



Uncovering the Link between Self-control, Age, and Psychological Maladjustment among Spanish Adolescents and Young Adults

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ABSTRACT

This study explores the relationships of self-control with age and psychological maladjustment in adolescents and young adults. The sample consisted of 1,600 randomly selected Spanish adolescents and young adults, aged 12-34 years ($M = 22.28$, $SD = 6.94$). Measures of self-control, Internet addiction, and anxiety-depressive symptoms were administered. Control variables included age and sex. Results indicated that adolescents between 15 and 19 years old showed the lowest self-control scores, while older participants showed greater scores. Low scores in self-control were significantly associated with greater substance consumption, more anxiety-depression symptoms, and higher scores on the Internet addiction scale. Also, participants with high scores on the addiction scale scored lower on self-control. These results evidence associations between self-control and some emotional-behavioral problems, and suggest the importance of promoting self-control to prevent Internet addiction, substance consumption, and anxiety-depression in adolescents and young adults.

Investigando la relación entre el autocontrol, la edad y el desajuste psicológico en adolescentes y jóvenes adultos españoles

RESUMEN

Este estudio explora las tendencias evolutivas en el autocontrol y su relación con el desajuste psicológico en adolescentes y jóvenes adultos. La muestra estuvo compuesta por 1,600 adolescentes y jóvenes adultos españoles de entre 12 y 34 años ($M = 22.28$, $DT = 6.94$) seleccionados aleatoriamente. Se administraron medidas de autocontrol, adicción a internet y síntomas de ansiedad-depresión. El sexo y la edad fueron utilizados como variables de control. Los resultados indicaron que los adolescentes con edades comprendidas entre los 15 y 19 años mostraron las puntuaciones más bajas en autocontrol, mientras que los participantes de más edad puntuaron más alto. Puntuaciones bajas en autocontrol estuvieron significativamente asociadas con mayor consumo de sustancias, más síntomas de ansiedad-depresión y puntuaciones más elevadas en la escala de adicción a internet. Además, los participantes con puntuaciones más altas en la escala de adicción puntuaron más bajo en autocontrol. Estos resultados evidencian las relaciones entre el autocontrol y algunos problemas emocionales y conductuales y sugieren la importancia de promover el autocontrol para prevenir la adicción a internet, el consumo de sustancias y los problemas de ansiedad-depresión en adolescentes y jóvenes adultos.

Palabras clave:

Autocontrol
Adicción a internet
Consumo de sustancias
Ansiedad-depresión
Adolescencia y adultez temprana

Self-control is an important personal competence that develops during the first decades of life. The empirical evidence indicates that self-control is significantly associated with emotional and behavioral adjustment (De Ridder, Lensvelt-Mulders, Finkenauer, Stok, & Baumeister, 2012). This study seeks to analyze the relationship between self-control assessed by the Spanish version of the Brief Self-control Scale (Tangney, Baumeister, & Boone, 2004) and age, as well as to explore how self-control is related to some of the most frequent emotional and behavioral problems among adolescents and

young adults, such as substance consumption, Internet addiction, and anxiety-depression symptoms.

When studying self-control, some authors have placed the emphasis on individuals' willpower to regulate self-behavior when faced with suppressing temptation and the long-term attainment of valuable objectives (Baumeister, Vohs, & Tice, 2007). As such, self-regulating competence is needed to withdraw and inhibit socially unacceptable impulses and to regulate behaviors, thoughts, and emotions (Tangney et al., 2004). This would mean prioritizing the

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response according to specific moral and social values to allow the achievement of valuable objectives in the long-term, as opposed to another immediately gratified response. Although many theories emphasize the inhibiting aspect of self-control, one must remember that this inhibition usually works to attain important objectives. Thus, some authors propose two different types of self-control, one of an inhibitory nature related to the regulation and control of impulses, and another responsible for initiating behaviors aimed at reaching a goal (De Ridder, de Boer, Lugtig, Bakker, & van Hooft, 2011; Myrseth, Fishbach, & Trope, 2009; Wills, Walker, Mendoza, & Ainette, 2006). While inhibitory self-control has been related to lesser incidence of problematic behaviors, initiating self-control predicts better positive or desirable behaviors (De Ridder et al., 2012).

With regard to the development of self-control, there is wide empirical evidence indicating a clear upwards trend during the first decade of life (Romer, Duckworth, Sznitman, & Park, 2010; Schel, Scheres, & Crone, 2014). Nevertheless, there is little evidence with regard to changes of self-control during adolescence and early adulthood. If we consider that self-control is the result of a balance between instigating and inhibiting factors, poor self-control could stem from both the strength of the mechanisms that initiate the impulses and the weakness of those trying to control them (Heatherton & Wagner, 2011). These mechanisms have a well-known basis in the brain: the mesolimbic reward circuit, responsible for triggering such impulses, and the prefrontal cortex involved in keeping them under control. Both circuits exhibit different maturation rates which lead to a certain imbalance between a mature and hyper-excited mesolimbic system, instigated by changes during puberty, and a prefrontal region that still needs several years to reach its maturity (Somerville, Jones, & Casey, 2010), as evidenced in several cross-sectional (Steinberg et al., 2008) and longitudinal studies (Harden & Tucker-Drob, 2011; Meldrum, Young, & Weerman, 2012). This temporal gap between both mechanisms may generate a period of vulnerability towards risk during mid-adolescence. As such, it is expected that during adolescence boys and girls may experience difficulties in controlling their impulses. This would explain the greater prevalence of certain addictive behaviors and the increase in risk taking behaviors during this stage following puberty (Steinberg, 2014). In light of this, it would be of interest to explore the relationship between age and self-control, not only in adolescents but also in young adults. Although an overcome of the imbalance of both cerebral systems and an increase in self-control could be expected, yet few studies have covered the entire period of adolescence and early adulthood.

According to the problem behavior theory (Jessor, 1991), alcohol, tobacco, and illicit substance use could be grouped with Internet addiction as problem behaviors that share common risk factors, such as poor self-control (Zhou, Zhu, Li, & Wang, 2014). The available evidence indicates that poor self-control is related to a number of maladjusted behaviors, which could have serious consequences on adolescents' development as they may hamper the achievement of some developmental milestones and hinder the successful transition to later stages (Jessor, 2014). In fact, a large proportion of the behavioral problems affecting adolescents and adults, such as substance consumption or Internet addiction, involve a lack of self-control (Ozdemir, Kuzucu, & Ak, 2014).

The relationship between poor self-control and substance consumption has been showed in various studies. For instance, Ford and Blumenstein (2013) found that self-control was a significant predictor of problems related to the consumption of alcohol in a sample of university students. Similar results have been also found in other studies (Tangney et al., 2004). Among the most common behavioral problems among adolescents and young adults is also the problematic or addictive use of Internet – understood as the inability to control the time spent online that leads to an excessive Internet use that interferes with daily life. According to Young (1998), this addictive use includes manifestations such as cybersexual

behaviors, cyber-relationships addictive behaviors, information overload, online gambling, or net compulsive behavior. With regard to the conceptualization of this variable, the debate continues about whether Internet addiction does really exist or if people use the Internet as an instrument to satisfy their addictive behaviors. Some scholars supported the idea that Internet addiction is a behavioral addiction that includes some key characteristics such as tolerance, withdrawal, time-management problems, mood modification, and neglect of social life and routines (e.g., Widyanto, Griffiths, Brunsten, & Ainette, 2008). There is also some debate surrounding the use of 'problematic' or 'addictive' Internet use terms (Carbonell, Chamorro, Oberst, Rodrigo, & Prades, 2018). However, as it is not the purpose of this paper to discuss about the convenience of using one term or the other and we measured this variable using the Internet Addiction Test (IAT; Young, 1998), we deemed more appropriate to use the Internet addiction term.

Regarding the role that self-control plays in the problematic and addictive use of the Internet, evidence is still quite scarce and not clear. While some studies have found correlation between the use of Internet and deficits in self-control (Kim, Hong, Lee, & Hyun, 2017), others have either not found any relationships or have even found just the opposite (Billieux & Van der Linden, 2012). These differences could be due to the diverse methods and tasks used by the researchers to evaluate self-control or to cultural differences between the studied samples.

Although most studies were focused on the relationship between low levels of self-control and problematic behavior, some data found that poor self-control plays a role in the emergence of several emotional difficulties. This may be due to the major coincidence between the cerebral mechanisms responsible for controlling behaviors and emotions. As good self-control also allows a better regulation of emotions and mood, it is not surprising that some studies find a relationship between low self-control and anxiety-depression disorders (Ozdemir et al., 2014; Yen, Chou, Liu, Yang, & Hu, 2014). Hence, poor self-control could be a shared risk factor that justifies the comorbidity found between anxiety-depressive disorders and both substance use and Internet addiction (Na, Lee, Choi, & Kim, 2017).

Based on the previous literature and bearing in mind the high prevalence of substance use, Internet addiction, and anxiety-depression symptoms during adolescence and early adulthood, this study sought to get updated data about the relationship of self-control with age and also with emotional and behavioral adjustment using a truly random sample of adolescents and young adults. Additionally, as age might be related to both self-control and the emotional-behavioral problems, we analyzed these associations accounting for the confounding effect of age. It might happen that any other variable related to age explains the association found between self-control and psychological adjustment problems.

The age range studied (12-34) will allow investigating changes in self-control not only during adolescence but also during the first adult years, gaining a more comprehensive picture and better understanding of the development of self-control. Although a longitudinal design would be more advantageous for establishing developmental trends, the broad age range studied and the random sampling hinder the follow-up. Thus, a cross-sectional design was used. Specifically, the aims of this study were to, firstly, explore the relationship of self-control with age during adolescence and early adulthood and, secondly, to analyze the relationship between self-control and substance consumption, Internet addiction, and anxiety-depression symptoms. According to these aims, the following hypothesis were formulated:

- a. Self-control would be higher among older participants.
- b. Lower scores for self-control would be related to higher substance consumption, more addictive Internet use, and more anxiety-depression symptoms.

- c. Higher scores of self-control may play a role in preventing frequent Internet users from becoming addicted to it.

Method

Participants and Procedure

The sample of this study consisted of 1,600 participants, between 12 and 34 years old, from the Spanish region of Andalusia. The sampling method was probabilistic and representative of the Andalusian population of this age range, taking into account the data provided by the municipal population census of the National Statistics Institute. The sample was proportionally stratified by provinces and the size of the municipalities according to the existent population from 12 to 34 years old within each stratum. A total of 10 surveys per sampling point was determined, one for each quota for sex (boy and girl) and age interval (from 12 to 14, from 15 to 19, from 20 to 24, from 25 to 29, and from 30 to 34 years old). The distribution of the sample according to sex and age was not proportional, but it ensured a minimum and equal representation of males and females for each age interval. Therefore, the final sample consisted of 800 boys and 800 girls, with an average age of around 22 years old ($M = 22.28$, $SD = 6.94$). We did not achieve representativeness of all age intervals; yet the sample was overall representative of the Andalusia population aged from 12 to 34 years.

Members of the fieldwork team administered the questionnaires during individual interview visits at participants' homes. These homes were selected using random routes within the selected census sections. A random decision square served to select the last sample unit (person to be interviewed). The selection of sampling points (census sections) by province and residence habitat was performed randomly, proportional to the population of each section, with a total of 160 census sections.

The Institutional Review Board approved the study design. The study was carried out in accordance with the Declaration of Helsinki. All participants, or their parents if they were under 18 years old, gave their informed consent prior to their participation.

Measures

Self-control. An adaptation of the Brief Self-control Scale (Tangney et al., 2004) was used. The Self-control Scale or its reduced version, the Brief Self-control Scale (Tangney et al., 2004) have been used in more than 60 studies showing good reliability and validity (Carver, Sinclair, & Johnson, 2010; De Ridder et al., 2011; Lindner, Nagy, & Retelsdorf, 2015). This scale evaluates the degree of self-control in adolescents and young adults. Its original version includes 13 items (e.g., "I am good at resisting temptation") on a Likert scale ranging from 1 (*totally disagree*) to 5 (*totally agree*). In order to provide cross-validity evidence for the Spanish version of the scale used in this study, an exploratory factor analysis (EFA) and a confirmatory factor analysis (CFA) were carried out in Mplus7.0 (Muthén & Muthén, 1998–2012). The EFA advised a reduction of the scale to 9 items. The CFA confirmed a factor structure of three first-order factors (contention, reflection, and discipline) and a second-order factor corresponding to the total self-control score (CFI = .97, TLI = .95, SRMR = .03, RMSEA = .05). In this study only the total score of the scale was used. Cronbach's alpha was .77.

Internet use. The use of the Internet was measured with two ad hoc questions about the daily average number of hours that participants spent using the Internet. Response options were *never*, *less than an hour*, *between 1 and 3 hours*, *between 3 and 6 hours*, and *more than 6 hours*.

Internet addiction. The Internet Addiction Test (IAT; Puerta-Cortés, Carbonell, & Chamarro, 2013; Young, 1998) was used. This is

the most often used measure to assess the behaviors associated with the addictive use of the Internet; it includes compulsion, escapism, and dependence, and the problems related to an addictive use in the personal, working, and social environments of adolescents and young adults. The test comprises 20 items (e.g., "How often do you find that you stay on-line longer than you intended?") that are answered in a 5 point-Likert scale from 1 (*never or rarely*) to 5 (*always*). It provides a global score of Internet addiction. According to Wydyanto & McCurran (2004), the scale offers cut-offs for moderate (scores ranging from 40 to 60) and severe addiction (scores > 60). The scale was translated into the Spanish language by the research team using back translation. Results from CFA in Mplus7.0 (Muthén & Muthén, 1998–2012) showed that the Spanish version of the Internet Addiction Test fitted the data satisfactorily (CFI = .96, TLI = .94, SRMR = .03, RMSEA = .04). Internal consistency measured by Cronbach's alpha was .94.

Substance consumption. It was used a questionnaire that asked about the consumption of the most common used substances among Spanish adolescents: tobacco, alcohol (daily consumption and number of drunkenness), and hashish or marijuana (Sánchez-Queija, Oliva, Parra, & Camacho, 2016). We combined the four ordinal items into a continuous single-interval measure, enabling us to compute an interval variable that provides clear advantages for statistical analysis (Simons-Morton, 2007). The Cronbach's alpha was = .70.

Anxiety-depression symptoms. Youth Self Report (YSR) and Adult Self Report (ASR) by Achenbach & Rescorla (2001) were used to evaluate the anxiety-depression disorders in adolescents and adults, respectively. The YSR anxious/depressed sub-scale was administered to those under the age of 19, and the same ASR sub-scale to those who were above 19 years of age. The YSR sub-scale consists of 13 items (e.g., "I cry a lot"), while the ASR has 18 items (e.g., "I feel lost or confused"). Items were rated on a 3-point scale ranging from 0 (*not true*) to 2 (*very true*). Standardized scores were used so that the scores for adolescents and adults were comparable. Cronbach's alphas were .74 for the YSR and .81 for the ASR.

Analysis

The relationship between the scores on the self-control scale and sex and age were tested by means of factor analysis of variance. Next, correlations between the variables included in the study were computed. To analyze the role of self-control in the prediction of Internet addiction, substance consumption, and anxiety-depression, hierarchical multiple regressions were performed introducing age and sex as predictors in the first step, and self-control in the second. Finally, participants who reported using the Internet for more than 3 hours per day were selected. Then, this subgroup of frequent Internet users was split up into two sub-groups according to the cut-off point for Internet addiction (Young, 1998): participants with moderate or severe addiction (addicted) and the rest (non-addicted). Univariate analysis of variance was used to analyze differences in self-control between both groups: frequent Internet users showing high scores in addiction and frequent Internet users with low scores in addiction. All the analyses were conducted using the statistical package SPSS 20.0.

The percentage of missing data was < 0.05% for all items. Given the large sample size, missing data were imputed using the expectation-maximization algorithm implemented in SPSS (Enders & Peugh, 2004; Schafer & Graham, 2002).

Results

Relationship of Self-control with Age in Boys and Girls

The analysis of self-control scores based on sex and age showed significant differences both for sex, $F(1, 1599) = 17.16$, $p < .001$, $\eta^2 = .01$,

and age, $F(4, 1596) = 20.38, p < .001, \eta^2 = .05$). As expected, girls and older adolescents scored higher (see means in Table 1). There were no significant interaction effects between sex and age, $F(4, 1599) = 26.21, p > .05$, which indicated that there were no gender differences in the relationship between age and self-control. As shown in Figure 1 and Table 1, there was a slight self-control decrease between the 12-14 years old and the 15-19 years old groups, after which a progressive increase was observed. Post hoc analyses indicated that scores were significantly higher in the 30-34 years old group comparing with the 12-14, $F(1,639) = 27.21, p < .001, \eta^2 = .04$, the 15-19 years old group, $F(1,638) = 71.67, p < .001, \eta^2 = .10$, and the 20-24 years old group, $F(1, 639) = 34.63, p < .001, \eta^2 = .05$. The 25-29 years old group also showed significantly greater scores than the group of 15-19 years old, $F(1,637) = 27.36, p < .001, \eta^2 = .04$. Lastly, the 12-14 years old group obtained higher scores than those from the 15-19 years old group that had the lowest score, $F(1,639) = 27.21, p < .001, \eta^2 = .04$. No other group differences were significant.

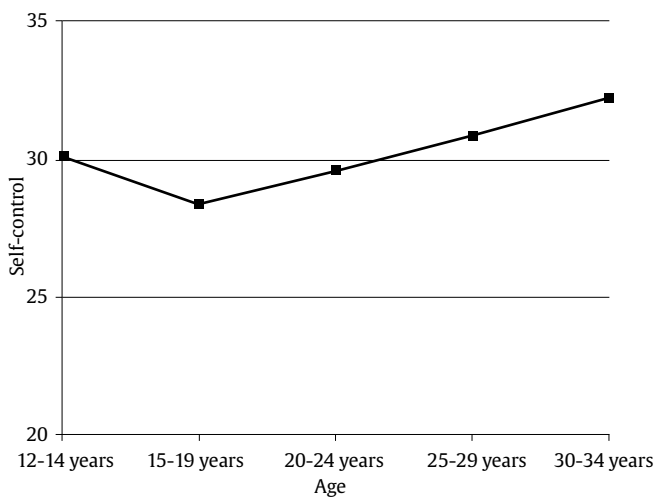


Figure 1. Self-control by Age.

Table 1. Means and Standard Deviations in Self-control by Gender and Age

Age	Males		Females		Total	
	M	SD	M	SD	M	SD
12-14	29.15	5.10	30.78	4.84	29.96	5.03
15-19	27.67	6.04	29.08	5.46	28.38	5.79
20-24	29.36	6.01	29.73	5.37	29.54	5.70
25-29	29.98	6.04	31.58	5.48	30.78	5.82
30-34	31.74	5.50	32.45	5.10	32.09	5.31
Total	29.59	5.89	30.72	5.38		

Note. Range = 9-45.

Post-hoc analyses: 30-34 > 12-14, 15-19, 20-24; 25-29 > 15-19; 12-14 > 15-19.

Correlations between Self-control and Internet Addiction, Substance Consumption, and Anxiety-Depression

Table 2 shows partial correlations among the variables included in this study after partialling out the effect of age. Correlations

were similar in the case of boys and girls. Significant correlations were observed between the total score of the self-control and the adjustment variables. Specifically, greater overall self-control was associated with lower scores on Internet addiction, anxiety-depression, and substance consumption. Internet addiction was also significantly correlated with substance consumption and anxiety-depression symptoms. Partial correlation between self-control and Internet addiction was not due to the influence of substance consumption or anxiety-depression since it remained significant after controlling for the effects of age and these two variables ($r = -.30, p < .001$). Correlation between self-control and substance consumption also remained significant ($r = -.37, p < .001$) after partialling out the effects of age, Internet addiction, and anxiety-depression. Finally, correlation between self-control and anxiety-depression also remained significant ($r = -.20, p < .001$) when substance consumption and Internet addiction were controlled. These results indicated that self-control had a significant relationship with every adjustment variable (anxiety-depression, substance consumption, and internet addiction) and these associations were independent of the influence of age and the other two adjustment variables.

Table 2. Partial Correlations among the Study Variables (partialling out the effect of age)

	1	2	3	4	5
1. Self-control	-				
2. Internet addiction	-.36***	-			
3. Daily Internet use	-.02	.37***	-		
4. Substance consumption	-.38***	.15***	.03	-	
5. Anxiety-depression	-.26***	.27***	.02	.06*	-

* $p < .05$, ** $p < .01$, *** $p < .001$.

Regressions of Adjustment Variables on Sex, Age, and Self-control

Findings from the hierarchical multiple regression analyses (see Table 3) showed that self-control significantly predicted scores in Internet addiction, substance consumption, and anxiety-depression symptoms. Sex and age, introduced in the first step, had a significant but small contribution to the explained variance in these three variables. The introduction of self-control in the second step led to a significant increase in the explained variance, contributing to a decrease in Internet addiction, substance consumption and, to lesser extent, in anxiety-depression symptoms.

Self-control as a Protective Factor for Internet Addiction

Although correlation between daily Internet use and Internet addiction was significant, the effect size was modest. Further, there were no significant correlations between daily Internet use and substance use or anxiety-depression symptoms. This finding suggests that not all individuals who intensively use the Internet become addicted to it. To test whether higher self-control prevents some heavy Internet

Table 3. Hierarchical Multiple Regressions Predicting Internet Addiction, Substance Consumption, and Anxiety-Depression

Step	Predictors	Internet addiction		Substance consumption		Anxiety-Depression	
		Beta	R ² and significance of R ² change	Beta	R ² and significance of R ² change	Beta	R ² and significance of R ² change
Step 1	Sex	-.04	.04***	-.15***	.09***	.13***	.02***
	Age	-.21***		.26***		-.05	
Step 2	Sex	-.01	.18***	-.11***	.23***	.16***	.09***
	Age	-.15***		.32***		.00	
	Self-control	-.37***		-.38***		-.27***	

* $p < .05$, ** $p < .01$, *** $p < .001$.

users from becoming addicted to it, we selected those participants who had reported using the Internet for more than 3 hours per day ($N = 371$). This group was split into two sub-groups: those whose scores on the Internet addiction scale were over 40 out of 100 (moderate or severe addiction) and could be deemed as individuals with Internet addiction ($n = 159$) and the rest ($n = 212$). The comparison of both groups showed significant differences in self-control: participants with high scores on the addiction scale scored lower in self-control, $F(1, 369) = 54.21, p < .001, \eta^2 = .13$ ($M = 27.29$ vs. $M = 31.64$ for individuals with Internet addiction vs. individuals without Internet addiction, respectively).

Discussion

Results from this study provided evidence about the significant associations between self-control and age, as well as between self-control and variables related to emotional and behavioral adjustment during adolescence and early adulthood. With regard to the relation between self-control and age, individuals between 15 and 19 years of age showed the lowest score in self-control while individuals between 30 and 34 years of age showed the highest score; thus, confirming the Hypothesis 1, participants aged 30 or older proved to have greater self-control. Additionally, the pattern of associations was similar for males and females. As stated in the introduction section, the lowest scores during adolescence could be explained by changes in the adolescent brain. Hormones and cerebral changes happening after puberty impair the balance between brain circuits triggering impulses and those trying to control them. As Casey, Jones, and Somerville (2011) claimed, adolescent brain resembles a vehicle with a very powerful motor, but that has insufficient brakes to control its strength. To a certain extent, this would explain the greater vulnerability of adolescents to develop addictive behaviors (Dahl, 2004; Potenza, 2013; Somerville et al., 2010; Steinberg, 2014). Throughout adolescence, connections between the prefrontal cortex and other emotional information-processing areas, including the limbic system, are reinforced. This allows clear advances in emotional and behavioral regulation and a decrease in impulsiveness with the onset of adulthood. As the various cerebral structures become integrated, adolescents' responses to different situations are based on combined efforts of various areas of the brain. Thus, at the beginning of adolescence, behavioral self-regulation depends exclusively on an immature prefrontal cortex, whereas by the end of this stage, and in adulthood, the responsibility for control is distributed among several areas of the brain to avoid overloading smaller areas, thus making it more effective (Steinberg, 2014). All these neurological changes in brain structure and functions allow reaching a balance between mechanisms of impulse action and control during late adolescence and early adulthood. That might help to explain the increase in self-control scores by later adolescence.

Additionally, although the relationship between age and self-control was similar in both sexes, females scored higher in self-control; however, it is noteworthy that the effect sizes for differences between males and females were very small. Greater self-control among females was also found in other studies (Klassen et al., 2009). Some authors have proposed that these effects may be due to differences in gender socialization practices. Whereas girls tend to be more monitored and controlled, impulsiveness and risk taking are more stimulated in boys; thus, this tendency towards less self-control may end up being part of male identity (Chapple & Johnson, 2007). Considering that this study includes a truly random sample of individuals aged between 12 and 34 years, the results about the association of age and self-control could represent an important contribution to the study of self-control after childhood.

The second aim of this study was to analyze the association between self-control and certain indicators of psychological

adjustment. The results confirmed our second hypothesis. Hence, low scores for self-control were significantly associated with higher substance consumption, more anxiety-depression symptoms, and higher scores for the Internet addiction scale. In spite of the fact that this study was correlational, data supports the importance of self-control as a personal competence that could be deemed as a potential protective factor against some of the most frequent problems during adolescence and early adulthood. Compulsion, loss of control, and the persistence of a given behavior despite the negative consequences deriving from this behavior are all essential elements to consider a behavior as addictive (Griffiths, 2005). It is not surprising that low levels of self-control have proved to have a significant association with Internet addiction and substance consumption (Zhou et al., 2014). Correlations between self-control and Internet addiction or substance consumption were quite similar ($r = -.36, r = -.38$); so, poor control seems to be a risk factor for both behaviors, influencing them to the same extent. In this regard, a significant correlation was also found between these two variables, thus, supporting a pattern of addiction co-occurrence for adolescents and young adults between behaviors that, as Sussman, Lisha, & Griffiths (2011) indicated, have addiction propensity. Poor self-control seems to be a factor that adds to the availability or easy access that young people have to attractive behaviors, such as substance consumption and Internet use.

What defines a behavior as addictive is not so much the frequency with which it is carried out, but rather the loss of control on behalf of the individual, and the establishment of a dependence that seriously interferes in his or her daily life. In this sense, it is important to outline that not all of the youths who used the Internet intensively obtained high scores in Internet addiction. A strong self-control prevented some frequent Internet users from becoming addicted, or at least from scoring high in the Internet addiction test. Hence, our data supports Jessor's (1991) suggestions that some factors in the personal domain could prevent individuals exposed to addiction triggers from developing psychological adjustment problems. This is especially relevant for frequent Internet users that are in a clear risk situation of developing an addiction to Internet. The small but significant association found between low self-control and anxiety-depression symptoms could be very well justified by the fact that difficulties in understanding and regulating emotions and mood have been postulated as important risk factors in the development of these symptoms (Papadakis, Prince, Jones, & Strauman, 2006; Spada & Marino, 2016). Although the scale used in our study essentially refers to behavioral self-control, as Koole, van Dillen, and Sheppes (2011) pointed out, behavior and emotional self-regulation are very closely linked. In both processes, individuals must make a deliberate effort to reach an objective through cognitive control, whether emotional or behavioral. In clear response, in addition to requiring the intervention of neurological systems as has been demonstrated by neuroimaging, greater activation of the dorsal anterior cingulate and prefrontal cortex is seen in both cases. These structures integrate the brain circuit in charge of self-regulation.

In addition to the similarity of underlying processes, one must remember that individuals with low self-control have more difficulties achieving important goals, which could lead to feelings of uneasiness and frustration that place the person in a more vulnerable position to develop symptoms of depression (Papadakis et al., 2006). So, the relationship between addiction and psychological well-being that has been found in some studies (Huang, 2010) could be explained by this feeling of frustration and by the fact that self-control is a risk factor for both addiction and depression.

While the present study has some strength, such as the use of a truly random sample of adolescents and young adults, it is not without its limitations. One of them has to do with the cross-sectional design, which does not allow establishing causal relationships. For instance, we should be cautious when interpreting the relationship between low self-control and substance use as far as this variable

could also interfere with a healthy brain development causing problems in self-control. However, it is relevant to note that the broad age range included in this study made it difficult to obtain longitudinal data. The same could be said regarding the association between Internet addiction and anxiety-depression. For instance, Romano et al. (2017) found an increase in anxiety symptoms after an intensive use of the Internet, which could indicate that anxiety-depression may be a negative consequence of Internet addiction. Another limitation has to do with the use of a single source of information that could have increased the correlations between the variables studied. All measures were based upon participants' reports of their own feelings and behaviors and could be subject to social desirability.

Implications of this Study

According to Jessor (1991, 2014), some behaviors like substance use or the Internet addiction may be deemed as risk factors, especially during adolescence, because they may jeopardize the accomplishment of normative developmental tasks and the acquisition of important skills. Hence, it is crucial to find which factors may prevent from these risk behaviors and ensure a healthy development. This study alerts us to the importance of promoting self-control during childhood and adolescence to prevent maladjustment and support positive development. As some studies have found, above and beyond the influence of genes, parenting style plays an important role in the development of self-regulation (Belsky & Beaver, 2011). Steinberg (2014) has pointed out that self-control can be fostered through significant changes in the way we raise, educate, and treat young people. Because brain systems related to self-control are developing from birth through early adulthood, parents could do a lot to help their children acquire the capacity for self-control. Schools should also pay more attention to the promotion of self-control, incorporating in their curricular activities and programs designed to train self-regulation skills. Assisting parents and teachers with that important task can be a challenge for a society that seeks to enhance the development of new generations of children and adolescents.

Conflict of Interest

The authors of this article declare no conflict of interest.

References

- Achenbach, T. M., & Rescorla, L. A. (2001). *Manual for the ASEBA school-age forms & profiles*. University of Vermont, Research Center for Children, Youth, & Families. Burlington, VT.
- Baumeister, R. F., Vohs, K. D., & Tice, D. M. (2007). The strength model of self-control. *Current Directions in Psychological Science*, 16, 396-403. <https://doi.org/10.1111/j.1467-8721.2007.00534.x>
- Belsky, J., & Beaver, K. M. (2011). Cumulative-genetic plasticity, parenting and adolescent self-regulation. *Journal of Child Psychology and Psychiatry*, 52, 619-626. <https://doi.org/10.1111/j.1469-7610.2010.02327.x>
- Billieux, J., & Van Der Linden, M. (2012). Problematic use of the Internet and self-regulation: A review of the initial studies. *The Open Addiction Journal*, 5(Suppl 1), 24-29. <https://doi.org/10.2174/1874941001205010024>
- Carbonell, X., Chamarro, A., Oberst, U., Rodrigo, B., & Prades, M. (2018). Problematic use of the Internet and smartphones in university students: 2006-2017. *International Journal of Environmental Research and Public Health*, 15, e475. <https://doi.org/10.3390/ijerph15030475>
- Carver, C. S., Sinclair, S., & Johnson, S. L. (2010). Authentic and hubristic pride: Differential relations to aspects of goal regulation, affect, and self-control. *Journal of Research in Personality*, 44, 698-703. <https://doi.org/10.1016/j.jrp.2010.09.004>
- Casey, B. J., Jones, R. M., & Somerville, L. H. (2011). Braking and accelerating of the adolescent brain. *Journal of Research on Adolescence*, 21, 21-33. <https://doi.org/10.1111/j.1532-7795.2010.00712.x>
- Chapple, C. L., & Johnson, K. A. (2007). Gender differences in impulsivity. *Youth, Violence and Juvenile Justice*, 5, 221-234. <https://doi.org/10.1177/1541204007301286>
- Dahl, R. E. (2004). Adolescent brain development: A period of vulnerabilities and opportunities. *Annals of the New York Academy of Sciences*, 1021, 1-22. <https://doi.org/10.1196/annals.1308.001>
- De Ridder, D. T. D., de Boer, B. J., Lugtj, P., Bakker, A. B., & van Hooft, E. A. J. (2011). Not doing bad things is not equivalent to doing the right thing: Distinguishing between inhibitory and initiatory self-control. *Personality and Individual Differences*, 50, 1006-1011. <https://doi.org/10.1016/j.paid.2011.01.015>
- De Ridder, D., Lensvelt-Mulders, G., Finkenauer, C., Stok, F. M., & Baumeister, R. F. (2012). A meta-analysis of how trait self-control relates to a wide range of behaviors. *Personality and Social Psychology Review*, 16, 76-99. <https://doi.org/10.1177/1088868311418749>
- Enders, C. K., & Peugh, J. L. (2004). Using an EM covariance matrix to estimate structural equation models with missing data: Choosing an adjusted sample size to improve the accuracy of inferences. *Structural Equation Modeling*, 11, 1-19. https://doi.org/10.1207/S15328007SEM1101_1
- Ford, J., & Blumenstein, L. (2013). Self-control and substance use among college students. *Journal of Drug Issues*, 43, 56-68. <https://doi.org/10.1177/0022042612462216>
- Griffiths, M. (2005). A components model of addiction within a biopsychosocial framework. *Journal of Substance Use*, 10, 191-197. <https://doi.org/10.1080/14659890500114359>
- Harden, K. P., & Tucker-Drob, E. M. (2011). Individual differences in the development of sensation seeking and impulsivity during adolescence: further evidence for a dual systems model. *Developmental Psychology*, 47, 739-746. <https://doi.org/10.1037/a0023279>
- Heatherington, T. F., & Wagner, D. D. (2011). Cognitive neuroscience of self-regulation failure. *Trends in Cognitive Sciences*, 15, 132-139. <https://doi.org/10.1016/j.tics.2010.12.005>
- Huang, C. (2010). Internet use and psychological well-being: A meta-analysis. *Cyberpsychology, Behavior, and Social Networking*, 13, 241-249. <https://doi.org/10.1089/cyber.2009.0217>
- Jessor, R. (1991). Risk behavior in adolescence: A psychological framework for understanding and action. *Journal of Adolescent Health*, 12, 597-605. [https://doi.org/10.1016/1054-139X\(91\)90007-K](https://doi.org/10.1016/1054-139X(91)90007-K)
- Jessor, R. (2014). Problem Behavior Theory: A half century of research on adolescent behavior and development. In R. M. Lerner, A. C. Petersen, R. K. Silbereisen, & J. Brooks-Gunn (Eds.), *The developmental science of adolescence: History through autobiography* (pp. 239-256). New York, NY: Psychology Press.
- Kim, J., Hong, H., Lee, J., & Hyun, M. (2017). Effects of time perspective and self-control on procrastination and Internet addiction. *Journal of Behavioral Addictions*, 6, 229-236. <https://doi.org/10.1556/2006.6.2017.017>
- Klassen, R., Ang, R. P., Chong, W. H., Krawchuk, L. L., Huan, V. S., Wong, I. Y. F., & Yeo, L. S. (2009). A cross cultural study of adolescent procrastination. *Journal of Research on Adolescence*, 19, 799-811. <https://doi.org/10.1111/j.15327795.2009.00620.x>
- Koole, S. L., van Dillen, L. F., & Sheppes, G. (2011). The self-regulation of emotion. In K. D. Vohs, & R. F. Baumeister (Eds.), *Handbook of self-regulation: Research, theory and applications* (pp. 101-112). New York, NY: Guilford.
- Lindner, C., Nagy, G., & Retelsdorf, J. (2015). The dimensionality of the Brief Self-Control Scale. An evaluation of unidimensional and multidimensional applications. *Personality and Individual Differences*, 86, 465-473. <https://doi.org/10.1016/j.paid.2015.07.006>
- Meldrum, R. C., Young, J. T. N., & Weerman, F. M. (2012). Changes in self-control during adolescence: Investigating the influence of the adolescent peer network. *Journal of Criminal Justice*, 40, 452-462. <https://doi.org/10.1016/j.jcrimjus.2012.07.002>
- Myrseth, K. O., Fishbach, A., & Trope, Y. (2009). Counteractive self-control: When making temptation available makes temptation less tempting. *Psychological Science*, 2, 159-163. <https://doi.org/10.1111/j.1467-9280.2009.02268.x>
- Muthén, L. K., & Muthén, B. O. (1998-2012). *Mplus user's guide* (7th Ed.). Los Angeles, CA: Muthén & Muthén.
- Na, E., Lee, H., Choi, I., & Kim, D. (2017). Comorbidity of Internet gaming disorder and alcohol use disorder: A focus on clinical characteristics and gaming patterns. *The American Journal on Addictions*, 26, 326-334. <https://doi.org/10.1111/ajad.12528>
- Ozdemir, Y., Kuzucu, Y., & Ak, S. (2014). Depression, loneliness and Internet addiction: How important is low self-control? *Computers in Human Behavior*, 34, 284-290. <https://doi.org/10.1016/j.chb.2014.02.009>
- Papadakis, A. A., Prince, R. P., Jones, N. P., & Strauman, T. J. (2006). Self-regulation, rumination, and vulnerability to depression in adolescent girls. *Development and Psychopathology*, 18, 815-829. <https://doi.org/10.1017/S0954579406060408>
- Potenza, M. N. (2013). Biological contributions to addictions in adolescents and adults: Prevention, treatment and policy implications. *Journal of Adolescent Health*, 52, 522-532. <https://doi.org/10.1016/j.jadohealth.2012.05.007>
- Puerta-Cortés, D., Carbonell, X., & Chamarro, A. (2012). Analysis of the psychometric properties of the Spanish version of Internet Addiction Test. Análisis de las propiedades psicométricas de la versión en español del Internet Addiction Test. *Trastornos Adictivos*, 14, 99-104. [https://doi.org/10.1016/S1575-0973\(12\)70052-1](https://doi.org/10.1016/S1575-0973(12)70052-1)
- Romano, M., Roaro, A., Re, F., Osborne, L., Truzoli, R., & Reed, P. (2017). Problematic internet users' skin conductance and anxiety increase

- after exposure to the internet. *Addictive Behaviors*, 75, 70-74. <https://doi.org/10.1016/j.addbeh.2017.07.003>
- Romer, D., Duckworth, A.L., Sznitman, S., & Park, S. (2010). Can adolescents learn self-control? Delay of gratification in the development of control over risk taking. *Prevention Science*, 11, 319-330. <https://doi.org/10.1007/s11121-010-0171-8>
- Sánchez-Queija, I., Oliva, A., Parra, A., & Camacho, C. (2016). Longitudinal analysis of the role of family functioning in substance use. *Journal of Child and Family Studies*, 25, 232-240. <https://doi.org/10.1007/s10826-015-0212-9>
- Schafer, J. L., & Graham, J. W. (2002). Missing data: Our view of the state of the art. *Psychological Methods*, 7, 147-177. <https://doi.org/10.1037/1082-989X.7.2.147>
- Schel, M. A., Scheres, A., & Crone, E. A. (2014). New perspectives on self-control development: Highlighting the role of intentional inhibition. *Neuropsychologia*, 65, 236-246. <https://doi.org/10.1016/j.neuropsychologia.2014.08.022>
- Simons-Morton, B. G. (2007). Social influences on adolescent substance use. *American Journal of Health Behavior*, 6, 672-684. <https://doi.org/10.5993/AJHB.31.6.13>
- Somerville, L. H., Jones, R. M., & Casey, B. J. (2010). A time of change: Behavioral and neural correlates of adolescent sensitivity to appetitive and aversive environmental cues. *Brain and Cognition*, 72, 124-133. <https://doi.org/10.1016/j.bandc.2009.07.003>
- Spada, M. M., & Marino, C. (2017). Metacognitions and emotion regulation as predictors of problematic internet use in adolescents. *Clinical Neuropsychiatry*, 14, 59-63. <https://doi.org/10.1016/j.abrep.2017.10.004>
- Steinberg, L. (2014). *Age of opportunity. Lessons from the new science of adolescence*. Boston, MA: Eamon Dolan/Houghton Mifflin Harcourt.
- Steinberg, L., Albert, D., Cauffman, E., Banich, M., Graham, S., & Woolard, J. (2008). Age differences in sensation seeking and impulsivity as indexed by behavior and self-report: Evidence for a dual systems model. *Developmental Psychology*, 44, 1764-1778. <https://doi.org/10.1037/a0012955>
- Sussman, S., Lisha, N., & Griffiths, M. (2011). Prevalence of the addictions: A problem of the majority or the minority. *Evaluation & the Health Professions*, 34, 3-56. <https://doi.org/10.1177/0163278710380124>
- Tangney, J. P., Baumeister, R.F., & Boone, A.L. (2004). High self-control predicts good adjustment, less pathology, better grades, and interpersonal success. *Journal of Personality*, 72, 271-324. <https://doi.org/10.1111/j.0022-3506.2004.00263.x>
- Widyanto, L., Griffiths, M. D., Brunsten, V., & McMuran, M. (2008). The psychometric properties of the Internet-Related Problem Scale: A pilot study. *International Journal of Mental Health and Addiction*, 6, 205-213. <https://doi.org/10.1007/s11469-007-9120-6>
- Widyanto, L., & McMuran, M. (2004). The psychometric properties of the internet addiction test. *Cyberpsychology & Behavior*, 7, 443-450. <https://doi.org/10.1089/cpb.2004.7.443>
- Wills, T.A., Walker, C., Mendoza, D., & Ainette, M.G. (2006). Behavioral and emotional self-control: Relations to substance use in samples of middle and high school students. *Psychology of Addictive Behaviors*, 20, 265-278. <https://doi.org/10.1037/0893-164X.20.3.265>
- Yen, C. F., Chou, W. J., Liu, T. L., Yang, P., & Hu, H. F. (2014). The association of Internet addiction symptoms with anxiety, depression and self-esteem among adolescents with attention-deficit/hyperactivity disorder. *Comprehensive Psychiatry*, 55, 1601-1608. <https://doi.org/10.1016/j.comppsy.2014.05.025>
- Young, K. S. (1998). Internet addiction: The emergence of a new clinical disorder. *Cyberpsychology & Behavior*, 1, 237-244. <https://doi.org/10.1089/cpb.1998.1.237>
- Zhou, Z., Zhu, H., Li, C., & Wang, J. (2014). Internet addictive individuals share impulsivity and executive dysfunction with alcohol-dependent patients. *Frontiers in Behavioral Neuroscience*, 8, 288. <https://doi.org/10.3389/fnbeh.2014.00288>