



# Adolescent Well-being and Life Satisfaction: Impact of Digital Technology Usage

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## Abstract

**Background:** Digital technologies have significantly changed the way adolescents perceive the world around them. The perception of the social environment is crucial for their well-being and health. **Objectives:** This paper aims to evaluate the relationship between the perceived life circumstances of adolescents, such as dietary habits, physical activity, obesity, subjective health, the use of digital technology devices, and the level of occupancy with school obligations. **Methods/Approach:** The survey research was conducted on a sample of adolescents between the ages of 11 and 15. Data was analysed using regression analysis and association rules. **Results:** The results present a moderate positive correlation between the level of school obligations and life satisfaction or subjective health, while for the independent variable, time spent in front of screens, the strength of the relationship is moderate and negative. **Conclusions:** The model represents a useful starting point for the recommendations for creating patterns to influence life satisfaction and well-being in adolescence. It provides insight into the potential optimisation of school obligations of adolescents according to the level of life satisfaction, subjective perception of health, and time spent in front of the screen.

**Keywords:** adolescence, subjective health, life satisfaction, school obligations, physical activity, digital technologies, regression, association rules

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## Introduction

The share of adolescents in the world's population is 16%, which is 1.2 billion adolescents between the ages of 10 – 19 (Patton et al., 2016). According to the results of the Institute for Health Metrics and Evaluation (IHME), in middle-income and low-income countries (LMIC), 13%–15% of adolescents are coping with a mental disorder of some kind (*Global Burden of Disease*, 2023; James et al., 2018).

The importance of the topics covered in this paper is demonstrated by the information about the adolescent's degree of life satisfaction, which is determined by the amount of stress they consider for school-related commitments. In this article, we are using data from the Croatian Institute for Public Health in 2018, which was collected based on a sample survey of a population of 2112 adolescents and limited only to the territory of the Republic of Croatia. Respondents were the elementary unit of the survey.

The special importance of this analysis is to find out the impact of social and health by drawing special attention to the importance of school obligations, physical activity, eating habits, and obesity conditions in adolescent years by acceptance of life commitments. The qualitative aspect of the description in the paper is further supported by wealthy research findings of theorists who are dealing with the mental health of children by finding interactivity among key factors and links between social issues in the context of personal perception of health that more or less positively affect the level of life satisfaction in adolescence about the amount of school obligations, all of which this paper proves.

The article is further assisted by many research findings of theorists who are dealing with the mental health of children. The level of life satisfaction in adolescence is influenced by key impacts of interconnection and correlation between social issues in the context of personal perception of health with different intensities.

All the already existing research of theorists pays particular attention to concerns that have shown up due to cognitive development and mental adolescent health (Crisanti et al., 2017; Shankar et al., 2017). The authors emphasise the importance of adolescent relationships in the family and with peers, which influence the fulfilment of school obligations. (Haslam et al., 2016, p. 4; Jegannathan et al., 2014). For years, other authors argued that in a case of missing key factors, such as unstable food supply and inadequate nutrition, psychological distress might occur, depression, anxiety or problems with mental health and the already stated ones have proven to be the principal causes of disability in the global capacity in the younger population (children and adolescents) (Halfors et al., 2011; Whitsett et al., 2019).

This research aims to determine the relationship between the preoccupation with school duties and certain determinants that are related to the life circumstances faced by young people in adolescence. Moreover, an attempt is made to explain the correlation between variables related to general life situations and the level of school obligations of adolescents. This research tries to answer the following questions: 1) How do the determinants of life circumstances, such as life satisfaction and physical activity in young people, influence the preoccupation with school obligations in adolescence? 2) Do the problems of today, such as excessive time spent in front of the screen and bad eating habits among adolescents, affect the level of school obligations?

Based on the obtained results, a model will be set up to recommend the optimal determination of the level of school obligations according to other life circumstances in adolescents. The results suggest which variables in the model should be selected to optimise the level of school obligations. The technique of associative rules will be used

to examine the observed variables in the model better to explain the relational relationships in the data set.

This paper begins with a literature review of the life circumstances that young people in adolescence encounter to describe the possible influence that different determinants, such as life satisfaction, physical activity, or eating habits, would have on the level of school obligations. Furthermore, the methods that were applied in the paper are defined together with the sample and the research instrument that was chosen for this research. The results of the research are presented, which should answer the research questions, that is, give certain findings about the influence of the situations and habits of adolescents regarding the presence of school obligations. Finally, the paper ends with a discussion of today's problems in adolescence and a conclusion with relevant implications and suggestions for future research.

## Literature review

Adolescence is a phase of maturation and a sensitive period of rapid emotional, cognitive, social, and neurological development. During this turbulent period, adolescents learn how to build relationships outside of the home, cope with challenging life events and learn healthy behaviours and habits that are more likely to continue into adulthood. Also, it was found that adolescents' health, well-being, and attitudes are greatly influenced by their social and physical environment. The period in adolescence is a phase of identity development, i.e., understanding one's self (Freeman & Block, 2021).

In their research, Murphy et al. (2020) focused on both challenges and advantages faced by adolescents living in urban areas (this topic is especially important during this sensitive period of social and neural development). Research by a group of authors has shown that creating a healthy home environment and ensuring parental presence and supervision at home can prevent misbehaviour even in the most challenging situations (Leung & Zhang, 2000; Nickerson & Nagle, 2004). Special attention is paid to the period of adolescent development: "Investing in adolescent's well-being and health [including mental health] attains a threefold dividend of advantages now, in the lives of adults in the future, and the lives of future generations of children (Hancox et al., 2005)."

### *School obligations issues*

School achievement during adolescence, as one of the indicators of success later in life, is one of the key factors that influences adolescents' life satisfaction.

Many researchers deal with the influence of the media on students' school achievement. While media use doubtlessly plays an important role in students' lives, its influence, however, can have both non-negative and positive impacts on students' school achievements (Adelantado-Renau et al., 2019; Mao et al., 2022). Some studies have shown a distorted association between the following variables, i.e., moderate media use contributes to students' school achievements, while excessive use can have a negative impact on it. This finding was also consistent with the one in a large meta-analysis that revealed a negative association between media use and school achievements (Guzikova, 2020; Huang, 2018; Mehmetaj & Zulfu Alili, 2020). Additionally, other researchers emphasised a consistent relationship between media use and sleeping or learning, as well as students' passivity (Kostyrka-Allchorne et al., 2017; Sharma et al., 2017).

Some anxiety triggers among adolescents are excessive media use, lack of routine, and eating issues (that could lead to eating disorders) (Schwartz & Costello, 2021).

### *Life satisfaction issues*

According to the World Happiness Report, in 2022, the majority of adults reported being satisfied with their lives. The most children and adolescents report positive levels of life satisfaction (Aknin & Wang, 2022). It is essential to remember the universal desire for happiness and the capacity of individuals to rally to each other's support in times of great need (Helliwell et al., 2022). The findings by these results reflect those of a group of authors who also found that most children and adolescents reported a generally higher level of life satisfaction (McCullough & Huebner, 2003; Park & Huebner, 2005; Siyez & Kaya, 2008).

International survey results from the following countries, namely America, Israel, South Korea, and China, showed a universal decline in life satisfaction at the beginning and during adolescence. Job loss has a negative effect on employees' well-being and self-esteem (Chang et al., 2003; Creed et al., 2003; Suldo & Huebner, 2004). A longitudinal study by Kwon (2020) showed that adolescents who dropped out of school reported a lower level of life satisfaction and higher rates of depression.

The results of the longitudinal study revealed that job abandonment was associated with life circumstances, which indicates that full-time employees reported higher levels of life satisfaction and lower financial stress in comparison to full/part-time students and former students who are currently in the labour market (Creed et al., 2003; Patton & Noller, 1984).

The study conducted by Tomić-Koludrović (1999) revealed that adolescents in Croatia were aware of music, fashion, and Western trends. However, the existing differences in consumption among adolescents were most likely related to peer group identification. Both Kwon (2020) and Valois et al. (2004) found similar results among American students; in a study conducted by Kwon (2020), there was a positive correlation between life satisfaction and meaningful involvement in an instrumental activity, while Valois et al. (2004) confirmed that diverse physical activity is related to higher life satisfaction.

### *Health issues*

Adolescence is a period of maturation and development characterised by changes in eating habits, sedentary behaviour, physical activity, and psychological health. Several studies have investigated the relationship between adolescents' life satisfaction and high-risk behaviours, such as violence and aggression, which can lead to premature mortality (Valois et al., 2006). There is a connection between adolescents' life satisfaction and risky behaviour, such as physical fighting. Based on the authors' findings, there was a connection between life happiness and feelings of insecurity at school, threats of injury, school trips, and property theft (Valois et al., 2001).

When it comes to participation in sports and physical activities among adolescents, the results show a decrease in girls' physical activity levels. On the other hand, there is an increase in adolescent depression, physical problems, and sedentary behaviour (Ortega et al., 2008). Magson et al. (2021) argue that exposure to the news is related to anxiety among adolescents. The pandemic caused an increase in anxiety and other mental conditions. Many adolescents had to cope with uncertainty and stress during the pandemic, and the pandemic impacted their lives in a way no one could predict (Smirni et al., 2020). According to Stephenson (2021), the pandemic impacted teenagers' mental health in a way that only one in three teenagers was able to cope with the ongoing stress created by the pandemic.

The adolescents' quality of attachment to parents is higher than attachment to friends, which is positively associated with life satisfaction. On the other hand, these

findings do not match those of American and Chinese youth (Huang, 2018; Stephenson, 2021).

### *Obesity issues*

Obesity is defined as an eating disorder caused by excessive food consumption that leads to long-term health problems and usually begins in childhood or during adolescence. In 2016, overweight and obesity affected an estimated 340 million children and adolescents aged 5-19 (*World Health Organization, 2023*). In addition to these findings, Valois et al. (2003) pointed out that several variables, namely weight loss diets, poor weight perception, weight loss attempts, vomiting, and taking weight loss medications or laxatives among adolescents, were negatively associated with life satisfaction.

Moreover, a negative correlation has been found between the body composition of school-age children and physical fitness (Abu Hanifah et al., 2013; Botelho et al., 2013; Brunet et al., 2007). Childhood obesity and overweight are associated with an increased risk of cardiometabolic diseases (Brouwer et al., 2013). Many studies have shown that physical exercise can lessen the risk of childhood obesity, prevent or reduce the symptoms of depression, and boost self-esteem (Nassis et al., 2005; Ortega et al., 2008).

### *Eating habits issues*

According to the Fourth Edition of the Diagnostic and Statistical Manual of Mental Disorders, the American Psychiatric Association distinguishes two types of eating disorders: Anorexia nervosa (AN) and bulimia nervosa (BN). Some psychological, behavioural, and interpersonal factors that may contribute to eating disorders among young people are perfectionism, low self-esteem, neuroticism, and sadness (Halvorsen & Heyerdahl, 2006; Proctor et al., 2017). Furthermore, the following factors, such as low self-esteem, depression, poor self-esteem, neuroticism, and maladaptive perfectionism, are also linked to life satisfaction among adolescents (Gilman et al., 2005).

### *Digital devices usage*

Many researchers deal with the influence of the media on the behaviour of adolescents. While some research supports little or no impact of television use on academic performance, many argue that the impact of media use on adolescent mental health is negative, especially taking into account that it negatively impacts the time devoted to school obligations (Shastri & Mohite, 1997; Tarekegn & Endris, 2019).

Among the positive effects of using the media, the connection with peers through digital platforms, which showed their meaning during the pandemic, stands out (Grah & Penger, 2022; Nguyen Ngoc et al., 2022). Many authors discuss the positive aspects of the influence of television use on the academic success of adolescents, and some believe that some media messages can teach adolescents various life lessons (Nathanson, 2001; Shastri & Mohite, 1997). Their attitude towards media content most often determines the role of parents and their concern about the effect of content on the mental health of adolescents (Nathanson, 2001).

On the other hand, many authors emphasise the negative effects of the use of electronic media on the mental health of adolescents. Research by a group of authors has shown that children have poorer executive functions if they are exposed for too long to programs that are not intended for their age (Barr et al., 2010). Henke (1999) finds that excessive media use negatively affects school performance.

According to Nathanson (2001), parents are obliged to assume the role of controller of the content and amount of use of electronic media.

To gain a better insight into this issue, additional research on this topic is needed, which would include research in the long term as well as research in special conditions such as a pandemic.

## Methodology

### *Data*

The methodology of the paper is based on secondary data, where the Croatian Institute of Public Health researched a sample of 2112 respondents. The target population is adolescents between the ages of 11 and 15 in the Republic of Croatia in 2018. The research was conducted using an internationally agreed methodology in such a way that students fill in the questionnaire anonymously and voluntarily. This standardised methodology enables comparative analysis, assessment of trends, and focus on specific challenges in improving the health and quality of life of adolescents.

### *Research instrument*

The Croatian Institute of Public Health tries to point out numerous factors that affect the health and well-being of young people within its activities. In its research, the institute focuses on understanding the life habits, circumstances, and attitudes of boys and girls aged 11, 13, and 15 in their living environment and social context - in the family, school, or their relationship with peers following health behaviour in school-aged children (HBSC) research standards. HBSC is a WHO collaborative cross-national study of adolescent health and well-being (Ravens-Sieberer et al., 2009). HBSC has conducted surveys every four years since 2002, and each survey does not examine the same adolescents in the sample. In addition, the intention is to point out certain risky behaviours and habits acquired during adolescence that can continue into adulthood and consequently significantly affect the health and social condition of individuals and the entire community.

The application of the mentioned international standard questionnaire enables the collection of common data in all participating countries, the quantification of key health indicators and contextual variables, and the comparison of data at the national and international levels. The collected data on the health behaviour of school-aged children is extremely valuable, and it can serve countries in the development of their national strategies and programs in the field of health promotion and health education and eliminate inequality and the consequences of inequality in later life.

For this research, data were selected for 2018 and presented in 5-point scale measures for 2,112 examined adolescents between the ages of 11 and 15. The data related to those variables that could best show the influence of life circumstances in the adolescent age on preoccupation with school responsibilities were processed, which, after all, represents a dependent variable in the research. The research instrument is a survey conducted by HBSC 2018, which contains a representative sample of children in the fifth and seventh grades of elementary and first grades of high school in the Republic of Croatia. The structure of secondary education has been preserved (gymnasiums, four-year and three-year schools). It participated in the research 634 students (30%) aged 11 years (average age 11.6 years), 612 students (29%) aged 13 (average age 13.6), and 866 students (41%) aged 15 years (average age 15.6 years). Out of a total of 2,112 students, 1,077 were male (50.99%) and 1,035 (49.01%) female. The survey lasted for 18 months, in which 2,112 students were

successfully surveyed out of a total of 5,169 assigned questionnaires, which represents a survey percentage of 40.86% at the national level.

Table 1  
Research variables

Variable Name	Variable abbreviation	Variable measurement
The level of school obligations	SOO	Assessing the occupancy of school obligations for students on 5- point ratio scale (1-not at all; 5-extremely much)
Life satisfaction	LiS	Measuring the degree of satisfaction with the life situation on 5- point ratio scale (1-very dissatisfied; 5-very satisfied)
The perception of subjective health	SH	Measuring the subjective attitude of students about health on 5- point ratio scale (1-very bad; 5-excellent)
Physical activity	PA	Measuring the frequency of physical activity among students in the past 7 days on 5- point ratio scale (1-never; 5-very often)
Diet quality of eating habits	DQ	Measuring the attitude of students about diet quality on 5- point ratio scale (1-very bad; 5-excellent)
Time in front of a screen	ST	Measuring the frequency of being in front of screens on leisure on 5- point ratio scale (1-never; 5-very often)

Source: Authors' work

According to the methodology of Schnettler et al. (2015), determinants such as eating habits, perceptions of life satisfaction, and subjective health are key to helping adolescents manage their school obligations. Also, a study by Loprinzi et al. (2012) postulates that physical health is the most important prerequisite in the fight against obesity and a long stay in front of mobile devices to strengthen the ability to master school duties. Based on these findings, the independent variables selected for this research focus on the life habits of adolescents during their school duties, such as the possible physical activity they engage in, eating habits, and perceptions of satisfaction with life and their health.

### Analysis

In this research, a regression analysis of the acceptance of school obligations in the dynamic life circumstances of adolescents was carried out. The dependent variable in the research is the level of preoccupation with schoolwork. In contrast, the independent variables are life satisfaction, subjective health, level of physical activity, eating habits, and time spent in front of the screen. Based on the mentioned variables, a multiple regression model is applied in the research, which tries to assess the connection between preoccupation with school duties in adolescents and the mentioned independent variables that imply the life circumstances they face. The multiple regression model with the dependent variable - the occupancy of school obligations will be estimated:

$$SOO_i = \alpha + \beta_1 LiS_i + \beta_2 SH_i + \beta_3 PA_i + \beta_4 DQ_i + \beta_5 ST_i + \sum u_i \quad (1)$$

The parameters in the equation of the multiple regression model will be evaluated for the dependent variable of the level of school obligations and for the observed independent variables in the model, namely perception of life satisfaction, subjective health, level of physical activity, eating habits and time spent in front of the screen. In addition, Pearson's correlation coefficient will be used to determine the direction and strength of the relationship between the dependent variable of the level of preoccupation with school obligations and the observed independent variables. For variables on an interval or ratio scale (numerical data), Pearson's coefficient of correlation is applied. A scatterplot's relationship between variables may be read, and it implies that the points follow and disperse around the line (Udovičić et al., 2007).

In this research, a sample of 2112 adolescents was examined, which is a prerequisite for potential data mining. Therefore, an associative rule data mining technique is performed that produces a list of rules that outline underlying patterns in the data set (Kumar & Toshniwal, 2016). The next few sentences will explain the items in the technical associative rules. If it is understood that there are two rules, A and B, while N is the total of observations, then rule A has the support of rule B. Hence, it can be said that the rule is supported. Support ( $S_p$ ) is often referred to as a free frequency limit. If it is satisfied by a sufficient number of cases, then rules are generated based on other support measures (Agrawal & Srikant, 1994).

$$S_p = \frac{P(A \cap B)}{N} \quad (2)$$

On the other hand, a very important element of the technique of associative rules is Confidence ( $C_f$ ) because it implies the reliability of rule A, defined as the ratio of occurrences of A and B (Kumar & Toshniwal, 2016). The equation calculates confidence:

$$C_f = \frac{P(A \cap B)}{P(A)} \quad (3)$$

Lift ( $L_t$ ) presents the ratio of the confidence and the expected confidence for the rule. Expected confidence can be defined as the occurrence of A and B together with the occurrence of B. Lift measures co-occurrence only and is also symmetric concerning A and B. The value ranges from 0 to  $\infty$ , and if it is over 1, then the rule is useful for forecasting future data sets (Agrawal & Srikant, 1994).

$$L_t = \frac{P(A \cap B)}{P(A) \times P(B)} \quad (4)$$

According to Kumar and Toshniwal (2016), leverage ( $L_v$ ) for rule A measures the difference between A and B, which appear together in the data set and are statistically dependent. The values range between -0.25 and + 0.25. If the value is 0, the rules or variables are independent, while when they are mutually dependent, the value is closer to +0.25. When one variable is only dependent and the other is not, the value of  $L_v$  goes to -0.25.

$$L_v = P(A \cap B) - P(A) \times P(B) \quad (5)$$

Conviction ( $C_v$ ) is a measure of confidence and lifts weakness. Assuming that there is no symmetry between rules A and B, conviction helps to calculate the degree of implication of any rule, and the values range between 0.5 and  $\infty$  (Kumar & Toshniwal, 2016). For values over 1, they represent interesting points in the possible

$$\text{rules. } C_v = \frac{P(A) \times P(B)}{P(A \cap B)} \quad (6)$$



## Results

### Descriptive analysis

For the research, a descriptive statistics analysis was performed for the observed variables. MEAN values, standard deviations, and p-values are given in Table 2. The variable life satisfaction (LiS) has the highest mean value (3.802) among the other observed variables, which proves that adolescents, on average, gave higher ratings when evaluating their perception of satisfaction with their life situation. Also, according to the mean value (2.182) of the PA variable, the surveyed adolescents very rarely engage in some physical activity, on average. The smallest average deviation from the arithmetic mean is achieved for the variables DQ and ST, while the variable SH has the largest standard deviation. Considering the p values according to which we determine significance, the variables SOO, LiS and SH are statistically significant in a multiple regression model at the 5% level of significance. In comparison, the variable ST is significant at the 1% level of significance. An explanation of the significance and reliability of the observed multiple regression model is given below in Table 4.

Table 2  
Descriptive statistics of observed variables

Variable	Mean	Std. Dev.	t Stat	p-value
SOO	3.356	0.027	-0.243	0.031
LiS	3.802	0.021	-0.907	0.046
SH	2.395	0.039	1.032	0.041
PA	2.182	0.006	-0.471	0.669
DQ	2.524	0.001	-3.462	0.101
ST	3.682	0.001	-8.572	0.003

Source: Authors' work

Table 3 presents the Pearson correlation coefficients for the observed variables. The relationship between the dependent variable SOO and the independent variable LiS is positive and strong. This means that life satisfaction increases the level of school obligations, and the student who has a high level of satisfaction implicates a high level of school obligations. An upper level of life satisfaction may affect better on school obligations. The analysed reflection in the literature review postulated that there is a link between a low level of life satisfaction and leaving school (school obligation – low level of meeting school obligations) where one needs to take into consideration research conducted by theorists according to which continuing the education (high education) is tied to a low level of scholastic success due to the psychological-emotional state caused by lowered financial abilities (Creed et al., 2003; Feather & O'Brien, 1986).

The connection between SOO and SH, through Pearson's correlation coefficient, leads to the knowledge of the direction and strength of the connection between the level of subjective health and the burden of school obligations. The obtained result determines a moderately strong positive correlation between the variables – SH and SOO. This means that subjective health increases the level of school obligations. Hence, adolescents with high subjective health have a moderately high level of school obligations. Subjective health is dependent on elements of encouragement and congruent conditions. According to research, physical inactivity increases the risk of depression (Valois et al., 2001). Elements of encouragement are evident in sedentary behaviour, media exposure, and the pandemic, affecting physical inactivity and even their health, with numerous consequences on self-esteem (Ortega

et al., 2008). It is worth noting that a high level of subjective health and life satisfaction of students makes them feel freer and more willing to take on more responsibilities and thus be more burdened with them (Magson et al., 2021; Ortega et al., 2008).

One should also consider that countries with a lower HDI (human development index) with medium and low income also report mental disorders in 13 to 15% of adolescents and that adolescents account for 16% of the world population. Almost 23% of the total number of inhabitants in its structure refers to adolescents in African countries, which demonstrates a progressive increase in the number of inhabitants, which would mean that almost every fourth inhabitant should be in his/her education stages, the possibility of which is dubious because of poverty (G. C. Patton et al., 2016).

Table 3  
Correlation matrix

	SOO	LIS	SH	PA	DQ	ST
SOO	1					
LIS	0.883**	1				
SH	0.512**	0.679**	1			
PA	-0.263	-0.537*	-0.899*	1		
DQ	-0.894	-0.953	-0.806*	0.661	1	
ST	-0.980***	-0.954***	-0.636**	0.414*	0.956	1

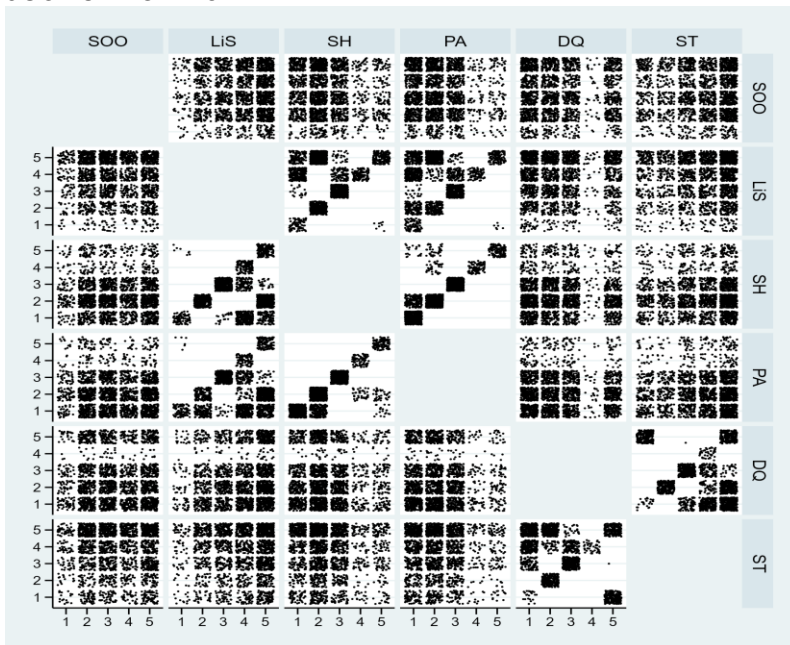
Note: \*statistically significant at 10%, \*\* 5%, \*\*\* 1%; Source: Authors' work

By connecting the independent variable, PA, with the dependent variable, SOO, we tried to explain the direction and strength of the relationship between the level of physical activity and school workload. The Pearson correlation coefficient appears to have a weak negative correlation between the variables – physical activity and school obligation on adolescents. This means that physical activity decreases the level of school obligations, and the physically active student implicates the low level of school obligations. This refutes certain knowledge about this relationship. Even though there is no reliably strong connection between physical activity and school obligations, numerous surveys indicate the existence of a strong connection between physical activity and life satisfaction (life quality), which share a positive correlation (Valois et al., 2004). Numerous surveys have shown a positive correlation between life satisfaction and intense physical activity in adolescents and a negative correlation to depression and anxiety (Vilhjalmsson & Thorlindsson, 1992). The positive correlation confirmed by research on physical intensity and life satisfaction points to a strong consequent link between life satisfaction, quality of life, and school obligations, which was shown (Maton, 1990). In the case of our research, with this negative correlation between the mentioned variables, it is obvious that the greater amount of school obligations in the adolescent age occupies too much of the free time of the adolescents themselves, which leads to a tendency for a lower volume of physical activity.

The correlation between variables SOO and DQ presents a strong negative correlation between eating habits and school obligation levels in adolescents. Generally, it means that students' eating habits significantly decrease the level of school obligations, and regular diet quality is implicated in the high level of school obligations. This confirms findings that proper nutrition and taking care of eating habits contribute to health, which later affects the reduction of the feeling of being overwhelmed by school obligations. Also, the relationship has a high psychophysical significance; hence, deciding on a controlled and quality diet in adolescence helps manage school obligations (Schnettler et al., 2015).

When explaining the connection between physical activity and eating habits with the school obligation level, we need to emphasise that a higher level of awareness of physical activity and diet quality leads to a reduction in workload and satiety in school obligations. Students fill their free time with more school obligations, which adds value to free time (Phinney & Ong, 2002). More free time also brings the possibility that young people spend more time in front of the screens of mobile or computer devices. The Pearson correlation coefficient shows a strong negative correlation between the variables – time spent in front of screen (ST) and school obligation level (SOO) on adolescents. The time spent in front of the screen decreases significantly and implicates the level of school obligations. This confirms the finding that in adolescence, it is precisely among the factors that reduce work habits and the desire for commitment. In addition, excessive staring at screens interferes with concentration for other things that adolescents need to do, especially at school (Kalenkoski & Pabilonia, 2012; Phinney & Ong, 2002).

Figure 1  
Scatter Plot Matrix



Source: Author's illustration

Figure 1 displays the dispersion between the observed variables, with 25 different positions in each diagram. The strength of the black colour on the diagram implies the strength of the relationship, while the position of the colour within the diagram represents the direction (positive or negative sign) of that relationship between the observed variables. On the scatter plot matrix (Figure 1), there is a positive and strong relation between the level of physical activity and subjective health, and the values are close to the regression line without much dispersion, which proves a strong connection in the relationship. In contrast, the positive slope of the direction implies a positive relation. Moreover, scatter presents positive and moderately strong relations between variable life satisfaction and physical activity, as well as subjective health. Also, there is a moderate negative relation between eating habits and time in front of a screen. These two variables' values are close to each other, which reduces the degree of data dispersion. The relationship between the time spent in front of screens

and eating habits is moderate, and the negative slope of the direction evidences the negative correlation.

### Regression Analysis

The method of ordinary least squares (OLS) was used to estimate the regression parameters of the variables. The results are given in Table 4, which contains the estimated values of the regression parameters and p-values.

Considering the presented results of the values of the regression parameters ( $\beta$ ) of the independent variables in Table 4, it can be determined that the variables LiS and SH have a positive relationship with the dependent variable SOO, indicating that if life satisfaction or the perception of subjective health increases, then the level of school obligations would increase on average. In the case of the values of the regression parameters for the PA, DQ and ST variables, they have a negative relationship with SOO, i.e. with an increase in the level of physical activity, eating habits, or the time spent in front of screens, then preoccupation with school duties would decrease. The dependent variable, the occupancy of school obligations, is affected by three variables: life satisfaction (LiS), subjective health (SH) at the 5% level of significance for time in front of the screen (ST) at the significant level of 1%, according to the results of p-value in Table 2.

Table 4  
OLS Result

Dependent variable (SOO)		
$\beta$	C	1.211
	LiS	0.616**
	SH	0.327**
	PA	-0.246
	DQ	-0.454
	ST	-0.532***
S.E. reg.	0.002	
R <sup>2</sup>	0.999	
Adj R <sup>2</sup>	0.997	
AIC	-9.867	
DW	2.451	
Prob(F)	0.029	

Source: Authors' work

Regarding the significance, the model includes variables that are statistically significant at the 5% and 1% levels, namely life satisfaction (LiS), subjective health (SH) and time in front of the screen (TS). The statistical significance of the variables LiS, SH and ST in the multiple regression model at the level of 5% and 1% significance presents the relevance of the observation of the variables for the given model, which indicates that the model has certain statistical reliability and significance with which it could be applied. The multiple regression model of the dependent variable - the occupancy of school obligations is given:

$$SOO_i = 1.211 + 0.616LiS_i + 0.327SH_i - 0.246PA_i - 0.454DQ_i - 0.532ST_i + \sum u_i \quad (7)$$

where  $SOO_i$  is the dependent variable for adolescent  $i$ , while LiS, SH, PA, DQ, and ST are independent variables, and  $u_i$  displays the standard error. Table 4 shows the results of the observed multiple regression model.

Based on the results of the observed multiple regression model, it can be determined that the standard error of the regression is small (*S.E. reg.* = 0.002), the coefficient of determination – R-squared ( $R^2$ ) is almost equal to 1, so almost all deviations are interpreted by the given model. Between the value of  $R^2$  and the corrected coefficient of determination Adjusted R-squared (*Adj R<sup>2</sup>*), there is a small difference of 0.002. The value of the Durbin-Watson test is 2.451 (<2.50). Hence, there is no first-order autocorrelation; Prob (*F*) = 0.029 explains the existence of a statistical connection between the variables in the observed model. According to the results of multiple regression, the model is relevant for researching the relationship between school obligations and the life situations faced by adolescents.

Furthermore, this answers the question of how the level of school obligations should be optimised regarding life satisfaction, subjective health and time spent in front of the screen. The model in which the level of school obligations in adolescents can be influenced through satisfaction with the life situation, perception of subjective health and time spent in front of the screen represents the most appropriate set of activities and should be observed in practice for optimising school obligations regarding the life circumstances. It should be emphasised that in this research, the model serves as a recommendation for the optimal determination of the level of school obligations according to other life circumstances of adolescents.

### Association Rules

After the explanation of the elements in the measurement of associative rules (in section *Analysis*), an example of the technique for the observed variables as attributes in this research is given. To carry out this technique, they are categorised in the manner indicated in Table 5. Given that the observed variables were measured ordinally, on a scale from 1 to 5, they are categorised; hence, 1 represents very low, while 5 means very high.

Table 5  
Attributes for Association Rule Analysis

Attribute name	Type	Categorised Values
School_obligations	Ratio	1-"very low"; 2-"low"; 3-"moderate"; 4-"high"; 5-"very high"
Life_satisfaction	Ratio	1-"very low"; 2-"low"; 3-"moderate"; 4-"high"; 5-"very high"
Subjective_health	Ratio	1-"very low"; 2-"low"; 3-"moderate"; 4-"high"; 5-"very high"
Physical_activity	Ratio	1-"very low"; 2-"low"; 3-"moderate"; 4-"high"; 5-"very high"
Diet_quality	Ratio	1-"very low"; 2-"low"; 3-"moderate"; 4-"high"; 5-"very high"
Screen_time	Ratio	1-"very low"; 2-"low"; 3-"moderate"; 4-"high"; 5-"very high"

Source: Authors' work

The technique of associative rules in this research is used to analyse and predict the behaviour of adolescents in cases where certain life circumstances affect each other. Practically, if an individual is satisfied with life situations, will he then have a higher level of subjective health and physical activity? A method of data mining strives to get a better insight into the chain of the behaviour of adolescents in different situations that they encounter in their life circumstances. This operation was performed in the Weka 3.8.6 system for the sake of simpler execution and use of data on the observed variables based on the examined adolescents. By processing attributes according to associative rules, 10 rules were obtained, which are shown in Table 6.

Table 6

## Association Rules Result

Rule no.	Rule body	C <sub>f</sub>	L <sub>f</sub>	L <sub>v</sub>	C <sub>v</sub>
1.	physical_activity = moderate → subjective_health = moderate	0.99	4.17	0.18	385.29
2.	physical_activity = very low → subjective_health = very low	0.99	4.17	0.18	385.29
3.	life_satisfaction = high → physical_activity = very high → subjective_health = moderate	0.95	3.95	0.15	216.03
4.	life_satisfaction = very high → physical_activity = low → subjective_health = moderate	0.95	3.95	0.13	282.07
5.	life_satisfaction = moderate → physical_activity = moderate → subjective_health = moderate	0.95	3.95	0.13	14.19
6.	life_satisfaction = high → physical_activity = high → diet_quality = moderate	0.72	2.34	0.13	13.12
7.	life_satisfaction = low → physical_activity = high → school_obligations = high	0.68	2.12	0.13	10.33
8.	life_satisfaction = low → physical_activity = high → diet_quality = low	0.55	2.01	0.13	10.21
9.	life_satisfaction = low → physical_activity = high → screen_time = low	0.49	2.01	0.14	8.37
10.	subjective_health = high → diet_quality = moderate	0.69	3.04	0.13	7.45

Source: Authors' work

The association rules represent that moderate or very low levels of physical activity lead to moderate or very low subjective health. Most of the rules are associated with the satisfaction of life. Therefore, a high and very high level of life satisfaction is achieved when physical activity is very high or, on the other hand, low with a moderate perception of subjective health. Also, a low level of satisfaction with the life situation is presented in the case of high physical activity followed by high preoccupation with school obligations. Furthermore, a low level of life satisfaction occurs in situations of high physical activity, bad eating habits, or less time spent in front of the screen. In addition, the perception of a high level of subjective health is achieved by moderate eating habits. Concerning the obtained rules, a lower concentration of connection and confidence with attributes such as school obligations and screening can be seen, which would certainly further strengthen the results of this research.

## Discussion

This paper showed the correlation of the level and amount of school obligations to certain independent variables that marked the daily lives of adolescents. These describe how certain life habits, namely nutrition, physical activity, time of usage of electronic devices, subjectively perceived health, and life satisfaction, can have an impact on requests defined by the school system. This period is very important for the lives of adolescents, defined by their role as students.

There is a link between low level of life satisfaction and leaving school (school obligation – low level of meeting school obligations) (Kwon, 2020). For many theorists, continuing education (high education) is tied to a low level of scholastic success due to the psychological-emotional state caused by lowered financial abilities (Creed et al., 2003).

Subjective health is dependent on elements of encouragement and congruent conditions, and according to research, physical inactivity increases the risk of depression (Valois et al., 2001). Elements of encouragement are evident in sedentary behaviour, media exposure, the pandemic, physical activity, and even health, with numerous consequences on self-esteem (Magson et al., 2021; Ortega et al., 2008; Stephenson, 2021). One should also take into account that countries with a lower HDI (human development index) with medium and low income also report mental disorders in 13 to 15% of adolescents and that adolescents account for 16% of the world population (Patton et al., 2016).

Numerous surveys indicate a strong connection between physical activity and life satisfaction (life quality), which share a positive correlation. Studies have also shown a positive correlation between life satisfaction and intense physical activity in adolescents and a negative correlation to depression and anxiety (Vilhjalmsson & Thorlindsson, 1992). The positive correlation confirmed by research on physical intensity and life satisfaction points to a strong consequent link between life satisfaction, quality of life, and school obligations (Maton, 1990).

To the younger population, it may seem that they represent a public ranking system and may have a negative connotation on the level of peer acceptance. They can fuel feelings of alienation or exclusion. Building healthy social media habits is essential to avoiding potential mental health risks. Use should be moderate and balanced, with a focus on communication and socialising with family and friends. This confirms the phrase "high tech to high touch". The decision on the duration of use depends on the individual's age, and it is also defined by character traits and the culture in which individuals live. However, the impact of the content that adolescents encounter and the activities they engage in on the Internet is perceived as more important than the actual time spent online. Instead of just using social media for posting content and passive browsing that might lead them to compare, it might be more useful to use it to strengthen close relationships with friends through comments and messages.

An important problem that society is facing nowadays is the growing number of overweight and obese children, increasing every day. The number of obese children and adolescents in Western countries has more than tripled in just twenty years. Among the young population, there is a growing epidemic of metabolic disorders linked to obesity, which are normally characteristic of old age. An increased body mass index in childhood and adolescence is very often associated with an increased risk of developing cardiovascular disease later in life. In addition to many factors, including the sedentary lifestyle of the modern "virtual" society, the root cause of this problem is the excessive intake of and easy access to energy-rich meals followed by very little physical activity, together, reduced physical activity and poor eating habits contribute to overweight and obesity.

According to the analysis of results obtained by the regression and correlation, high levels of subjective health and life satisfaction in adolescents create the opportunity for more experiences, more sense of freedom, and being more relaxed in specific life situations, thus demonstrating a greater willingness to assume more responsibility prompted by their inexperience and naiveté. Being more burdened and fed up with the tasks are the final consequences of that condition. On the other hand, the analysis of the Pearson coefficient correlation indicates that a higher awareness level concerning physical activity and eating breakfast in terms of creating more adequate eating habits can result in reducing the sense of being burdened and fed up with school responsibilities. In this manner, scheduling their free time for specific extracurricular activities, sports, and recreation, as well as taking greater care of their

health, led to a reduced sense of feeling burdened by the responsibilities that the school system imposes on adolescents.

This analysis opens the discussion on the importance of the impact of experiences such as feeling burdened with school responsibilities and feeling occupied by obligations due to the school schedule of students of adolescent age. The emphasis is on the effect this has on their life habits and everyday situations - which they might find themselves in.

Based on all of the above, the following recommendations can be made: First, further in-depth research should be conducted to examine variables such as television program content and student academic performance, as well as parent guide television programs and student academic performance. Moreover, parents should adequately mediate and control their children's behaviour when watching television (Kwon, 2020; Magson et al., 2021; Valois et al., 2003).

## Conclusion

Research results confirmed that overdosing on screens negatively affects school performance (Henke, 1999; Nathanson, 2001). There is a moderately positive relationship between school obligations and life satisfaction or subjective health. Therefore, it can be postulated that satisfaction with life situations and a favourable perception of health among adolescents have a positive effect on managing school obligations. This builds on the authors' findings that confirm the positive effect of satisfaction with the life situation and health on school obligations (Adelantado-Renau et al., 2019; Stephenson, 2021). Although no statistical significance was shown in the model for the independent variables DQ and PA, they are negatively related to SOO.

In the analysis of observed variables with the technique of associative rules, most of them are associated with the life satisfaction (LiS) attribute, especially with the assumed rules that a certain level of physical activity and subjective health can influence satisfaction with the life situation.

The multiple regression model, which was implemented in the research, serves as a guideline for future forms and programs for managing school obligations and life situations in adolescence. The results of the analysis of associative rules did not concentrate enough on attributes related to school obligations and time spent in front of the screen. Considering the conducted multiple regression analysis and obtained associative rules, the observed model represents a useful recommendation for developing patterns to influence satisfaction with the life situation with a certain level of school obligations in adolescence. Moreover, the model provides insight into the potential optimisation of school obligations of adolescents according to the level of life satisfaction, subjective perception of health and time spent in front of the screen.

A certain shortcoming of this research existed due to the subjective opinion of adolescents and their inexperience when it comes to being overburdened with responsibilities, creating their perception and attitude, which cannot be reliable indicators of the real situation. A limitation of this study is the use of data every four years as values for the regression and correlation methods. For more relevant insights, research should address data obtained from population surveys. Future research should come to grips with the issues and get clearer views of this topic, which could provide useful guidelines for determining what problem burdens adolescents the most and diverts focus from issues that are more important for their character development.



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