



## Quality of life in adolescents. A longitudinal study of the impact of the COVID-19 pandemic

Javier Morales-Ortiz<sup>1,\*</sup>, Sandra Muñoz-Martínez<sup>1</sup>, Ainhoa Martínez-Sánchez<sup>2</sup>, and Juan José López-García<sup>3</sup>

*1 Asociación Salud Mental Molina y Comarca, Molina de Segura, Murcia (Spain)*

*2 Servicio de Psicología Aplicada. Universidad de Murcia (Spain)*

*3 Dpto. Psicología Básica y Metodología. Universidad de Murcia (Spain)*

**Título:** Calidad de vida en adolescentes. Un estudio longitudinal del impacto de la pandemia por COVID-19.

**Resumen:** Diversos estudios han informado que la calidad de vida relacionada con la salud (CVRS) en adolescentes ha disminuido durante la pandemia por COVID-19. En este trabajo se analizó la CVRS en jóvenes de 13 a 17 años una vez finalizada la pandemia. Para ello se hizo un seguimiento en tres momentos diferentes: antes de la pandemia (2019), durante las restricciones de la pandemia (2021) y tras las restricciones de la misma (2022). Se utilizó un diseño de retardo temporal (time-lag design) en tres fases, con un total de 2027 adolescentes que cumplimentaron el cuestionario Kidscreen-10 de CVRS. Mediante modelos ANOVA y de regresión logística se analizó la influencia del género, la práctica deportiva y estar en tratamiento en salud mental. Los resultados obtenidos mostraron un empeoramiento de la CVRS en 2021, cuando los jóvenes volvían a los centros educativos en régimen de semipresencialidad. Este descenso fue independiente del género. En 2022, una vez eliminadas todas las restricciones, la CVRS se recuperó a niveles prepandemia en los chicos, pero no en las chicas. Lo mismo ocurrió con los jóvenes en tratamiento de salud mental. En todos los casos, la práctica deportiva se mostró como un factor protector de la CVRS.

**Palabras clave:** Calidad de vida relacionada con la salud. CVRS. Adolescentes. Covid-19.

**Abstract:** Several studies have reported that health-related quality of life (HRQoL) in adolescents has decreased during the COVID-19 pandemic. In this study, HRQoL was analyzed in young people aged 13 to 17 years after the end of the pandemic. For this purpose, we followed up at three different points in time: before the pandemic (2019), during (2021) and after the pandemic restrictions (2022). A time-lag design in three phases was used, with a total of 2027 adolescents completing the Kidscreen-10 HRQoL questionnaire. ANOVA and logistic regression models were used to analyze the influence of gender, playing sports and mental health treatment. The results obtained showed a worsening of HRQoL in 2021, when young people returned to school on a blended learning basis. This worsening occurred regardless of gender. In 2022, once all restrictions were removed, boys recovered health-related quality of life to pre-pandemic levels, but this did not occur in girls. The same happened with young people in mental health treatment. In all cases, doing sports was shown to be a protective factor for HRQoL.

**Keywords:** Health-related quality of life. HRQoL Adolescents. COVID-19.

### Introduction

The COVID 19 pandemic has had a significant impact on the mental health of the population (Brooks et al., 2020), especially in children and adolescents (Beam & Kim, 2020; Buitrago Ramírez et al., 2021; Valdez-Santiago et al., 2022). The results of different studies showing an increase in anxious-depressive symptoms among children and adolescents are worrying (Cohen et al., 2021; Orgilés Amorós et al., 2021; Pizarro-Ruiz & Ordóñez-Cambor, 2021; Wang et al., 2021; Zhou et al., 2020). Specifically, this prevalence, which before the pandemic ranged from 1.8%-9.4% for depression and 6-20%, for anxiety disorders (Sánchez & Cohen, 2020), is found in figures reaching 20-43.7% in depressive symptoms (Ma et al., 2021) and 18.9-37.4% in anxiety in the first months of lockdown (Nearchou et al., 2020). Different systematic reviews (Chen et al., 2022; Panchal et al., 2021; Panda et al., 2021) continue to yield very high anxiety and depression data in young people, finding a prevalence during lockdown of 63.8%.

Within the child and adolescent population, those with psychiatric and developmental disorders such as Attention Deficit Hyperactivity Disorder (ADHD), Obsessive Com-

pulsive Disorder (OCD), or severe obesity were especially vulnerable to the mental health effects of the pandemic (Theberath et al., 2022). Hards et al. (2022) also found that loneliness due to confinement correlated with increased severity of current anxious-depressive symptomatology, amplifying their previous difficulties. Lopez-Serrano et al. (2021) found an increase in clinical symptoms in young people with mental pathologies after lockdown. This increase was also found in the opinion of healthcare professionals, given that in a study conducted in child and adolescent psychiatric care centers in Europe, the impact perceived by professionals at the psychopathological level in youth and adolescents increased dramatically from “medium” (50%) in 2020 to “strong” or “extreme” (80%) in 2021 (Revet et al., 2021).

Despite these findings, the long-term consequences that the pandemic will have on the mental health of young people (Solaniilla-Salamero et al., 2022) and especially of those young people who previously had mental health problems or previous pathologies are still unknown. In addition, it is necessary to analyze the evolution in mental health understood not only as the presence of clinically relevant symptoms but also in its broad sense, as a state of physical, mental and social well-being. For this purpose, the concept of health-related quality of life (hereinafter HRQoL) is highlighted. Although there are various definitions and instruments to assess global health and quality of life in young people (Costa et al., 2021), HRQoL seems to receive a broad consensus in the field of public health and has been used in large cross-

**\* Correspondence address [Dirección para correspondencia]:**

Juan José López García. Dpto. Psicología Básica y Metodología. Universidad de Murcia (Spain). E-mail: [jilopga@um.es](mailto:jilopga@um.es)

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national studies as a measure of psychological well-being in childhood and adolescence (Aymerich et al., 2005; Ravens-Sieberer, 2008).

Although not very numerous, some work has been done on the impact of COVID on the HRQoL of children and adolescents. In Germany, in a study in young people aged 7 to 17 years on the impact of the first two waves, it was found that the percentage of young people who assessed their HRQoL as low increased from 15.3% before the pandemic to 4.2% in June 2020 and 47.7% in December 2020 (Ravens-Sieberer, et al., 2021). Barbieri et al. (2022) also found a decrease in HRQoL in young people after one year of pandemic. In a systematic review (Nobari et al., 2021) in which 6 papers ( $n=3,177$ ) were analyzed, 4 of them found a significant decrease in HRQoL in children and adolescents, without conclusive results on the differential effect on the basis of gender.

Although there is not total agreement on the impact of the gender and age variables (Nearchou et al., 2020), it has been found that, during the pandemic, anxiety and depression were more prevalent in female population and in younger population (Fancourt et al., 2021; Chawla et al., 2021). Other work has reported a decrease in life satisfaction in young people after the pandemic that was particularly significant among girls (Magson et al., 2021).

On the other hand, increased levels of physical activity are related to better HRQoL (Marker et al., 2018; Wu et al., 2017), as less physical exercise also leads to more social isolation, which negatively impacts the mental health of young people (Hall et al., 2021), which may also imply a negative impact at the level of self-concept in this population (Lindel-Postigo et al., 2020). Wunsch et al. (2021) found a significant association between pre-COVID-19 HRQoL and physical activity during COVID-19 in children under 10 years of age and women, although not in adolescents and children.

Joensen et al. (2022) found that HRQoL decreased after the first lockdown, and so did mental well-being and loneliness, and while the latter two variables did return to pre-pandemic levels, HRQoL never returned to normal. However, these studies have focused on analyzing the impact in the first months of the pandemic, when measures were very strict, such as home confinement or other limitations on social life. For this reason, the aim of this study is to test the effect of the pandemic on the HRQoL of adolescents at three points in time: a) before the pandemic, b) when there were no longer strict home confinements, but measures such as blended learning or social distancing measures were implemented, which came to configure what was called the new normality, and c) when all measures were eliminated, including the use of masks in schools, under the hypothesis that once the restrictions were removed, HRQoL would increase to pre-pandemic levels.

## Methods

### Participants

The sample consisted of 2027 adolescents in 3rd and 4th of Compulsory Secondary Education (CSE) of Molina de Segura, belonging to 10 of the 13 schools of the municipality, distributed in three rounds: 680 minors (51% girls, 92.1% nationals and 62.2% public schools) in 2019, in a pre-pandemic situation, 397 minors (54% girls, 94.9% nationals and 5.4% public schools) in 2021, in a semi-pandemic educational situation with subgroups, social distancing measures, ventilation and use of masks and 950 minors (52% girls, 92.1% nationals and 64.1% public schools) in 2022, once all restrictions were removed. The type of sampling was convenience sampling.

The sample used did not differ by gender in the three rounds ( $\chi^2 = .989; p = .610$ ), nor did it vary significantly by the national/immigrant origin of the student body ( $\chi^2 = 3.693; p = .158$ ). Regarding the type of school, in 2019 and 2022, the sample used did not vary significantly from the actual enrollment rate, which amounted to 35.1% of students in private/charter schools. In 2021, however, due to the semi-presential situation with subgroups and occasional confinements of positive cases, this percentage was higher ( $\chi^2 = 23.007; p < .001$ ).

### Instruments

The KIDSCREEN-10 questionnaire (Ravens-Sieberer et al., 2010) was used as a measure of HRQoL, in its self-report version. It is composed of 10 Likert-type items on a scale of 1 to 5, to indicate how the person is feeling in the last week. It presents good internal consistency ( $\alpha = .82$ ; in this study  $\alpha = .73$ ) and test-retest stability ( $r = .73$ ; ICC = .72). It was developed from Item Response Theory, using the Rasch model. It provides an R or Rasch score and a T score, transformed from the previous one, with mean 50 and standard deviation 10 (KIDSCREEN Group Europe, 2006). The instrument was developed in several European Union countries (Austria, Czech Republic, France, Germany, Greece, Hungary, Ireland, Poland, Spain, Sweden, Switzerland, the Netherlands and the United Kingdom) and has specific scales for each country. In the Spanish adolescent population, according to this scale, the average T-score in boys is 5.95 ( $SD = 8.79$ ) and in girls 48.42 ( $SD = 9.65$ ). Higher values indicate higher HRQoL.

In addition, an ad hoc questionnaire was used that included information on gender, type of school, playing sports, receiving mental health treatment and other sociodemographic data.

**Procedure**

The participation of the 13 secondary schools in the municipality was requested, and 10 of them confirmed their participation. The study was conducted in 3 rounds, in October 2019, in a pre-pandemic situation, in June 2021, in a situation of “new normality”: mandatory use of masks, social distancing and blended learning, and in June 2022, when all restrictions were removed in the schools.

In each round, the authorization of the legal guardians of minors in 3rd and 4th CSE was requested. The questionnaires were administered in the classrooms, coordinated with the guidance team of each school.

**Design, variables and statistical analysis**

A time-delay or time-lag design (Ato et al., 2013) was conducted in three phases with adolescents in 3rd and 4th CSE.

The criterion variables used were:

- HRQoL-T: KIDSCREEN-10 normalized T-score.
- HRQoL-d: dichotomous score of low HRQoL, defined as one standard deviation below the mean, according to gender. In boys, T-score less than or equal to 42.17. In girls, less than or equal to 38.77. The criterion of low HRQoL has been used in other research (Barbieri et al., 2022; Ravens-Sieberer et al., 2021) and represents a relevant decrease in HRQoL.

As predictor variables, in addition to the round (2019, 2021 and 2023) and the gender variable, the following variables were used:

- Playing sports frequently (yes/no), defined as playing sports at least 2 days a week.
- Being in mental health treatment (yes/no) in response to the question “Are you currently receiving any psychological or psychiatric treatment?”

For the statistical treatment, frequency distributions and contingency table analysis were used to describe the variables. For the analysis of HRQoL using the HRQoL-T score, ANOVA was used (with normality and homogeneity of variance assumptions) with post-hoc tests, and nonparametric Mann-Whitney U and Kruskal-Wallis tests. Logistic regression analysis was used to analyze HRQoL using the HRQoL-d score. Statistical analyses were performed with SPSS (v.28) and Jamovi (v. 2.3.16).

Four missing data referring to being in mental health treatment and 18 missing data referring to playing sports were identified. Missing data were eliminated in the statistical treatment of these variables.

**Results**

Table 1 shows the descriptive statistics of HRQoL-T and low HRQoL (HRQoL-d) according to the predictor variables.

**Table 1**  
*Descriptive statistics of HRQoL in the three rounds according to predictor variables.*

Variable	Level	N	2019 M (SD)	%L <sub>HRQoL</sub>	N	2021 M (SD)	% L <sub>HRQoL</sub>	N	2022 M (SD)	% L <sub>HRQoL</sub>
Round		680	44.5(7.11)	23.5	397	41.3(4.67)	42.6	950	43.0(8.33)	35.8
Gender	Man	333	45.8(8.04)	27.6	182	42.6(4.68)	43.4	456	45.7(7.94)	29.2
	Woman	347	43.2(5.84)	19.6	215	40.2(4.39)	41.9	494	40.4(7.88)	41.9
Center	Public	423	44.1(6.59)	24.8	200	41.6(4.45)	39.0	609	42.6(8.58)	37.4
	Private	257	45.0(7.88)	21.4	197	41.1(4.89)	46.2	341	43.6(7.84)	32.8
MH-Treat	No	642	44.7(7.09)	22.1	363	41.4(4.67)	41.9	847	43.7(7.99)	32.3
	Yes	36	41.0(6.86)	47.2	32	4.2(4.72)	53.1	103	36.7(8.45)	64.1
PSports	No	231	43.0(6.60)	31.2	153	4.0(4.73)	52.3	354	4.2(7.81)	46.6
	Yes	433	45.3(7.29)	18.9	242	42.2(4.44)	36.4	596	44.6(8.19)	29.4

Note: N: Sample size; M (SD): Mean (Standard Deviation) of HRQoL-T; % B<sub>HRQoL</sub>: % low HRQoL. MH-Treat: Current Treatment in Mental Health; PSports.: Playing sports regularly.

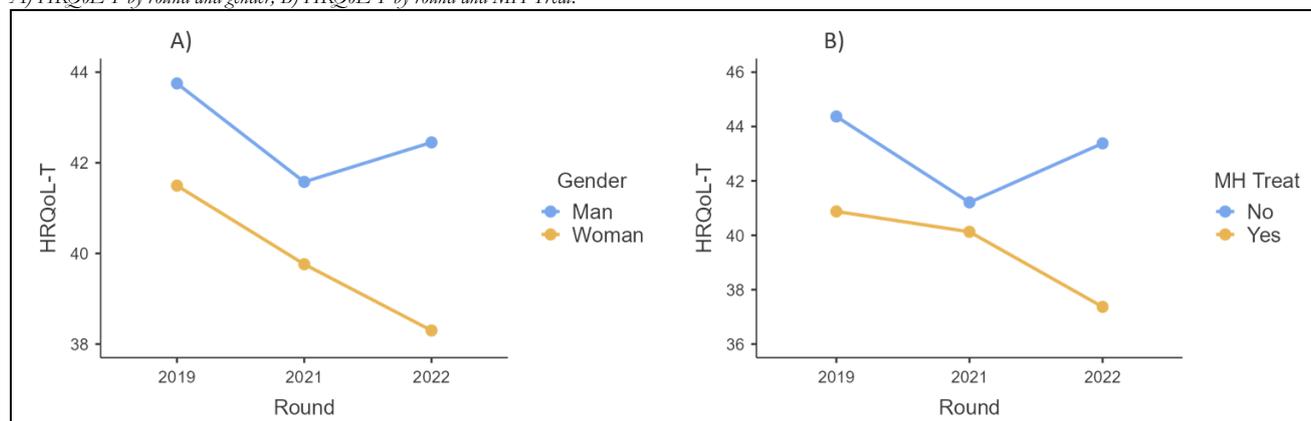
A factorial ANOVA was performed on HRQoL-T with Round, Gender, Mental Health Treatment and Playing Sports as factors. The complete model was statistically significant ( $F_{23, 1981} = 16.314; p < .001$ ), with an effect size of  $\eta^2 = .159$ , but included many non-significant interactions, so we fitted the restricted model in Table 2, which was found to be statistically significant ( $F_{9, 1995} = 41.000; p < .001$ ) with an effect size of  $\eta^2 = .156$ . The contribution of the 9 interactions eliminated was not statistically significant ( $F_{14, 1981} = .531; p = .916$ ).

**Table 2**  
*ANOVA HRQoL-T.*

	SC	df	F	p	$\eta^2_p$
Model	17308.089	9	41.000	< .001	.156
Round	499.280	2	5.322	.005	.005
Gender	3123.242	1	66.586	< .001	.032
MH Treat	1488.686	1	31.738	< .001	.016
PSports	2572.802	1	54.851	< .001	.027
Round*Gender	534.790	2	5.701	.003	.006
Round*MH Treat	583.246	2	6.217	.002	.006
Residual	93576.416	1995			
Total	110884.505	2004			

**Figure 1**

A) HRQoL-T by round and gender, B) HRQoL-T by round and MH Treat.



The analysis of the simple effects of these interactions, as can be seen in Figure 1A and 1B, indicated a significant decrease in HRQoL in men in 2021 and a recovery in 2022. In women, however, no recovery was observed. A similar effect could be observed as a function of being in mental health treatment or not. However, the adjusted ANOVA model did not meet the assumption of normality ( $KS = .063$ ;  $p < .001$ ) nor the assumption of homogeneity of variances ( $F_{23,1981} = 3.579$ ;  $p < .001$ ). Therefore, nonparametric tests were used to confirm these indications.

For men, it was confirmed that HRQoL varied significantly by round ( $KW_2 = 29.803$ ;  $p < .001$ ;  $\epsilon^2 = .031$ ). Using DSCF comparisons, it was found that HRQoL declined in 2021 ( $W_{2019-2021} = -6.342$ ;  $p < .001$ ) and recovered in 2022 ( $W_{2019-2022} = 1.256$ ;  $p = .648$ ). In women, it also varied according to the round ( $KW_2 = 46.428$ ;  $p < .001$ ;  $\epsilon^2 = .044$ ), decreasing in 2021 ( $W_{2019-2021} = -9.000$ ;  $p < .001$ ), although this decline was not recovered by 2022 ( $W_{2019-2022} = -7.960$ ;  $p < .001$ ), remaining at levels equivalent to those of 2021 ( $W_{2021-2022} = .624$ ;  $p = .898$ ).

On the other hand, in young people who were not in mental health treatment, HRQoL varied significantly according to round ( $KW_2 = 55.062$ ;  $p < .001$ ;  $\epsilon^2 = .030$ ), decreasing significantly in 2021 ( $W_{2019-2021} = -1.997$ ;  $p < .001$ ) and recovering in 2022 ( $W_{2019-2022} = -2.820$ ;  $p = .114$ ). In youth who were in treatment, HRQoL was lower and also varied by Round ( $KW_2 = 1.676$ ;  $p = .005$ ;  $\epsilon^2 = .063$ ), although in 2021 it did not differ from that recorded in 2019 ( $W_{2019-2021} = -.340$ ;  $p = .969$ ), with a significant decrease in 2022 ( $W_{2021-2022} = -3.546$ ;  $p = .033$ ).

Finally, playing sports was significantly associated with higher HRQoL ( $U = 334362$ ;  $p < .001$ ).

Alternatively, a categorical analysis was performed, using the binary variable low HRQoL. The full logistic regression model, with the same factors, resulted in statistically significant ( $X^2_{23} = 18.695$ ;  $p < .001$ ) with an  $R^2_{Nagelkerke} = .12$ . From this model, 9 non-significant interactions were eliminated to define the restricted model shown in Table 3, which was statistically significant ( $X^2_8 = 163.779$ ;  $p < .001$ ) with an  $R^2_{Nagelkerke} = .109$ . Comparing the full model with the restricted model, it was verified that the interactions eliminated did not make a statistically significant difference ( $X^2_{15} = 16.916$ ;  $p = .324$ ), thus confirming the goodness-of-fit of the selected model.

**Table 3**  
*Logistic Regression on Low HRQoL.*

Predictor	$\chi^2$	df	$p$
Round	15.577	2	< .001
Gender	9.775	1	.002
MH Treat	4.200	1	.040
PSports	47.176	1	< .001
Round * Gender	12.844	2	.002
Gender * MH Treat	5.532	1	.019

Playing sports reduced by half the risk of showing low HRQoL (Table 4). In the rest of the factors, as there were significant interactions, the simple effects were analyzed. Table 5 compares different rounds according to gender, showing that in men in 2021 the risk of showing low HRQoL was 2 times higher than in 2019. However, in 2022 the risk was equivalent to that of 2019, confirming the recovery indicated above. In the case of women, in 2021 the risk was 2.8 times higher than in 2019, and was maintained in 2022, where it was 2.5 times higher than in 2019.

**Table 4**  
*Coefficients of the logistic regression model.*

Predictor	Estimate	EE	Z	p	OR	OR <sub>95%inf</sub>	OR <sub>95%sup</sub>
Constant	-1.252	.133	-9.423	< .001	.286	.220	.371
Round:							
2021 – 2019	.756	.199	3.795	< .001	2.130	1.442	3.149
2022 – 2019	.138	.165	.838	.402	1.148	.831	1.588
Gender:							
Woman – Man	-.597	.192	-3.109	.002	.550	.378	.802
MH Treat:							
Yes – No	.569	.274	2.072	.038	1.766	1.031	3.023
PSports:							
No – Yes	.715	.104	6.853	< .001	2.045	1.667	2.509
Round * Gender:							
(2021 – 2019) * (Woman – Man)	.288	.282	1.020	.308	1.333	.767	2.318
(2022 – 2019) * (Woman – Man)	.812	.236	3.437	< .001	2.253	1.418	3.580
Gender * MH Treat:							
(Woman – Man) * (Yes – No)	.826	.353	2.338	.019	2.285	1.143	4.567

**Table 5**  
*Simple effects of the Round factor by Gender.*

Moderator levels		Estimate	SE	exp(B)	95% Exp(B) Confidence Interval		z	p
Gender	contrast				Lower	Upper		
Man	2021 - 2019	.756	.199	2.130	1.442	3.149	3.795	< .001
	2022 - 2019	.138	.165	1.148	.831	1.588	.838	.402
Woman	2021 - 2019	1.044	.200	2.841	1.921	4.201	5.231	< .001
	2022 - 2019	.951	.169	2.587	1.858	3.603	5.628	< .001

Regarding being in mental health treatment, the simple effects according to gender (see Table 6) showed that men in treatment had 1.7 times the risk of low HRQoL than those who were not in treatment. In women, the risk was markedly

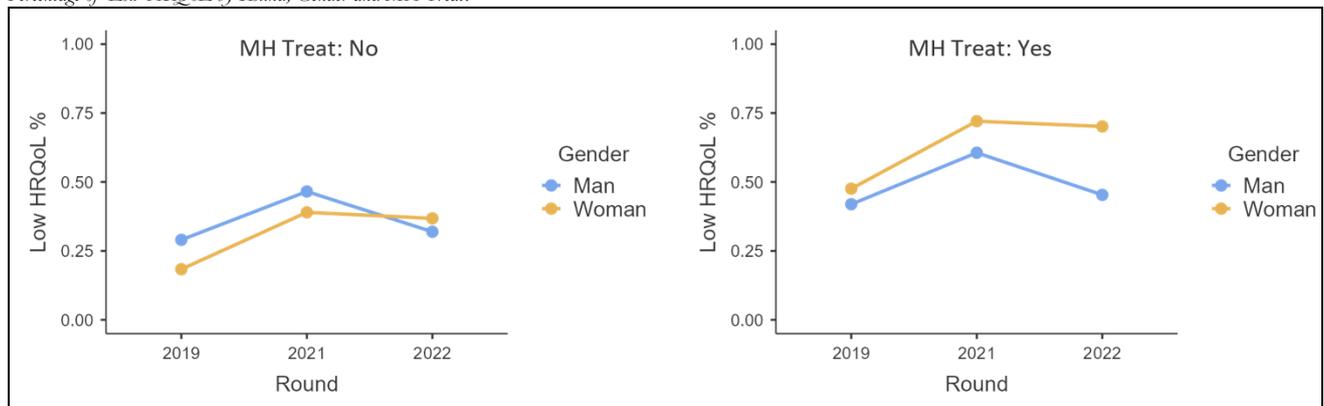
higher. Women in treatment were 4 times more likely to have low HRQoL than those who were not in treatment.

Figure 2 shows the percentage of low HRQoL by gender and round according to being in mental health treatment.

**Table 6**  
*Simple effects of the MH Treat factor by Gender.*

Moderator levels		Estimate	SE	exp(B)	95% Exp(B) CI		z	p
Gender	contrast				Lower	Upper		
Man	Yes - No	.569	.274	1.766	1.031	3.023	2.072	.038
Woman	Yes - No	1.395	.222	4.034	2.613	6.229	6.293	< .001

**Figure 2**  
*Percentage of Low HRQoL by Round, Gender and MH Treat.*



## Discussion

The results obtained in HRQoL-T show a significant decrease in HRQoL during the pandemic (2020), both in men and women, which is congruent with the results of other research (Mikkelsen et al., 2022; Ravens-Sieberer et al., 2021; Riiset et al., 2020). They also show that both before (2019) and during the pandemic (2020), HRQoL was lower in women. This gender difference has been confirmed by other studies before (Langeland et al., 2019) and during the pandemic (Hussong et al., 2022; Plass-Christl et al., 2021), but associating this decrease to the COVID pandemic may entail important methodological problems, since this difference is inherent to gender itself, as evidenced by the KIDSCREEN-10 normative scales in the Spanish population (KIDSCREEN Group Europe, 2006). In this regard, Langeland et al. (2019) confirmed that HRQoL in girls in the first and third year of secondary school was lower than in boys, that in both girls and boys it declined significantly between grades, but the change from 1st to 3rd grade did not differ by gender. Therefore, the interpretation of the results should be done within each gender.

Due to the problems of the T-scores in complying with the assumptions of the statistical tests used, in this study we also chose to use the binary criterion of presenting (or not) low HRQoL, as has also been used in other studies (Barbieri et al., 2022; Ravens-Sieberer et al., 2021), defining low HRQoL as a standard deviation below the average of the national scale. To avoid confounding associated with gender, the average of the national scale for each gender was used.

Based on these data, 23.5% of young people had low HRQoL before the pandemic. This data seems to differ from that reported by Ravens-Sieberer et al. (2021), who reported 15.3% low HRQoL in young Germans before the pandemic. However, the sample used by these authors was qualitatively different. With a sample size of  $n=1586$ , it included two-thirds of 11- to 17-year-olds who completed the KIDSCREEN-10, and one-third of 7- to 10-year-olds with information provided by their parents, whereas the sample in this study comprised mostly 14- to 16-year-olds. As evidenced in other studies, the percentage of low HRQoL reported by parents of young children is lower than the self-report of adolescents (Barbieri et al., 2022) and self-reported HRQoL among young people decreases with age (Hussong et al., 2022; Langeland et al., 2019; Palacio-Vieira et al., 2008; Plass-Christl et al., 2021), which could justify the difference observed.

After lockdown, in June 2021, when the restriction measures had been relaxed and the school was returned to blended learning, the percentage of young people with low quality of life grew significantly (from 23% to 42%), with an increase of 19%. Ravens-Sieberer, Erhart, et al. (2022) analyzed the effect of the first 3 waves of the pandemic in Germany and estimated the low HRQoL at 48.1% in January 2021 after the second wave, when the country was confined, and 35.5% in October 2021, after the third wave, when the

number of deaths had decreased significantly and restrictions had been relaxed. This third wave would be comparable to the second round of this study and shows in young Germans an increase in the percentage of low HRQoL of 20%, very similar to that found in this study. In any case, a significant decline in HRQoL associated with the pandemic is observed, as has also been corroborated by other studies (Barbieri et al., 2022; Hussong et al., 2022; Mikkelsen et al., 2022; Ravens-Sieberer, Kaman, et al., 2022; Riiser et al., 2020).

The percentage of low HRQoL increased significantly during the pandemic, in both men and women, as has also been confirmed by other studies (Nobari et al., 2021; Ravens-Sieberer, Erhart, et al., 2022). It is in 2022, after the pandemic, when an important change in trend is observed: while in men there is a recovery of HRQoL, returning to pre-pandemic levels (from 43.4% to 29.2%), in women there is no recovery, remaining at 2021 levels (41.9%). This would indicate a possible long-lasting effect in women, more so than in men (Ravens-Sieberer, Erhart, et al., 2022). The gender difference in post-pandemic recovery has also been addressed in other studies that indicate greater involvement in women and slower recovery (Condom et al., 2022; Cuadrado et al., 2023).

The percentage of youth reporting being in mental health treatment grew significantly in the pandemic (from 5.6% in 2019 to 8.8% in 2021) and continued to increase after the pandemic (12.1% in 2022). In general, young people in treatment had a higher percentage of low HRQoL, much more pronounced among females. Joensen et al. (2022) and Plass-Christl et al. (2021) also confirmed this association and gender difference, which has even manifested itself in the increase of suicide attempts among adolescent girls (Valdez-Santiago et al., 2022).

Comparing the samples of young people in treatment and without treatment, the pattern of the three rounds according to gender is identical: after the pandemic there is a recovery of HRQoL but only in men. Females maintain the HRQoL levels they showed in the pandemic. In 2021, 7.2% of men reported being on treatment, compared to 8.9% of women. In 2022, these percentages were 7% and 14.4%, respectively. These data may again point to long-lasting effects associated with the pandemic in women.

Physical exercise has been associated with better HRQoL regardless of gender and round. However, low HRQoL increased during the pandemic for both those who practiced sport and those who did not, as also confirmed by Wolf et al. (2021) and Li et al. (2022). It also decreased in both groups after the pandemic, but in all cases the variations were homogeneous. Therefore, sports practice seems to represent a protective factor for HRQoL, as also suggested by Basterfield et al. (2022).

Some limitations of this study are its cross-sectional nature. Nevertheless, the sample size was sufficient, although it was limited by the semi-presential nature of the study in 2021. The preexistence of a pre-pandemic study and the

situation of semi-presence limited this study to a single HRQoL indicator. Finally, the age range of 14 to 16 years implies that the conclusions of this study should be limited to adolescence. It would be interesting, in future studies, to be able to use samples with greater territorial coverage, of a longitudinal nature and different HRQoL indicators.

## Conclusions

This study provides relevant information on HRQOL in young people after the pandemic, showing a differential effect associated with gender: while men show a recovery of HRQoL after the pandemic, women's HRQoL remains at the same level as during the pandemic. This highlights the need to take direct intervention measures for the care and

promotion of the mental health of young people, such as the implementation of educational programs on awareness and promotion of mental health care habits, as well as the promotion of sports practice. At the same time, it would be advisable to increase and intensify care resources for young people with mental health problems, in order to curb the chronification of problems exacerbated or caused by the pandemic. All interventions should take into account the gender perspective.

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## References

- Ato, M., López-García, J. J., & Benavente, A. (2013). A classification system for research designs in psychology. *Anales de Psicología*, *29*(3), 1038-1059. <https://doi.org/1.6018/analesps.29.3.178511>
- Aymerich, M., Berra, S., Guillaumon, I., Herdman, M., Alonso, J., Ravens-Sieberer, U., & Rajmil, L. (2005). Desarrollo de la versión en español del KIDSCREEN, un cuestionario de calidad de vida para la población infantil y adolescente [Development of the Spanish version of the KIDSCREEN, a health-related quality of life instrument for children and adolescents]. *Gaceta Sanitaria*, *19*(2), 93-102. <https://doi.org/1.1157/13074363>
- Barbieri, V., Wiedermann, C. J., Kaman, A., Erhart, M., Piccoliori, G., Plagg, B., Mahlknecht, A., Ausserhofer, D., Engl, A., & Ravens-Sieberer, U. (2022). Quality of Life and Mental Health in Children and Adolescents after the First Year of the COVID-19 Pandemic: A Large Population-Based Survey in South Tyrol, Italy. *International Journal of Environmental Research and Public Health*, *19*(9), 522. <https://doi.org/1.3390/ijerph19095220>
- Basterfield, L., Burn, N. L., Galna, B., Batten, H., Goffe, L., Karolyte, G., Lawn, M., & Weston, K. L. (2022). Changes in children's physical fitness, BMI and health-related quality of life after the first 2020 COVID-19 lockdown in England: A longitudinal study. *Journal of Sports Sciences*, *40*(10), Art. 1.
- Beam, C. R., & Kim, A. J. (2020). Psychological sequelae of social isolation and loneliness might be a larger problem in young adults than older adults. *Psychological Trauma: Theory, Research, Practice and Policy*, *12*(S1), S58-S6. <https://doi.org/1.1037/tra0000774>
- Brooks, S. K., Webster, R. K., Smith, L. E., Woodland, L., Wessely, S., Greenberg, N., & Rubin, G. J. (2020). The psychological impact of quarantine and how to reduce it: Rapid review of the evidence. *The Lancet*, *395*(10227), 912-92. [https://doi.org/1.1016/S0140-6736\(20\)30460-8](https://doi.org/1.1016/S0140-6736(20)30460-8)
- Buitrago Ramírez, F., Ciurana Misol, R., Fernández Alonso, M. del C., & Tizón, J. L. (2021). Pandemia de la COVID-19 y salud mental: Reflexiones iniciales desde la atención primaria de salud española [COVID-19 pandemic and mental health: Initial considerations from spanish primary health care]. *Atención Primaria*, *53*(1), 89-101. <https://doi.org/1.1016/j.aprim.202.06.006>
- Chawla, N., Tom, A., Sen, M. S., & Sagar, R. (2021). Psychological Impact of COVID-19 on Children and Adolescents: A Systematic Review. *Indian Journal of Psychological Medicine*, *43*(4), 294-299. <https://doi.org/1.1177/02537176211021789>
- Chen, J., Yang, K., Cao, Y., Du, Y., Wang, N., & Qu, M. (2022). Depressive Symptoms Among Children and Adolescents in China During the Coronavirus Disease-19 Epidemic: A Systematic Review and Meta-Analysis. *Frontiers in Psychiatry*, *13*, 870346. <https://doi.org/1.3389/fpsy.2022.870346>
- Cohen, Z. P., Cosgrove, K. T., DeVille, D. C., Akeman, E., Singh, M. K., White, E., Stewart, J. L., Aupperle, R. L., Paulus, M. P., & Kirlic, N. (2021). The Impact of COVID-19 on Adolescent Mental Health: Preliminary Findings From a Longitudinal Sample of Healthy and At-Risk Adolescents. *Frontiers in Pediatrics*, *9*. <https://doi.org/1.3389/fped.2021.622608>
- Condom, L. C., Coppin, O. V., Bellido, S. C., & Trigo, C. F. (2022). Estado anímico en jóvenes de Barcelona provincia: evolución, factores asociados e impacto de la pandemia [State of mind in adolescents in Barcelona province (Spain): Evolution, associated factors and impact of the pandemic]. *Revista Española de Salud Pública*, *96*(2/11). <https://dialnet.unirioja.es/servlet/articulo?codigo=8655677>
- Costa, D. S. J., Mercieca-Bebber, R., Rutherford, C., Tait, M.-A., & King, M. T. (2021). How is quality of life defined and assessed in published research? *Quality of Life Research*, *30*(8), 2109-2121. <https://doi.org/1.1007/s11136-021-02826-0>
- Cuadrado, E., Rich-Ruiz, M., Gutiérrez-Domingo, T., Luque, B., Castillo-Mayén, R., Villacéja, J., & Farhane-Medina, N. Z. (2022). Regulatory emotional self-efficacy and anxiety in times of pandemic: a gender perspective. *Health psychology and behavioral medicine*, *11*(1), 2158831. <https://doi.org/1.1080/2164285.2022.2158831>
- Fancourt, D., Bu, F., Mak, H. W., Paul, E., & Steptoe, A. (2021). *Covid-19 Social Study. Results Release* 32. UCL. [https://www.covidsocialstudy.org/\\_files/ugd/3d9db5\\_c559cf48943940b196853ce33da1e8b2.pdf](https://www.covidsocialstudy.org/_files/ugd/3d9db5_c559cf48943940b196853ce33da1e8b2.pdf)
- Hall, G., Laddu, D. R., Phillips, S. A., Lavie, C. J., & Arena, R. (2021). A tale of two pandemics: How will COVID-19 and global trends in physical inactivity and sedentary behavior affect one another? *Progress in Cardiovascular Diseases*, *64*, 108-11. <https://doi.org/1.1016/j.pcad.202.04.005>
- Hards, E., Loades, M. E., Hignson-Sweeney, N., Shafran, R., Serafimova, T., Brigden, A., Reynolds, S., Crawley, E., Chatburn, E., Linney, C., McManus, M., & Borwick, C. (2022). Loneliness and mental health in children and adolescents with pre-existing mental health problems: A rapid systematic review. *British Journal of Clinical Psychology*, *61*(2), Art. 2. <https://doi.org/1.1111/bjc.12331>
- Hussong, J., Möhler, E., Kühn, A., Wenning, M., Gehrke, T., Burckhart, H., Richter, U., Nonnenmacher, A., Zemlin, M., Lücke, T., Brinkmann, F., Rothoef, T., & Lehr, T. (2022). Mental Health and Health-Related Quality of Life in German Adolescents after the Third Wave of the COVID-19 Pandemic. *Children*, *9*(6), 78. <https://doi.org/1.3390/children9060780>
- Joensen, A., Danielsen, S., Andersen, P. K., Groot, J., & Strandberg-Larsen, K. (2022). The impact of the initial and second national COVID-19 lockdowns on mental health in young people with and without pre-existing depressive symptoms. *Journal of Psychiatric Research*, *149*, 233-242. <https://doi.org/1.1016/j.jpsychires.2022.03.001>

- KIDSCREEN Group Europe. (2006). *The KIDSCREEN questionnaires. Quality of life questionnaires for children and adolescents—Handbook*. Papst Science Publisher.
- Langeland, I. O., Sollesnes, R., Nilsen, R. M., Almending, G., & Langeland, E. (2019). Examining boys' and girls' health-related quality of life from the first to the third year of upper secondary school: A prospective longitudinal study. *Nursing Open*, 6(4), 1606-1614. <https://doi.org/1.1002/nop2.366>
- Li, M., Wang, Q., & Shen, J. (2022). The Impact of Physical Activity on Mental Health during COVID-19 Pandemic in China: A Systematic Review. *International Journal of Environmental Research and Public Health*, 19(11). <https://doi.org/1.3390/ijerph19116584>
- Lindell-Postigo, D., Zurita-Ortega, F., Ortiz-Franco, M., & González-Valero, G. (2020). Cross-Sectional Study of Self-Concept and Gender in Relation to Physical Activity and Martial Arts in Spanish Adolescents during the COVID-19 Lockdown. *Education Sciences*, 10(8), Art. 8. <https://doi.org/1.3390/educsci10080210>
- Lopez-Serrano, J., Díaz-Bóveda, R., González-Vallespi, L., Santamarina-Pérez, P., Bretones-Rodríguez, A., Calvo, R., & Lera-Miguel, S. (2021). Psychological impact during COVID-19 lockdown in children and adolescents with previous mental health disorders. *Revista de Psiquiatría y Salud Mental*. <https://doi.org/1.1016/j.rpsm.2021.04.002>
- Ma, L., Mazidi, M., Li, K., Li, Y., Chen, S., Kirwan, R., Zhou, H., Yan, N., Rahman, A., Wang, W., & Wang, Y. (2021). Prevalence of mental health problems among children and adolescents during the COVID-19 pandemic: A systematic review and meta-analysis. *Journal of Affective Disorders*, 293, 78-89. <https://doi.org/1.1016/j.jad.2021.06.021>
- Magson, N. R., Freeman, J. Y. A., Rapee, R. M., Richardson, C. E., Oar, E. L., & Fardouly, J. (2021). Risk and Protective Factors for Prospective Changes in Adolescent Mental Health during the COVID-19 Pandemic. *Journal of Youth and Adolescence*, 50(1), 44-57. <https://doi.org/1.1007/s10964-020-01332-9>
- Marker, A. M., Steele, R. G., & Noser, A. E. (2018). Physical activity and health-related quality of life in children and adolescents: A systematic review and meta-analysis. *Health Psychology: Official Journal of the Division of Health Psychology, American Psychological Association*, 37(10), 893-903. <https://doi.org/1.1037/hea0000653>
- Mikkelsen, H. T., Skarstein, S., Helseth, S., Smastuen, M. C., Haraldstad, K., & Rohde, G. (2022). Health-related quality of life, health literacy and COVID-19-related worries of 16-to 17-year-old adolescents and parents one year into the pandemic: A cross-sectional study. *Bmc Public Health*, 22(1), 1321. <https://doi.org/1.1186/s12889-022-13737-1>
- Nearchou, F., Flinn, C., Niland, R., Subramaniam, S. S., & Hennessy, E. (2020). Exploring the Impact of COVID-19 on Mental Health Outcomes in Children and Adolescents: A Systematic Review. *International Journal of Environmental Research and Public Health*, 17(22), 8479. <https://doi.org/1.3390/ijerph17228479>
- Nobari, H., Fashi, M., Eskandari, A., Villafaina, S., Murillo-Garcia, A., & Perez-Gomez, J. (2021). Effect of COVID-19 on Health-Related Quality of Life in Adolescents and Children: A Systematic Review. *International Journal of Environmental Research and Public Health*, 18(9), 4563. <https://doi.org/1.3390/ijerph18094563>
- Orgilés Amorós, M., Espada Sánchez, J. P., Delvecchio, E., Francisco, R., Mazzeschi, C., Pedro, M., & Morales Sabuco, A. (2021). Anxiety and depressive symptoms in children and adolescents during COVID-19 pandemic: A transcultural approach. *Psicothema*, 33(1), 125-13. <https://doi.org/1.7334/psicothema202.287>
- Palacio-Vieira, J. A., Villalonga-Olives, E., Valderas, J. M., Espallargues, M., Herdman, M., Berra, S., Alonso, J., & Rajmil, L. (2008). Changes in health-related quality of life (HRQoL) in a population-based sample of children and adolescents after 3 years of follow-up. *Quality of Life Research: An International Journal of Quality of Life Aspects of Treatment, Care & Rehabilitation*, 17(10), 1207-1215. <https://doi.org/1.1007/s11136-008-9405-7>
- Panchal, U., Salazar de Pablo, G., Franco, M., Moreno, C., Parellada, M., Arango, C., & Fusar-Poli, P. (2021). The impact of COVID-19 lockdown on child and adolescent mental health: Systematic review. *European Child & Adolescent Psychiatry*, 1-27. <https://doi.org/1.1007/s00787-021-01856-w>
- Panda, P. K., Gupta, J., Chowdhury, S. R., Kumar, R., Meena, A. K., Madaan, P., Sharawat, I. K., & Gulati, S. (2021). Psychological and Behavioral Impact of Lockdown and Quarantine Measures for COVID-19 Pandemic on Children, Adolescents and Caregivers: A Systematic Review and Meta-Analysis. *Journal of Tropical Pediatrics*, 67(1). <https://doi.org/1.1093/tropej/fmaa122>
- Pizarro-Ruiz, J. P., & Ordóñez-Cambor, N. (2021). Effects of Covid-19 confinement on the mental health of children and adolescents in Spain. *Scientific Reports*, 11(1), Art. 1. <https://doi.org/1.1038/s41598-021-91299-9>
- Plass-Christl, A., Ravens-Sieberer, U., Hölling, H., & Otto, C. (2021). Trajectories of health-related quality of life in children of parents with mental health problems: Results of the BELLA study. *Quality of Life Research*, 30(7), 1841-1852. <https://doi.org/1.1007/s11136-021-02783-8>
- Ravens-Sieberer, U., Erhart, M., Devine, J., Gilbert, M., Reiss, F., Barkmann, C., Siegel, N. A., Simon, A. M., Hurrelmann, K., Schlack, R., Hölling, H., Wieler, L. H., & Kaman, A. (2022). Child and Adolescent Mental Health During the COVID-19 Pandemic: Results of the Three-Wave Longitudinal COPSYP Study. *Journal of Adolescent Health*. <https://doi.org/1.1016/j.jadohealth.2022.06.022>
- Ravens-Sieberer, U., Erhart, M., Gosch, A., & Wille, N. (2008). Mental health of children and adolescents in 12 European countries—Results from the European KIDSCREEN Study. *Clinical Psychology & Psychotherapy*, 15(3), 154-163. <https://doi.org/1.1002/cpp.574>
- Ravens-Sieberer, U., Erhart, M., Rajmil, L., Herdman, M., Auquier, P., Bruil, J., Power, M., Duer, W., Abel, T., Czerny, L., Mazur, J., Czimbalmos, A., Tountas, Y., Hagquist, C., & Kilroe, J. (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: An International Journal of Quality of Life Aspects of Treatment, Care & Rehabilitation*, 19(10), 1487-150. <https://doi.org/1.1007/s11136-010-9706-5>
- Ravens-Sieberer, U., Kaman, A., Erhart, M., Devine, J., Schlack, R., & Otto, C. (2022). Impact of the COVID-19 pandemic on quality of life and mental health in children and adolescents in Germany. *European Child & Adolescent Psychiatry*, 31(6), 879-889. <https://doi.org/1.1007/s00787-021-01726-5>
- Ravens-Sieberer, U., Kaman, A., Erhart, M., Otto, C., Devine, J., Löffler, C., Hurrelmann, K., Bullinger, M., Barkmann, C., Siegel, N. A., Simon, A. M., Wieler, L. H., Schlack, R., & Hölling, H. (2021). Quality of life and mental health in children and adolescents during the first year of the COVID-19 pandemic: Results of a two-wave nationwide population-based study. *European Child & Adolescent Psychiatry*. <https://doi.org/1.1007/s00787-021-01889-1>
- Revet, A., Hebebrand, J., Anagnostopoulos, D., Kehoe, L. A., Gradl-Dietsch, G., Anderlüh, M., Armando, M., Askenazy, F., Banaschewski, T., Bender, S., Bernardon, A., Brunner, R., Cortese, S., Delorme, R., Deschamps, P., Dodig-Čurković, K., Drobnic Radobuljac, M., Dubicka, B., Falkenberg Krantz, M., ... COVID-19 Child and Adolescent Psychiatry Consortium. (2021). Perceived impact of the COVID-19 pandemic on child and adolescent psychiatric services after 1 year (February/March 2021): ESCAP CovCAP survey. *European Child & Adolescent Psychiatry*. <https://doi.org/1.1007/s00787-021-01851-1>
- Rüser, K., Helseth, S., Haraldstad, K., Torbjørnsen, A., & Richardsen, K. R. (2020). Adolescents' health literacy, health protective measures, and health-related quality of life during the Covid-19 pandemic. *PLoS ONE*, 15(8), e0238161. <https://doi.org/1.1371/journal.pone.0238161>
- Sánchez, P., & Cohen, D. (2020). Ansiedad y depresión en niños y adolescentes [Anxiety and depression in children and adolescents]. *Adolescere*, 8(1), 16-27.
- Solanilla Salamero, E., Trucharte Álvarez, C., & Guerrero García, C. (2022). El impacto de la COVID-19 en la salud mental de los adolescentes y su relación con las redes sociales [The impact of COVID-19 on adolescents' mental health and its relation with social media]. *Atención Primaria*, 54(1), 102149. <https://doi.org/1.1016/j.aprim.2021.102149>
- Theberath, M., Bauer, D., Chen, W., Salinas, M., Mohabbat, A. B., Yang, J., Chon, T. Y., Bauer, B. A., & Wähler-Roedler, D. L. (2022). Effects of COVID-19 pandemic on mental health of children and adolescents: A systematic review of survey studies. *SAGE Open Medicine*, 10, 2050312122108671. <https://doi.org/1.1177/2050312122108671>

- Valdez-Santiago, R., Villalobos, A., Arenas-Monreal, L., González-Forteza, C., Hermosillo-de-la-Torre, A. E., Benjet, C., & Wagner, F. A. (2022). Comparison of suicide attempts among nationally representative samples of Mexican adolescents 12 months before and after the outbreak of the Covid-19 pandemic. *Journal of Affective Disorders*, *298*(Part A), 65-68. <https://doi.org/1.1016/j.jad.2021.1.111>
- Wang, C., López-Núñez, M. I., Pan, R., Wan, X., Tan, Y., Xu, L., Choo, F., Ho, R., Ho, C., & García, M. E. A. (2021). The Impact of the COVID-19 Pandemic on Physical and Mental Health in China and Spain: Cross-sectional Study. *JMIR Formative Research*, *5*(5), e27818. <https://doi.org/1.2196/27818>
- Wolf, S., Seiffer, B., Zeibig, J.-M., Welkerling, J., Brokmeier, L., Atrott, B., Ehring, T., & Schuch, F. B. (2021). Is Physical Activity Associated with Less Depression and Anxiety During the COVID-19 Pandemic? A Rapid Systematic Review. *Sports Medicine (Auckland, N.Z.)*, *51*(8), 1771-1783. <https://doi.org/1.1007/s40279-021-01468-z>
- Wu, X. Y., Han, L. H., Zhang, J. H., Luo, S., Hu, J. W., & Sun, K. (2017). The influence of physical activity, sedentary behavior on health-related quality of life among the general population of children and adolescents: A systematic review. *PLOS ONE*, *12*(11), e0187668. <https://doi.org/1.1371/journal.pone.0187668>
- Wunsch, K., Nigg, C., Niessner, C., Schmidt, S. C. E., Oriwol, D., Hanssen-Doose, A., Burchartz, A., Eichsteller, A., Kolb, S., Worth, A., & Woll, A. (2021). The Impact of COVID-19 on the Interrelation of Physical Activity, Screen Time and Health-Related Quality of Life in Children and Adolescents in Germany: Results of the Motorik-Modul Study. *Children (Basel, Switzerland)*, *8*(2), 98. <https://doi.org/1.3390/children8020098>
- Zhou, S.-J., Zhang, L.-G., Wang, L.-L., Guo, Z.-C., Wang, J.-Q., Chen, J.-C., Liu, M., Chen, X., & Chen, J.-X. (2020). Prevalence and socio-demographic correlates of psychological health problems in Chinese adolescents during the outbreak of COVID-19. *European Child & Adolescent Psychiatry*, *29*(6), 749-758. <https://doi.org/1.1007/s00787-020-01541-4>