, 2021a). Our findings support the importance of social activities, where online contact and spending time with friends were correlated with better life satisfaction. ABC (Act, Commit, Belong) for better mental health, is the first research-based effort that targets the entire population, aspiring to engage the population to increase mental health in the general population. It is well documented that the health-promoting measure is good for our mental health; do something active together with someone and do something meaningful (Donovan et al., 2021; Jalleh et al., 2007). Recently, recommendations were given to provide meaningful learning activities and ensure supportive environments that stimulate coping skills and give people the experience of playing a significant role in the community (Norwegian Directorate of Health, 2023; White Paper 15, 2023).

It is important to prevent social withdrawal, which can further exacerbate social isolation and loneliness (WHO, 2021a). Adolescence is an important time period in life for young people to acquire the social, emotional and cognitive skills that will shape their future mental health as adults. Thus, it is important to address and enhance psychosocial– and mental health development, as it may affect individuals later in life (WHO, 2023). Previous studies that included the adult population (aged 20 years and older) from of the HUNT Study indicated that individuals who were culturally active reported better health, were more satisfied with their lives, experienced less anxiety and depression (Cuypers et al., 2012), had lower chronic pain symptoms (Skjellegrind, 2016) and lower overall mortality risk (Løkken, 2023) than individuals who were not

culturally engaged. In addition, participating in cultural activities may promote mental health and social relationships, thereby preventing loneliness. In epidemiological studies using cross-sectional data, conclusions cannot be drawn about mechanisms or causal relationships. Further research is needed to find out whether it is poor mental health or other factors that cause adolescents not to participate in leisure activities, or good mental health that predicts engagement. Leisure time participation is a multidimensional construction; consequently, there may be mental, physical, social and behavioural effects (Fancourt & Finn, 2019; Fancourt & Steptoe, 2021). Additionally, Newman and Diener have brought forth five "core psychological mechanisms" between leisure and well-being: autonomy, meaning, mastery, and detachment–recovery (Newman et al., 2013). The causal pathways in mental health are unknown and presumably complex. Thus, evidence from population-based samples concerning the effects of participation in a wide range of activities is important for establishing the public health-related significance of such activities. Studies that follow individuals over time from childhood to adolescence and into adulthood provide important knowledge for determining whether patterns of behaviour from early childhood have an impact on an individual's mental health and behaviour throughout their life.

1.7 Strengths and limitations

The main strengths of this adolescent population-based study are that 1) it is representative of the Norwegian adolescent population and 2) data has been collected repeatedly in the same geographic region. Further, the various data collections (surveys) have high response rates and consist of rich information regarding a range of several leisure activities, including social activities collected over three decades. In addition to the main variables used in the present study, important potential confounders were available that covered several health aspects and the sociodemographic information. This enabled reporting bias for the correlations conducted to be reduced. A major strength is also this research project's ability to explore the correlates for a range of leisure activities on the risk of poor mental health and loneliness. The adolescent participants were blinded to

future research questions when invited to partake in the surveys, which reduced social-desirability bias. The Norwegian version of the generic 7-item ILC was used to assess various life satisfaction areas over the past week (Jozefiak et al., 2008). According to the subjective nature of the ILC–28, the instrument is representative of adolescent psychological and physiological health. The adolescent's perception of their family's financial situation was used as a measure of socioeconomic status. This was adjusted accordingly, as health problems are generally more prevalent in families that have lower socioeconomic status, so most studies do adjust for socioeconomics in the analyses.

Limitations include a lack of consistency in how leisure activities were measured in the various surveys. Concerning the interpretation of the correlation results, it is important to be aware of the fact that adolescents may participate in several activities simultaneously. As a result, a great variation and pattern of activities may be embedded within the total leisure time engagement (Davies et al., 2012). In this particular study, this combination of various patterns of engagement has not been considered in the analysis. Furthermore, several activities may be undertaken at either the individual or community level (Campagna et al., 2020); however, this aspect was not considered. Moreover, it is not easy to adjust for the social factors that may have influenced the observed correlations, any of which may have played an important role. Our results suggest that it is people who never engage in activities that are at highest risk of experiencing health problems. However, the dose of cultural engagement necessary to achieve optimal health effects is another important question (Knudtsen et al., 2005). There are several challenges with operationalizing data over time, as the activities develop and are shaped by historical, social, and psychological conditions (Stebbins, 2015). This is also the case with our study where data has been collected approximately every 10th year in a changing environment. In this respect, particular emphasis needs to be put on societal changes related to the increasing use of digital technology, and the needs for updated measures used especially in the last Young–HUNT survey (2017–2019). The lack of correlated measurements throughout the three surveys resulted in a certain loss of data, due to its not being compatible (Skovlund, 2017). Further, some of the activity measurements

were merged to make the activities more comparable between the various time points. Isolation of a single activity is complicated, as participation in one activity could increase the likelihood of attending other activities; for example, playing an instrument may increase the probability of being a spectator at concerts, or vice-versa. As such, the single-effect estimates may be confounded as they may contain attributable effects from other activities. Furthermore, possible effects of potential diseases and multiple risk factors (e.g., a cluster of risk factors within a single individual) were not accounted for. Neither was the impact of social factors or serious life events, both potentially affecting mental health, considered. As a result, residual confounding may remain. It is important to note that our study is observational. Therefore, further studies should explore the uncertainty around the leisure participation measures needed to implement in real life to improve health; this aspect needs to be followed up in well-planned intervention studies.

1.8 Implications of current prevalence's and correlates of leisure-time activities

Given the proliferation of research in the area of leisure-time activities among adolescents, it is interesting to note that relatively little of the published research describes the magnitude of the activity engagement and its distribution in populations. Although diverse measures are used in assessing leisure time activities, these different measures may be needed in different research projects, both to assess engagement in different contexts and enact population surveillance. We reported on three recent period-defined systematic appraisals of the prevalence of leisure time activities in a large sample of adolescents in a population study. We reported an increase in participation in leisure activities over a three-decade period among both girls and boys. Social activities were shown to be relatively stable over time. In contrast, there were changes in the study period, with increasing proportions of individuals attending cultural events as spectators and reporting screen-based activities that included internet use and gaming. Our findings suggest that for some types of activities, adolescents who never participate are at high risk for reporting

poorer life satisfaction (creative and screen-based activities) and loneliness (creative activities and internet use among boys and gaming among girls).

Since participation in leisure time activities is relevant for adolescents' mental health, especially when considering that this is a significant period for psychological development, it is important to understand all aspects of the factors that influence the mental health outcomes. Given the limitations of this cross-sectional study design, there is no evidence to claim that there is a causal relationship in any of the present findings. It is not known whether it is participation in specific leisure activities that predicts good mental health or the opposite. However, there is a fundamental need for surveillance systems to monitor the prevalence of leisure time activities over time, using identical measures and methods to identify population trends and study potential causal relationship. Together with qualitative research, this will help us ascertain why particular leisure time activities affect the various mental health outcomes, and others do not (Murphy, 2022; Timonen et al., 2021). It is also important to qualitatively explore gender differences, for example why girls who were actively engaged with internet use and games had a higher risk of being lonely compared to boys.

Even if many of the conditions for this study were not optimal, the knowledge achieved is an important start for implementing leisure time engagement in public health initiatives. Policymakers should review whether there is sufficient access to leisure time activities across all regions of the country, regardless of socioeconomic levels, and provide meeting places for adolescents. These activities may increase social interaction in the community, foster psychosocial benefits and, hopefully, promote and maintain life satisfaction and social relationships among adolescents. Facilitating adolescents' leisure activities may positively impact their mental health and thereby promote public health, i.e., optimising leisure engagement could be an important arena for preventing the adverse mental health trends currently being observed (see also Steigum & Bruun, årstall, ch. 2). A focus on coping with life challenges could help many individuals to evolve salutogenetic strategies (see also Heide & Reistadbakk, ch. 3; Batt-Rawden. ch. 4; Kibirige, ch. 5; Nygård-Pearson,

ch. 7; Jenssen, ch. 9). School is one of few arenas where almost all individuals can be reached; thus, the findings in this study are of importance for professionals who work with adolescents in schools and health services as well as for those who work with, or have relationships with, adolescents in their spare time, as the findings contribute important knowledge about adolescents' leisure-time activities.

In conclusion, engagement in leisure time activities is pervasive and needs careful measurement and monitoring as well as a better understanding of the importance of participation and subgroup identification in the population. This is necessary so that public health strategies can be implemented to promote mental health and well-being in the general population.

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Data availability

Data are available upon request from the HUNT Research Centre. Projects must be referred by the Regional Committee for Medical Research in Norway (REK) and registered with the Norwegian Social Science Data Services (NSD). The project leader affiliated with the Medical Faculty at NTNU is covered under HUNT's licence from the Data Inspectorate; however, it must obtain a referral from the Regional Committee for Medical and Health Research Ethics (REK). Interested, qualified researchers may request these data by contacting HUNT

Research Centre, Norwegian University of Science and Technology, Levanger at hunt@medisin.ntnu.no

References

Bakken, A. (2021). *Ungdata 2021. National results [Ungdata 2021. Nasjonale resultater]*. O. NOVA. https://hdl.handle.net/11250/2767874

Bang Nes, R. & Clench-Aas, J. (2016). *Mental health in Norway. Status report with international comparisons [Psykisk helse i Norge. Tilstandsrapport med internasjonale sammenligninger]* (2011:2). ISSN trykt: 1503-1403). https://www.fhi.no/publ/2011/psykisk-helse-i-norge.-tilstandsrap/

Bland, J. M., & Altman, D. G. (2000). The odds ratio. *BMJ*, *320*(7247), 1468. https://doi.org/10.1136/bmj.320.7247.1468

Campagna, D., Caperna, G. & Montalto, V. (2020). Does culture make a better citizen? Exploring the relationship between cultural and civic participation in Italy. *Social Indicators Research*, *149*(2), 657–686. https://doi.org/10.1007/s11205-020-02265-3

Core curriculum. (2017). *Core curriculum. Health and life skills*. The Norwegian Directorate for Education and Training. https://www.udir.no/lk20/overordnet-del/prinsipper-for-laring-utvikling-og-danning/tverrfaglige-temaer/folkehelse-og-livsmestring/?lang=eng

Core curriculum. (2020). *Core curriculum. About the core curriculum.* https://www.udir.no/lk20/overordnet-del/om-overordnet-del/?lang=eng

Cuypers, K., Krokstad, S., Lingaas Holmen, T., Skjei Knudtsen, M., Bygren, L. O. & Holmen, J. (2012). Patterns of receptive and creative cultural activities and their association with perceived health, anxiety, depression and satisfaction with life among adults: The HUNT study, Norway. *Journal of Epidemiology and Community Health*, *66*(8), 698. https://doi.org/10.1136/jech.2010.113571

Davies, C., Pescud, M., Anwar-McHenry, J. & Wright, P. (2016). Arts, public health and the National Arts and Health Framework: A lexicon for health professionals. *Australian and New Zealand Journal of Public Health*, *40*(4), 304–306. https://doi.org/10.1111/1753-6405.12545

Davies, C., Rosenberg, M., Knuiman, M., Ferguson, R., Pikora, T. & Slatter, N. (2012). Defining arts engagement for population-based health research: Art forms, activities and level of engagement. *Arts Health*, *4*. https://doi.org/10.1080/17533015.2012.656201

Donovan, R. J., Koushede, V. J., Drane, C. F., Hinrichsen, C., Anwar-McHenry, J., Nielsen, L., Nicholas, A., Meilstrup, C. & Santini, Z. I. (2021). Twenty-one reasons for implementing the act-belong-commit-'ABCs of mental health' campaign.

International Journal of Environmental Research and Public Health, *18*(21). https://doi.org/10.3390/ijerph182111095

Fancourt, D., & Finn, S. (2019). *What is the evidence on the role of the arts in improving health and well-being? A scoping review* (Health Evidence Network (HEN) synthesis report 67). WHO. http://www.euro.who.int/en/data-and-evidence/cultural-contexts-of-health-and-well-being/publications/political-symposium-on-the-arts-and-health-in-the-nordic-region.-state-of-the-evidence-2019

Fancourt, D. & Steptoe, A. (2021). How leisure activities affect health: The serious leisure perspective – authors' reply. *The Lancet. Psychiatry*, *8*(7), 562–563. https://doi.org/10.1016/S2215-0366(21)00201-7

Hoare, E., Milton, K., Foster, C. & Allender, S. (2016). The associations between sedentary behaviour and mental health among adolescents: A systematic review. *The International Journal of Behavioral Nutrition and Physical Activity*, *13*(1), 108–108. https://doi.org/10.1186/s12966-016-0432-4

Holmen, T. L., Bratberg, G., Krokstad, S., Langhammer, A., Hveem, K., Midthjell, K., Heggland, J. & Holmen, J. (2014). Cohort profile of the Young-HUNT Study, Norway: A population-based study of adolescents. *International Journal of Epidemiology*, *43*(2), 536–544. https://doi.org/10.1093/ije/dys232 (NOT IN FILE)

Jalleh, G., Donovan, R. J., James, R. & Ambridge, J. (2007). Process evaluation of the act-belong-commit mentally healthy WA campaign: First 12 months data. *Health Promotion Journal of Australia*, *18*(3), 217–220. https://doi.org/10.1071/he07217

Jensen, A., Torrissen, W. & Stickley, T. (2020). Arts and public mental health: Exemplars from Scandinavia. *WHO regional publications. European series*, *6*, 194–210.

Jozefiak, T., Larsson, B., Wichstrøm, L., Mattejat, F. & Ravens-Sieberer, U. (2008). Quality of life as reported by school children and their parents: A cross-sectional survey. *Health and Quality of Life Outcomes*, *6*(1), 34. https://doi.org/10.1186/1477-7525-6-34

Knudtsen, M. S., Holmen, J. & Håpnes, O. (2005). Cultural approaches to treatment and public health work [Kulturelle virkemidler i behandling og folkehelsearbeid]. *Tidsskrift for den Norske Laegeforening*, *125*(24), 3434.

Krokstad, S., Langhammer, A., Hveem, K., Holmen, T. L., Midthjell, K., Stene, T. R., Bratberg, G., Heggland, J. & Holmen, J. (2013). Cohort profile: The HUNT study, Norway. *International Journal of Epidemiology*, *42*(4), 968–977. https://doi.org/10.1093/ije/dys095

Krokstad, S., Weiss, D. A., Krokstad, M. A., Rangul, V., Kvaløy, K., Ingul, J. M., Bjerkeset, O., Twenge, J. & Sund, E. R. (2022). Divergent decennial trends in mental health according to age reveal poorer mental health for young people:

Repeated cross-sectional population-based surveys from the HUNT Study, Norway. *BMJ Open*, *12*(5), e057654. https://doi.org/10.1136/bmjopen-2021-057654

Labs, S. (2023). *The mental state of the world in 2022* (sapienlabs.org/mental-health-million-project issue). https://mentalstateoftheworld.report/wp-content/uploads/2023/02/Mental-State-of-the-World-2022.pdf

Løkken, B. I. (2023). *Engagement in cultural activity and public health* (Publication number NTNU;2023:132) [Medicine, NTNU]. NTNU. https://hdl.handle.net/11250/3064857

Mahon, N. E., Yarcheski, A., Yarcheski, T. J., Cannella, B. L. & Hanks, M. M. (2006). A meta-analytic study of predictors for loneliness during adolescence. *Nursing Research*, *55*(5), 308–315. https://journals.lww.com/nursingresearchonline/Fulltext/2006/09000/A_Meta_analytic_Study_of_Predictors_for_Loneliness.3.aspx

Montgomery, S. C., Donnelly, M., Bhatnagar, P., Carlin, A., Kee, F. & Hunter, R. F. (2020). Peer social network processes and adolescent health behaviors: A systematic review. *Preventive Medicine*, *130*, 105900. https://doi.org/10.1016/j.ypmed.2019.105900

Murphy, J., Coulter, M., Sweeney, M. R., et al. (2022). "You Get to…" a qualitative study of perceived influence of physical activity and sport on mental wellbeing among adolescent girls. *Advances in Physical Education, 12*(2). https://doi.org/10.4236/ape.2022.122008

Newman, D. B., Tay, L. & Diener, E. (2013). Leisure and subjective well-being: A model of psychological mechanisms as mediating factors. *Journal of Happiness Studies*, *15*(3), 555–578. https://doi.org/10.1007/s10902-013-9435-x

NIPH. (2023). *Mental problems and disorders in children and young people* (The Norwegian public health report issue). FHI. https://www.fhi.no/nettpub/hin/psykisk-helse/psykisk-helse-hos-barn-og-unge/

Norwegian Directorate of Health. (2023). *Knowledge summary on inequalities in health and quality of life in Norway since 2014 – summary. [Kunnskapsoppsummering om ulikheter i helse og livskvalitet i Norge siden 2014 – sammendrag]*. https://www.helsedirektoratet.no/rapporter/kunnskapsoppsummering-om-ulikheter-i-helse-og-livskvalitet-i-norge-siden-2014--sammendrag/anbefalinger

OECD. (2009). Special focus: Measuring leisure in OECD countries. https://www.oecd.org/berlin/42675407.pdf

Rangul, V. & Kvaløy, K. (2020). *Self-perceived health, body mass and risk behavior among adolescents in Nord-Trøndelag county 2017–19. Health statistics report no. 1, the Young-HUNT4 Survey*. H. R. Center. http://www.ntnu.no/hunt/

Rew, L., Arheart, K. L., Thompson, S. & Johnson, K. (2013). Predictors of adolescents' health-promoting behaviors guided by primary socialization theory. *Journal for Specialists in Pediatric Nursing*, *18*(4), 277–288. https://doi.org/10.1111/jspn.12036

Skjellegrind, R. K. (2016). *Can cultural participation contribute to a lower incidence of chronic pain in the popoulation? [Kan kulturdeltagelse bidra til lavere forekomst av kronisk smerte i befolkningen?]* [Master, NTNU]. NTNU. http://hdl.handle.net/11250/2420325

Skovlund, E. (2017). Dichotomization of variables – what is the price? [Dikotomisering av variabler – hva er prisen?]. *Tidsskrift Norsk Legeforening*. https://doi.org/10.4045/tidsskr.17.0972

Solmi, M., Radua, J., Olivola, M., Croce, E., Soardo, L., Salazar de Pablo, G., Il Shin, J., Kirkbride, J. B., Jones, P., Kim, J. H., Kim, J. Y., Carvalho, A. F., Seeman, M. V., Correll, C. U. & Fusar-Poli, P. (2022). Age at onset of mental disorders worldwide: Large-scale meta-analysis of 192 epidemiological studies. *Molecular Psychiatry*, *27*(1), 281–295. https://doi.org/10.1038/s41380-021-01161-7

Stebbins, R. A. (2015). *Leisure and positive psychology: Linking activities with positiveness* (1st 2015. ed.). Palgrave Macmillan.

Thiel, L. (2015). *Leave the drama on the stage: The effect of cultural participation on health* (SOEPpapers on Multiodisciplinary Panel Data Research, Issue. S. T. G. S.-E. P. s. a. D. Berlin). https://www.diw.de/documents/publikationen/73/diw_01.c.510133.de/diw_sp0767.pdf

Timonen, J., Niemelä, M., Hakko, H., Alakokkare, A. & Räsänen, S. (2021). Associations between adolescents' social leisure activities and the onset of mental disorders in young adulthood. *Journal of Youth and Adolescence*, *50*(9), 1757–1765. https://doi.org/10.1007/s10964-021-01462-8

Twenge, J. M., Haidt, J., Lozano, J. & Cummins, K. M. (2022). Specification curve analysis shows that social media use is linked to poor mental health, especially among girls. *Acta Psychologica*, *224*, 103512. https://doi.org/10.1016/j.actpsy.2022.103512

White Paper 15. (2023). *White paper 15 (2022–2023) public health report – national strategy for reducing social inequalities in health [Meld. St. 15 (2022–2023) Folkehelsemeldinga – nasjonal strategi for utjamning av sosiale helseforskjellar]*. Regjeringa.no. https://www.regjeringen.no/no/dokumenter/meld.-st.-15-20222023/id2969572/

WHO. (2021a). *Mental health of adolecents*. World Health Organization (WHO). https://www.who.int/news-room/fact-sheets/detail/adolescent-mental-health

WHO. (2021b). *Mental health of adolescents (fact sheets)*. World Health Organization (WHO). https://www.who.int/news-room/fact-sheets/detail/adolescent-mental-health

WHO. (2023). *Improving the mental and brain health of children and adolescents*. https://www.who.int/activities/improving-the-mental-and-brain-health-of-children-and-adolescents

Aanondsen, C. M., Jozefiak, T., Heiling, K., Lydersen, S. & Rimehaug, T. (2021). Psychometric properties of the Inventory of life quality in children and adolescents in Norwegian sign language. *BMC Psychology*, *9*(1), 89. https://doi.org/10.1186/s40359-021-00590-x

Åsvold, B. O., Langhammer, A., Rehn, T. A., Kjelvik, G., Grøntvedt, T. V., Sørgjerd, E. P., Fenstad, J. S., Heggland, J., Holmen, O., Stuifbergen, M. C., Vikjord, S. A. A., Brumpton, B. M., Skjellegrind, H. K., Thingstad, P., Sund, E. R., Selbæk, G., Mork, P. J., Rangul, V., Hveem, K., … Krokstad, S. (2022). Cohort profile update: The HUNT study, Norway. *International Journal of Epidemiology*. https://doi.org/10.1093/ije/dyac095