

# The relationship between personality dimensions and problematic Internet use in children aged 11 to 14 years

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**Abstract:** Problematic Internet Use (PIU) is defined as a person's inability to self-regulate Internet usage. This addiction can have a negative influence on mental and physical health, as well as on quality of life. This phenomenon of PIU has arisen as a result of technological development and has become a worldwide issue. As a form of addictive behaviour, PIU manifests itself through poorly controlled behaviour concerning computer use, Internet access, online gambling, gaming, etc., which leads to distress. Children and young people are particularly susceptible to this type of addiction. Relevant research in the field has identified several risk factors that may influence the occurrence of this type of addiction. Personality traits may be one of the risk factors. The aim of this study is to explore the interconnection between personality traits based on the *Five-Factor Personality Model* (FFM) and problematic Internet use and to explore which personality traits may be protective and which may be considered risk factors. Research data were collected for the purpose of standardization and cultural adaptation of psychological instruments for children. The research is based on an extracted number of 102 respondents from a representative sample of primary school students aged 11 to 14 years. Research is ongoing, and partial data is presented in this paper. Problematic Internet usage was measured with the short version of the *Youth Version of the Problematic Internet Use Questionnaire*, which includes 9 questions (PIUQ-9). The full version of this instrument has 18 questions. This scale is on 5-point Likert scale, with a minimum total score 9 and a maximum of 45. It was developed by Demetrovics, Szeredi, & Rózsa (2008). This scale has three subscales: obsession, neglect, and control disorder. The Big Five Questionnaire for children (BFQ-C) has been used for measuring personality traits. This instrument was developed by Barbaranelli et al. (2003). This is a 65-item questionnaire, 5-point Likert scale with 13 items related to each of the five dimensions of openness/intellect, conscientiousness, extraversion/energy, agreeableness, neuroticism (OCEAN). Findings from this Macedonian study identify the relevant influence of personality traits on problematic Internet usage (PIU). Four personality traits can be considered as protective factors (extraversion, openness, agreeableness, conscientiousness), and one (emotional instability) as a risk factor for problematic usage of the Internet.

**Keywords:** children, five factor personality model, problematic Internet use

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This study, which aimed to explore the interconnection between personality dimensions and problematic Internet use among children, was conducted before the global COVID-19 pandemic. Therefore, the novel epidemiological situation did not affect the findings of this study. Scientists expected that the current pandemic situation would have an impact on the problematic use of the Internet as it intensifies the period of Internet use (*Has the coronavirus turned us all into Internet addicts?*, 2020) as people become reliant on many different online services that replace office work, education, sport activities, etc. Recommended social distancing replaces offline human communication with virtual communication. “Will the coronavirus turn us into Internet addicts?” may become a pertinent research topic these days, and this relevance may continue after the coronavirus pandemic.

New technologies, such as the Internet, have become an inseparable component of all aspects of modern life. The Internet has been defined as “a worldwide system of computer networks – a network of networks in which users at any one computer can, if they have permission, get information from any other computer” (Rouse, 2019). The Internet connects billions of computers around the world in a non-hierarchical way. It is the product of a combination of media, computers and telecommunications. The Internet is a product of technological and scientific progress as well as result of social, economic and political processes (*Funkcija Internet*, n.d.). The Internet has become an integral part of contemporary life because of its three main functions: very fast communication between people and companies anywhere in the world (e-mail, or mailing lists, newsgroups, chat sessions, instant messaging, Internet telephone, etc.); download capability (easy access to data and information) and easy buying and selling (*Osnove internteta*, n.d.).

The use of the Internet has been increasing in the world (for example, the number of computers on the Internet in 1981 was 213, and in 1998, 29,670,000, according to Glowniak, 1998). The trend toward increasing online activity may be observed in Macedonia, too. According to the data of the Macedonian State Statistical Office, in the first quarter of 2019, 81.8% of the households had access to the Internet at home. 81.4% of the total population aged 15–74 used the Internet, and 72.9% used the Internet every day or almost every day (State Statistical Office, 2019). This expansion of rapid Internet use can be followed by overuse or misuse. Reasonable use of the Internet is necessary, but a certain segment of the population manifests

behavioral problems, such as excessive and uncontrolled usage. Children and the young are more attracted to new technologies. They are using Internet more frequently making them the population at the highest risk of Internet misuse (Cakmak & Gul, 2018). Young people are using the Internet as a channel for communication and socialization, and they prefer using this channel regularly for sharing emotions and thoughts (*Children and the Internet*, n.d.).

According to the Addiction Centre, a website for the general population, Internet addiction is described as a “range of behaviours and impulse-control problems involving the Internet, personal computer, and mobile technology and there is yet no officially accepted criteria to diagnose Internet addiction” (*What is Internet Addiction?*, n.d.). Internet addiction was first recognized as a new type of addiction in the 1990s. Young (1998) was among the first researchers of this disorder, and according to her (2004), several factors predispose young people to Internet addiction: free and unlimited Internet access; unstructured time; freedom from parental control; no monitoring or censoring of online behaviour, etc. Although Young has claimed these factors to be relevant to the age range of university students, they can be equally applied to younger ages, such as elementary and secondary school students. Internet addiction has been explained as an inability to stop using the Internet, perception of offline experience as meaningless, and excessive irritation and aggression during deprivation (Young, 2004). There is an increasing interest among researchers regarding the effects of intensive Internet use on mental health. The number of studies increased in the years following the first paper published by Young (1998) and in 2018, more than 1,600 scientific papers about Internet misuse could be found on PubMed (Wiederhold, 2018). Besides extensive research interest, there are still debates about the terminology, diagnosis, and measurement of Internet misuse or abuse (Demetrovics et al., 2008). Concerning terminology, a few concepts can be identified: Internet addiction (Young, 1998), problematic Internet use (Caplan, 2002), pathological Internet use (Davis, 2001), as well as many other concepts.

Debates among researchers concern mostly the appropriateness of two concepts: Internet addiction and problematic Internet use (Fernandes, Rodrigues, & Pontes, 2019).

The concept of Internet addiction faces two types of challenges: is it addiction, and is the Internet a medium to which one is expected to be addicted? First, according to Starcevic (2010) there is “no evidence that this is really an addictive disorder which is typical for substance addiction such as tolerance and withdrawal”. Second, it is hard to declaim that Internet as media in itself can cause addiction. In general, the Internet can be seen to have an indirect benefit on overall human wellbeing (Kearns & Whitley, 2019).

This concept has received numerous criticisms among researchers. Particularly, critics cite the lack of a theoretical concept, international consensus concerning diagnosis and relevant empirical findings (Fernandes, Rodrigues, & Pontes, 2019). Some researchers consider that excessive use of the Internet reflects a unique mental disorder, while for others it is merely a symptom of other mental health issues (Shaffer, Hall, & Bilt, 2000).

At the end of this short elaboration, it can be concluded that the term *Internet addiction* should be used only in the case of extensive usage of the Internet with clinical significance. We consider the term *problematic Internet use* more appropriate (Fernandes, Rodrigues, & Pontes, 2019) as it describes behaviour on the Internet more broadly including different types of behavior, with different level of disturbance (Ang et al., 2012).

Problematic Internet use is not a disease, pathology, or clinical disturbance, but it can have mental and physical health consequences (Fineber et al., 2018). It is seen more as behaviour which has a negative impact on everyday life such as a decrease in productivity, school achievement, and social relations (Caplan, 2002). Davis (2001) draws a distinction between generalized and specific pathological Internet use. Specific pathological Internet use refers to specific types of Internet use (for example online gaming, gambling, and shopping). Generalized use means extensive usage of many different possibilities provided by the Internet, sometimes not necessarily tied to a specific activity, but merely to spending time online (Davis, 2001). It is a multidimensional overuse of the Internet, frequently accompanied by time-wasting and non-directed use of different Internet applications, such as YouTube, music sites, social networking sites (SNS), information-searching sites, etc. (Brand, Young, & Laier, 2014). Specific use refers to pathological use of particular features of the Internet (online gaming, gambling, pornography and online shopping). Therefore, it can be assumed that Internet addiction is related to specific uses of certain Internet features and not to its general

use. In this situation, people manifest addictive behaviour to one or several specific online activities (Billieux, 2012). Usually, specific Internet addiction is associated with similar problematic behaviour outside (without) the Internet (Brand et al., 2014).

PIU as an umbrella term encompasses all potentially problematic Internet-related behaviours, such as excessive online gambling, online gaming, online shopping, cybersex and prolonged viewing of pornographic content, to exceedingly frequent email checking, social media use and cyber-bullying, all of which can cause significant impairment of everyday functioning in some individuals (Fineberg et al., 2018). It is a type of behaviour which cannot be controlled and this uncontrolled use of the Internet leads toward an inability to accomplish daily activities (Shapira et al., 2000).

## **1 Problematic Internet use and Internet addiction**

Different terms can be found in literature to describe excessive internet use. The most frequently used terms are: Internet addiction, problematic Internet use, pathological Internet use (Yellowlees & Marks, 2007). To provide a more broad perspective, in this section we will look at research connected to both PIU and Internet addiction. According to some authors, PIU is defined as an impulse control disorder, it is a condition in which an individual loses control over the use of the Internet and continues to use it excessively to the point of experiencing problematic outcomes with negative impact. As the Internet is a highly used medium, it is very important to establish criteria which will differentiate between normal Internet use and Internet abuse (Young, 2004).

Internet addiction is an emergent disorder, it is still controversial, and there are several diagnostic criteria, no widely accepted unique diagnostic criteria and various measurement instruments. According to the American Psychiatric Association (2014) problematic or pathological Internet use, is based on the criteria for substance dependence or pathological gambling. It is characterized by an individual's lack of control over his or her use of the Internet. In recent years, the term addiction has been expanded beyond substance dependence to include non-substance behaviours (Poli, 2017). The most important behavioural symptoms characterizing Internet addiction are: a need to extend time spent on the Internet; lack of interest in other activities; wasting time being on the Internet; when there is no possibility to be on the Internet, anxiety, depression or obsessive thinking

can occur; negative influence on social relations (Salicetia, 2015). From a cognitive-behavioural prospective (Davis, 2001), Internet-addicted people have: distorted thoughts about the self and the world; low self-confidence; relationship problems, mood disorders, anxiety, and inability to control impulse, sleeping problems, back aches, headaches, etc. (Davis, 2001). The difference between abuse and addiction is that in a case of abuse, the user has more control over the behavior (Young, 2004).

The discussion among researchers has two directions – one that claims that Internet addiction is, or should be, established as a psychiatric disorder, and the other that posits it is merely problematic internet use (not addiction) that may, however, lead to some mental health issues. According to the European research network into problematic usage of the Internet, PIU “encompasses all potentially problematic Internet related behaviours, including those relating to gaming, gambling, buying, pornography viewing, social networking, ‘cyber-bullying,’ ‘cyberchondria,’ among others. PIU may have mental and physical health consequences” (Fineberg et al., 2018, p. 1234).

Intensive research on PIU led to the need to construct measurement tools. Several instruments have been designed to measure problems associated with extensive use of the Internet. Goldberg (1995, in Salicetia, 2015) published one of the first tests for Internet Addiction Disorder with seven questions as indicators for seven symptoms. This was more a questionnaire which was not used as a diagnostic tool, as its author in fact did not believe in the existence of Internet addiction (Gregory, n.d). Brenner (1997) constructed a 32-item true-false questionnaire (*Internet-Related Addictive Behavior Inventory*) assessing experiences similar to those associated with substance abuse as defined in the DSM-IV. Young (1998) developed a brief eight-item *Diagnostic Questionnaire* (DQ), which modified criteria for pathological gambling assuming that it can be used as a screening instrument. Young (2004) constructed another scale with 20 items (*Internet Addiction Test*) and sufficient inner consistency (Widyanto & McMurrin, 2004). Caplan (2002) designed *Generalized Problematic Internet Use Scale* (GPIUS) to operationalize Davis’s theoretical construct of generalized PIU and identified seven unique sub-dimensions: mood alteration, perceived social benefits available online, negative outcomes associated with Internet use, compulsive Internet use, excessive amounts of time spent online, withdrawal symptoms

when away from the Internet, and perceived social control available online. Davis, Flett, and Besser (2002) constructed multidimensional measure of problematic Internet use – *Online Cognition Scale* (OCS). Confirmatory factor analysis indicated four dimensions: diminished impulse control, loneliness/depression, social comfort, and distraction. Nichols and Nicki (2004) constructed a 36-item *Internet Addiction Scale* (IAS). They added two items (salience and mood modification) to the seven DSM–IV criteria for substance use dependence. A principal-components analysis indicated that the IAS consists mainly of one factor. Meerkerk et al. (2009) created a questionnaire measuring a single factor, which is known as *Compulsive Internet Use Scale* (CIUS) and contains 14 items on a 5-point Likert scale.

Demetrovics, Szeredi, and Rozsa (2008) created a scale available to measure problematic Internet use or Internet addiction (PIUQ). This instrument was constructed on the basis of *Young's Internet Addiction Test*. This test has 18 items grouped in three subscales: obsession, neglect, and control disorder. The short form of this instrument was used in this research, so detailed explanation of the metrics characteristic can be found below.

It can be concluded that although there are several studies, a widely accepted assessment instrument for problematic Internet use has not yet been created.

## **2 Risk factors for problematic Internet use**

A relatively large number of studies on the problematic use of the Internet has shown that several risk factors can be identified. Findings suggest that problematic Internet use shows significant variation depending on gender. Namely, men have a higher presence of abuse/misuse or excessive use of the Internet than women (Islam & Hossin, 2016; Lee et al., 2018; Serin, 2011). Boys spend more time on the Internet than girls. Girls manifest intense use of social networks and boys are intensive users of multiplayer online role-playing games, online games, and adult sites (Dufour et al., 2016). Age was also identified as a risk factor for PIU. A study conducted in Croatia, Finland, and Poland (Karacic & Oreskovic, 2017) showed that adolescents aged 15–16, especially male adolescents, are the most prone to the development of Internet addiction, whereas adolescents aged 11–12 show the lowest level of Internet addiction. A study conducted in the Czech Republic (Dobešová Cakirparoglu et al., 2020) showed that members of generation Z (born between 1996 and 2000 and later) are significantly more

addicted to the Internet compared to Generation Y (born after 1980). A similar finding was identified in a Chinese study among children and youth between 9 and 24. In this study, high school students were significantly more likely to be PIUs than college students and elementary school students (Cao et al., 2011). The age when the child was exposed to the Internet can also be a risk factor. Namely, the earlier a child is exposed to the Internet, the higher the probability for PIU (Lee et al., 2018).

Concerning socioeconomic status, it was found that children of families with a high socioeconomic level have a higher likelihood of becoming addicted to the Internet (Islam & Hossin, 2016; Kayri & Günüş, 2016). In a Hong Kong study (Lai & Kwan, 2017) it was found that parental education and family socioeconomic status has influence on association between the amount of Internet use and the severity of PIU.

Beside demographic variables such as gender, age, and socioeconomic status, personality, as well as mental and physical health factors were also identified in several studies. Some studies identify the interconnection between physical activity and PIU. Low physical activity (Islam & Hossin, 2016) as well as poor physical energy (Cao et al., 2011) were found to be risk factors.

Recent studies found that all Big Five personality traits had a significant relationship with Internet addiction. Personality is considered to be the most important factor related to Internet addiction. Openness to new experiences, conscientiousness, agreeableness and extraversion were negatively correlated with Internet addiction whereas neuroticism was positively correlated with it (Hussain & Pontes, 2018; Kayisa et al., 2015; both studies are meta analyses of empirical research). Personality traits can be evaluated as protective (conscientiousness, extraversion, openness) or as risk factors (neuroticism; Kuss et al., 2013 – sample consisted of university students). Extraversion and openness to experience are relevant in the use of interactive social media (Correa et al., 2010, based on a national sample of US adults). Beside personality traits defined by the five-factor personality model, other personality traits can be considered predictor variables for PIU: life satisfaction and loneliness (Serin, 2011; sample consisted of university students).

Some mental health issues were connected with PIU (Zhang et al., 2018). Co-morbidity was found between PIU and substance (alcohol, drug) abuse



(Lee et al., 2013), attention deficit / hyperactivity disorder (Cakmak & Gul, 2018), anxiety (Dobesova Cakirpaloglu et al., 2019a,b; Weinstein et al., 2015) and depression. It was found that depression can be a risk factor for PIU, but it can also be the result of intensive Internet usage. Depression was identified as a risk factor for PIU (Lee et al., 2018) among the young between ages 13 and 18. Depressive symptoms among college students were associated with spending increased time doing online activities, namely shopping and gambling (Morgan & Cotten, 2003). Adolescents with PIU are at a relatively high risk of depression and poor social adaptation. Lam and Peng (2010) found that intensive usage of the Internet can be a risk for developing depression; young people (13–18 years) who are initially free of mental health problems but use the Internet pathologically may be prone to developing depression. Mental health of the parents, particularly depression has impact on Internet intensive usage/abuse among their children (Lam, 2015).

Stress coping strategies (Wegmann & Brand, 2016), low self-esteem, self-criticism, negative self-evaluation (Błachnio et al., 2016) as well as negative self-concept mediated by parent-children relationship (Huang et al., 2019), low social support from significant others such as family and friends (Cevik & Yilidiz, 2017) are identified as risk factors for extreme and maladaptive Internet usage.

### **3 Personality (Five-factor personality model)**

The Five-Factor Model (FFM) is an empirical approach toward explanation of personality traits (McCrae & Costa, 1999). This model is a hierarchical organization of personality traits derived from research examining the structure of personality-descriptive language and personality inventories. FFM makes distinction between basic tendencies and characteristic adaptations. Personality traits as basic tendencies are biologically given potentials of the individual which remain stable over time. Characteristic adaptations are defined by the interactions between the basic tendencies and the environment (McCrae et al., 1998).

Research based on the usage of instruments with FFM background identified that each dimension develops during the life span as a result of interaction between biological and environmental factors (Soto et al., 2016). Results from cross-cultural studies suggest that the FFM is a biologically based human universal (McCrae et al., 1998). Measures of the Big Five have shown

considerable metric characteristics and can be used to predict a variety of important social, occupational, psychological, and health outcomes (Soto et al., 2016). The five basic dimensions are: extraversion, agreeableness, neuroticism, conscientiousness, and openness to experience (McCrae & John, 1992). Each Big Five dimension is defined by a number of more-specific facet traits. Extraversion can be defined as the extent to which an individual is outgoing in social situations. Agreeableness concerns the extent to which someone behaves pro socially toward others. Conscientiousness describes an individual's capacity to organize things, complete tasks, and work toward long-term goals. Neuroticism is the tendency to be prone to experiencing negative emotions and moods. Openness to experience is about the individual's intellectual, artistic, and experiential life (Soto et al., 2016).

The applicability of the FFM in the study of childhood personality has been the focus of recent research (Markos & Kokkinos, 2017). It is well known that self-report tests about personality traits are widely used in understanding and measuring personality in adulthood, but there are very few studies which can give an answer to how self-perceptions of personality during lifespan develop.

The study of Maesselle et al. (2005) conducted among children from ages 5 to 7 demonstrated that children of this age are able to describe themselves on all dimensions according to the Five-Factor model of personality. Children within this age range are going through cognitive changes which are linked with capacities for self-representation. Another survey (Soto et al., 2008) among children between 10 and 20 years also supports the findings from the previous study. Findings of the presented studies provide an argument that self-report tests can be a valuable approach in understanding the personality development during childhood and adolescence.

The most common approach in personality assessment among children and adolescents is the modification of item wording of adult questionnaires. This strategy was adopted in the construction of a children's version of the *Big Five Questionnaire*, BFQ-C; constructed by Barbaranelli et al. (2003).

## 4 Method

### 4.1 *Participants and procedure*

In the period from October 2019 to February 2020, field research was conducted with the aim to collect data for cultural adaptation, standardization and preparation of norms for several tests for children aged 8 to 14 years. To conduct the research, the Ministry of Education of Macedonia issued a permission which was submitted to school principals and mayors. The sample was constructed to be stratified, to include children from all regions and municipalities of the Republic of Macedonia. Unfortunately, the emergence of the COVID 19 virus disrupted the planned course of research and the research was not finished but relevant amount of data had already been collected. In order to conduct the research, school psychologists from schools that agreed to engage in the research were trained by the research team. Psychologists selected the children to be included in the sample. Criteria for selection were the age and sex of the child and the consent of the parents. Parental authorization was obtained for each child who took part in this research. Psychologists were asked to include children who had different school performance. The students completed the tests in groups in the presence of the school psychologist. The children were given the opportunity to answer all tests at once or, if they were tired, to finish the next day. In order to prevent anxiety in students that may occur due to the nature of the instruments, psychologists were instructed to talk to the children after the test. During the period of the research, it was not reported that any kind of anxiety appeared in the children. On the contrary, the children were interested and ready to cooperate.

### 4.2 *Research sample*

The sample which was drawn from the standardization study comprised 102 schoolchildren speaking the Macedonian language (Macedonians), from a non-clinical population, ranging in age from 11–14 years. Subjects were selected from different elementary schools in Macedonia. The sample comprised 51 boys (50%) and 51 girls (50%).

### 4.3 Research question and hypotheses

Main research question of this study was as follows: Is there an interconnection between personality traits (defined according to FFM model) and problematic Internet use in children aged 11–14?

The General hypothesis is:

Personality traits have an influence on the intensity of problematic Internet use (PIU) among children aged between 11 and 14 years.

From the general hypothesis, there are 5 particular hypotheses:

H1: Openness is negatively associated with PIU.

H2: Conscientiousness is negatively associated with PIU.

H3: Extraversion is negatively associated with PIU.

H4: Agreeableness is negatively associated with PIU.

H5: Neuroticism is positively associated with PIU.

### 4.4 Instruments

Two instruments were used for the purposes of this study. One is a personality test according to the Five-Factor model: *Big Five Questionnaire for children*, BFQ-C (Barbaranelli et al., 1998), and the other one is the scale of problematic Internet use (*Problematic Internet Use Questionnaire* – PIUQ with 9 items, Demetrovic et al., 2008).

#### *Problematic Internet Usage Questionnaire with nine items (PIUQ-9)*

The nine-item *Problematic Internet Use Questionnaire* (PIUQ-9) is a brief self-report screening instrument for problematic Internet use. It is a short form of the original PIUQ which has 18 items. On the basis of Young's (1998) *Internet Addiction Test*, the authors created a 30-item questionnaire PIUQ (Demetrovic, 2008). As a result of reliability analysis and factor analysis, the number of items was reduced to 18. PIUQ has three subscales (obsession, neglect, and control disorder). Cronbach's alpha of the original form consisting of 18 items is 0.87 in adult sample and 0.87 in adolescent sample (of the three subscales respectively 0.85, 0.74 and 0.76). Five-point scale is used (*never, rarely, sometimes, often, always*). The obsession subscale concerns obsessive thinking about the Internet. The neglect subscale refers

to the neglect of everyday activities and essential needs. The control disorder subscale is about difficulties in controlling Internet use (Koronczai et al., 2011). *Problematic Internet Use Questionnaire* (PIUQ) has two short forms, with 9 and with 6 items. The 9-item scale will be used as a tool to identify the intensity of Internet abuse among children in this study. The short nine-item version was constructed by the same authors (Demetrovic et al., 2008) to retain the original three-factor structure assessed by three items each. A 5-point Likert scale (1 = *never* to 5 = *always*) was used (Laconi et al., 2019). The obtained score can range between 9 and 45. The higher the score, the higher the risk of PIU. PIUQ-9 is available in Italian, German, French, Polish, Turkish, Hungarian, English, and Greek (Laconi et al., 2019). With this study, this instrument will also be available in Macedonian language.

PIUQ scale satisfied five of six criteria that one instrument for PIU should achieve. It is comprehensive (it assesses three basic aspects of PIU), concise (has versions of 18, 9 and 6 items), with reliable factor structures, and proven validity, the scale is applicable for different age groups and appropriate for different cultures. The last criterion, to incorporate a cut off score, was not achieved as there are still no consensual diagnostic criteria, so these tools are not validated on clinical samples (Koronczai et al., 2011).

#### *Big Five Questionnaire – Children (BFQ)*

The instrument used for the measurement of personality traits was the BFQ-C (Barbaranelli et al., 1998, 2003). This questionnaire is derived from the BFQ for adults designed by Caprara et al. (1993) and consists of five scales developed from lexical analysis (Holado et al., 2007). The *Big Five Questionnaire for Children* (BFQ-C) was developed by Barbaranelli, Caprara, Rabasca, and Pastorelli (1998, 2003) specifically to measure children's personality dimensions according to the FFM.

The original version was in Italian, but it has been translated and used in Dutch, German, and Spanish samples, and with this survey a Macedonian language version will become available too. It is a new FFM inventory specifically aimed at addressing child or adolescent traits. The *Big Five Questionnaire for Children* (BFQ-C) is a scale that purports to resolve the deficits found in other personality scales for children (Barbaranelli et al., 2003). The BFQ-C was developed to explore and measure the big five personality factors through parent, teacher, and self-report with children ranging in age from

8 to 14 years. It has two versions: one for children aged 8–10 (three-point scale: *almost never, sometimes, a lot of times*) and second one for children aged 11–14 (five-point scale: *almost never, few times, sometimes, a lot of times, almost always*). The BFQ-C is a phrase-based questionnaire consisted of 65 items equally distributed across the five factors.

Compared to the test for the measurement of the Big Five in adults, the BFQ-C has a lower number of sentences (65) which responds to the need to simplify the instrument as much as possible. For the same reason only, the fundamental dimensions of the personality (the five major factors) are taken into consideration in the BFQ-C and not the sub-dimensions or facets. The term neuroticism which defines this dimension is not used as it has psychopathological meaning. This dimension is named *Emotional Instability* (in the BFQ for adults it is named *Emotional Stability*; Barbaranelli et al., 1998).

The five factors referred to in the BFQ-C are presented in Table 1.

*Table 1*

#### Dimensions according to FFM

Energy/Extraversion	Refers to traits such as an individual's sociability, assertiveness, and enthusiasm, sociability, loquacity, assertiveness, level of activity, dynamism
Agreeableness	Refers to traits that reflect concern toward others; friendliness, altruism, taking care, giving support, cooperation, trust
Emotional Instability	Related to moods, such as being prone to anger, depression, or anxiety. Emotional stability is the ability to control emotional reactions, mood stability, absence of negative affect, ability to control anger and irritation
Conscientiousness	Ability to self-regulate, precision, accuracy, scrupulousness, tenacity, perseverance
Intellect/Openness	Openness to experience is concerned with imagination, creativity, and intelligence as well as openness to new experiences, to novelty, broad cultural interests, originality, creativity

Reliability of the BFQ-C was calculated with Cronbach's alpha: Conscientiousness (.87), Extraversion (.77), Openness (.82), Neuroticism (.77), and Agreeableness (.71). Principal components analysis (PCA) revealed five clear components for all respondents (Barbaranelli et al., 2003).

The reliability and validity of the BFQ-C have been explored in few studies. In the Dutch study (Muris, Meesters, & Diederens, 2005) results showed that the BFQ-C had a five-factor structure, good internal consistency, and validity. The Spanish study (Holgado et al., 2009) found overlap between factors Openness, Conscientiousness and Extraversion. In the American version (Gaio, 2012), the results indicate that in contrast to the Italian study, six components were loaded. These data confirm the need for further research.

## 5 Results

Statistical procedures were carried out with SPSS 19.0 for Windows (IBM SPSS Statistics).

### 5.1 Metric characteristic of BFQ-C

Cronbach's alpha coefficient for all five scales of Macedonian translation of BFQ-C is very high. Cronbach's alpha for extraversion is 0.79, for agreeableness 0.77, conscientiousness 0.82, openness 0.81, and emotional insecurity 0.80.

Correlation between the five scales is presented below in Table 2.

*Table 2*

Pearson's coefficients of correlation among five scales in BFQ-C

	E	A	C	N	O
E	1	0.51**	0.53**	-0.21*	0.43**
A	0.51**	1	0.70**	-0.42**	0.51**
C	0.53**	0.70**	1	-0.32**	0.64**
N	-0.21*	-0.42**	-0.32**	1	-0.22*
O	0.43**	0.51**	0.64**	-0.22*	1

\*\*Correlation is significant at the 0.01 level (2-tailed).

\* Correlation is significant at the 0.05 level (2-tailed).

As can be seen from table 2, a positive correlation exists between the dimensions Extraversion, Openness, Conscientiousness and Agreeableness. Negative correlation was found between the dimension Emotional instability and all other dimensions. This correlation among dimensions corresponds to the structure of psychological tests constructed on the basis of the FF model (McCrae & Costa, 1999)

### 5.2 Metric characteristic for Problematic Internet Use Questionnaire (PIUQ)

In the study (Laconi et al., 2019) the main goal of which was to explore the psychometric properties of the PIUQ-9 (conducted in nine languages: Italian, German, French, Polish, Turkish, Hungarian, English, and Greek), the internal consistency ranged from 0.81 (German sample) to 0.90 (Turkish sample). It should be noted that respondents in the study were aged between 23 and 32 years on average. In the Macedonian study, Cronbach's Alpha coefficient of total score was 0.79, on three sub-scales it is lowest for sub-scale control (0,38) and highest for obsession (0,84). Cronbach's Alpha of subscale Neglect is 0,60. Correlation between total score and scores of each of three sub-scales demonstrated high coefficient of correlation, all of them are on 0,01 level of significance (see table below). Application of principal component analysis extracted one main factor (see Table 4).

Table 3

Pearson's coefficients of correlation

Pearson Correlation Sig. (2-tailed)	Total score of PIUQ	Obsession	Neglect	Control
Total score of PIUQ	1	.819**	.833**	.736**
Obsession	.819**	1	.497**	.399**
Neglect	.833**	.497**	1	.468**
Control	.736**	.399**	.468**	1

\*\* Correlation is significant at the 0.01 level

Table 4

Principal component analysis of the Macedonian translation of PIUQ – 9

No of item	Component	
	1	2
1	.688	.249
2	.091	.782
3	.513	.349
4	.659	.429
5	.781	-.303
6	.549	-.174
7	.761	-.214
8	.763	-.330
9	.594	.071



As can be seen from Table 4, item 2 (“How often do you feel tense, irritated, or stressed if you cannot use the Internet for several days?”) stands out from the others and forms a second component. Further research will show which factors influenced this issue, maybe the formulation of this question is not clear enough for the children and it should be reformulated.

Findings from the principal component analysis suggest that one general factor explains most of the variance in PIUQ-9, so in this study we will consider PIUQ-9 a scale with one total score (and no three sub scores).

### 5.3 Linear regression analysis

Linear regression analysis was calculated to estimate the relationships between the dependent variable (problematic Internet use) and independent variables (five personality dimensions). In the general hypothesis, it was assumed that there is a connection, i.e. influence of personality dimensions on problematic Internet use among children aged between 11 and 14 years of age.

It was assumed that personality dimensions openness, conscientiousness agreeableness and extraversion are negatively associated and that neuroticism is positively associated with PIU.

Beta coefficients of linear regression with the level of statistical significance are presented in table 5.

*Table 5*

Beta coefficients of regression analysis between the total score of PIUQ and five personality dimensions from BFQ-C

	Neuroticism	Extraversion	Openness	Agreeableness	Conscientiousness
PIUQ total score	.319**	-.272**	-.311**	-.381**	-.467**

Statistical analysis of the interconnection between two variables: personality traits (defined according to the Five Factorial Model) and problematic Internet use showed that these variables are connected in the way that dimensions extraversion, agreeableness, openness, and conscientiousness are found to be protective factors, and neuroticism is a risk factor for intensive usage/misuse of Internet.

## 6 Discussion

The appearance of Internet influenced global change in the 21st century, penetrating in every aspect of life and changing the culture. Its use among population has a wide spectrum, from moderate, controlled to intensive, uncontrolled or maladaptive. This newly appearing phenomenon in mid-1990s was a trigger factor for scientists and practitioners to focus their interest on identifying and defining Internet maladaptive behavior and its influence on mental health. Different concepts and definitions were provided. In this paper the term problematic Internet use (PIU) is used for repetitive and impairing Internet behavior (Fineberg et al., 2018) and focus on research is on generalized PIU. Target population are adolescents, aged 11–14, as children and young are group at a higher risk of extensive Internet use. Many factors have been deemed to be either risk or protective factors, but this study explored the influence of personality traits on problematic usage of Internet, namely which one are protective, and which ones are risk factors.

Two instruments have been used to explore the interaction between personality traits and PIU: a personality test based on FF Model – *Big Five Questionnaire for Children* (BFQ-C) (Barbareneli et al., 2003) and the short version of a scale for measuring the intensity of inappropriate Internet use – *Problematic Internet Use Questionnaire* (PIUQ-9) (Demetrovic et al., 2008).

The outcome of the applied regression analysis showed that four dimensions can be considered protective factors (extraversion, openness, agreeableness, conscientiousness) and one a risk factor (emotional instability). Findings obtained in this study are similar to other studies. Öztürk et al. (2014) found that the risk of Internet addiction is connected with the level of extraversion and openness to experience among adolescents from high schools. In Öztürk's study, students who are not at risk of PIU scored higher on scale of extraversion, but students who are higher on openness dimension have higher scores on Internet addiction scale. Contrary to Öztürk's study, and in favor of this study, are the findings of Lavin's et al. study (1999) where respondents who scored lower in the sensation and excitement seeking dimension (openness) were intensive Internet users.

Many studies provided evidence that emotional instability (neuroticism) has a positive correlation with problematic Internet use. Neuroticism

emerged as a significant associated factor with Internet abuse. Higher levels of neuroticism can be considered a risk factor for intensive, inappropriate Internet use (Othman, 2017; Saini et al., 2016).

Findings of all studies which explore the interconnection between personality traits and PIU provided results that conscientiousness is in a negative correlation with PIU (Błachnio et al., 2016). Conscientious individuals are more disciplined which make them capable of taking control over time spent on the Internet. Agreeableness can also be assumed as a protective factor in terms of Internet addiction; individuals with low levels of agreeableness are more prone to use Internet excessively. The negative relation between Internet addiction and agreeableness was found in other studies (McElroy et al., 2007).

Interpretation and explanation of the impact of personality dimensions according to the Five-Factor Model are mainly based on the description of the five dimensions given by Costa and McCree in the description of the NEO PI test of personality (McCrae et al., 1998).

Extroverts are more comfortable in social activities, make friends easily, and are cheerful, they prefer companionship and social activities. This predisposition makes those with a high level of extraversion less prone to spend their time online. People high on agreeableness dimension are more willing to believe in cooperation, friendship. Conscientious people have a sense of purpose and a high level of aspiration, they are organized and have long term plans. People who have high intensity of neuroticism (or emotional instability) are more hopeless, with low self-esteem. It can be said that individuals with high levels of neuroticism refrain from face-to-face communication which makes Internet communication more acceptable for them as it can reduce anxiety and feeling of insecurity. Those who are open to new experiences (openness) have a need for novelty, change, they want to travel, have different hobbies; they are open toward new ideas and attitudes (McCrae & Costa, 1999).

Some studies found that there was a negative correlation between openness to new experiences and Internet addiction while others found that this correlation is positive. The negative correlation can be explained through the fact that life experiences offline are more realistic and exciting which makes these individuals prefer real life settings more than virtual life settings. The

positive correlation can be explained by their tendency to be attracted by novelty.

The results obtained from many studies, including the Macedonian study, showed that openness, conscientiousness, extraversion, and agreeableness are personality dimensions which are negatively related with problematic Internet use whereas neuroticism (emotional instability) is positively related with PIU.

Finally, if a general conclusion is to be drawn on PIU, then it can be said that there is no difference between offline and online life. Both are merely different manifestations of personality expression. Human behavior is determined by established emotional stability and a positive self-concept, so emotionally stable people will be self-accepting, and they will restrain from any type of risk behavior, including PIU.

## 7 Limitation of the study

The situation with COVID 19 made it impossible to conduct and finish the field research. Findings in this study are based on only a limited segment of the planned stratified sample, which allowed exploring the correlation and regression between variables.

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## Vztah mezi osobnostními charakteristikami a problémovým užíváním internetu mezi dětmi ve věku 11 až 14 let

**Abstrakt:** Problematické užívání internetu (*problematic Internet use*) je definováno jako neschopnost regulovat vlastní užívání internetu. Tato závislost může mít negativní vliv na duševní i fyzické zdraví i na kvalitu života. Zmíněný fenomén je spojen s technologickým pokrokem a stal se celosvětovým problémem. Projevuje se omezenou kontrolou chování ve vztahu k přístupu k a užívání internetu, online hazardním hrám, online hrám apod. Děti a mládež jsou obzvláště náchylní k tomuto typu závislosti. Výzkum ukázal několik rizikových faktorů, jedním z nichž jsou osobnostní charakteristiky. Cílem předkládané studie je prozkoumat vztah mezi charakteristikami osobnosti definovanými podle Velké Pětky (pětifaktorový model

osobnosti) a problematickým užíváním internetu a to, které z charakteristik mohou být považovány za rizikové a které za ochranné faktory. Data byla sbírána za účelem standardizace a kulturní adaptace psychologického měřicího nástroje pro děti. Výsledky této studie jsou založeny na analýze dat od 102 respondentů z reprezentativního vzorku žáků základních škol ve věku 11 až 14 let. Výzkum dále pokračuje a další data jsou sbírána. Problematické užívání internetu bylo zkoumáno pomocí krátké verze dotazníku problematického užívání internetu pro mládež (PIUQ-9; Demetrovics, Szeredi, & Rózsa, 2008), která má devět položek. Plná verze instrumentu je založena na 18 položkách. Využita je pětistupňová Likertova škála; minimální skóre ve zkrácené verzi je 9, maximální 45. Instrument má tři sub-škály o třech položkách: škála obsese (abstinenční symptomy při nedostatečném přístupu k internetu), škála zanedbávání potřeb (zanedbávání osobních potřeb a každodenních činností), škála poruchy kontroly (nedostatek kontroly ve spojení s užíváním Internetu). Pětifaktorový osobnostní inventář pro děti (BFQ-C; Barbaranelli et al., 2003) se zaměřil na osobnostní charakteristiky. Nástroj obsahuje 65 položek s pětistupňovou Likertovou škálou. 13 položek se zaměřuje na každou z následujících oblastí: otevřenost vůči zkušenostem / intelekt, svědomitost, extraverte/energie, přívětivost, neuroticismus. Zjištění makedonské studie naznačují faktory relevantní pro rozvoj problematického užívání internetu – čtyři osobnostní charakteristiky lze považovat za ochranné faktory (extraverte, otevřenost vůči zkušenosti, přívětivost a svědomitost) a jeden za rizikový faktor (neuroticismus).

**Klíčová slova:** děti, pětifaktorový model osobnosti, problematické užívání Internetu