

Selective attention, anxiety, depressive symptomatology and academic performance in adolescents

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Abstract

Introduction. In this cross-sectional, descriptive research we studied the relation between three psychological variables (anxiety, depression and attention) in order to analyze their possible association with and predictive power for academic achievement (as expressed in school grades) in a sample of secondary students.

Method. For this purpose we worked with a sample of 98 randomly selected students, ages 12-16 years, enrolled at two secondary schools in the city of Granada.

Results. The results indicate a significant association between depression and anxiety in parts of the sample, as well as a significant inverse association between depression and academic performance. The analysis of gender differences showed significant differences between men and women in the overall grade point average (higher in women than in men) as well as in depression, with more depressive symptoms in boys. There were no significant differences in anxiety or attention deficit between men and women. Regression analysis indicated that moderate levels of anxiety are associated with better academic performance, with no association observed between anxiety and selective attention.

Discussion and Conclusion: It is important to monitor levels of depressive symptomatology and emotional disturbance in secondary students, since early detection makes it possible to provide suitable care and to reduce these variables' role in academic failure, or at the least, to improve students' academic performance.

Keywords: Academic performance. Academic achievement. Anxiety. Depression. Selective attention.

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Resumen

Introducción. En la presente investigación descriptiva transversal se estudia la relación entre tres variables de carácter psicológico (ansiedad, depresión y atención), con el fin de analizar la posible asociación y el poder predictivo de las mismas sobre el rendimiento académico (expresado a través de las calificaciones escolares) en una muestra de estudiantes de enseñanzas medias.

Método. Para ello se trabajó con una muestra de 98 estudiantes de edades comprendidas entre 12 y 16 años, escolarizados en dos centros académicos de la ciudad de Granada elegidos al azar.

Resultados. Los resultados indican una asociación significativa entre depresión y ansiedad en los integrantes de la muestra, así como una asociación significativa inversa entre depresión y rendimiento académico. El análisis de diferencias de géneros, mostró diferencias significativas entre hombres y mujeres en la media global de la calificación académica (siendo superior en las mujeres que en los hombres) así como en depresión, siendo la sintomatología depresiva mayor en los niños. No se encontraron diferencias significativas en ansiedad ni en déficit de atención entre hombres y mujeres. El análisis de regresión señala igualmente que unos niveles moderados de ansiedad se asocian a mejor rendimiento académico, sin que se observe asociación entre esta variable y la atención selectiva.

Discusión y Conclusión. Parece cobrar relevancia la atención a los niveles de sintomatología depresiva y alteración emocional en estudiantes de enseñanzas medias, ya que la detección precoz permitiría poner en marcha una adecuada atención y reducir la incidencia de estas variables sobre el fracaso académico o cuando menos, mejorar su rendimiento académico.

Palabras Clave: Rendimiento académico. Ansiedad. Depresión. Atención selectiva.

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Introduction

Academic performance is often conceptualized as referring to the different stages of the educational scene, as one of the goals pursued in the teaching-learning process, sought after by educational authorities, teachers, parents, and of course, the students themselves. During this process, the student is to become transformed through a sequence of active work, becoming enriched not only at the cognoscitive level, but also in skills, aptitudes, interests, ideals, etc., that are needed for success in academic, personal and social life (Cano, 2001; Espinoza, 2006). This being so, a quantification of academic performance is considered one possible expression with which to assess the teaching-learning process.

When it comes to the operative measurement of academic performance, one of the most common criteria has been the grades which teachers give students upon their completion of some evaluation system, most notably, the oral, written, or performance tests that students complete over the course of the school year. It can be said that these grades are one of the most predictive factors of school performance (Cano, 2001). It follows that, since students' academic performance is measured through the grades they obtain, such scores would also constitute the main indicator of school success.

In this regard we can also speak of school failure, which, according to the experts, refers to the case of having reached the end of one or several stages in the educational system and obtaining unsatisfactory grades. This failure extends to other spheres of the student's personal and social life, etc., and is a possible precursor or circumstance associated with later failures in other aspects of life (McCarty, Mason, Kosterman, Hawkins, Lengua & McCauley, 2008). Academic failure in our country has drawn attention and in recent years has even led to questioning the quality of the educational system, due to the figures which have been made public not only by the Ministry of Science and Education itself (*Instituto Nacional de Evaluación y Calidad del Sistema Educativo* (INECSE), 2004), but also in reports from international organizations such as the Organization for Economic Cooperation and Development (OECD), in its well-known PISA report (OECD, 2003; 2005 and 2007). For example, school failure indices in Spain for the year 2006-2007 ranged from 10 to 30%, placing our country below average for the European Union in the percentage of the population (from ages 25 to 64) that have reached the level of Secondary Education (*Ministerio de Educación, Política Social y Deportes*, 2007).

It would be a mistake to think that the pupil is the only one responsible for this failure, since he or she receives influences both within and outside the educational system itself (Ahmed & Bruinsma, 2006; Cano, 2001; Espinoza, 2006). In general, school performance is considered a highly complex variable, where a multiplicity of factors intervene, and these factors do not always lend themselves to clear definition. Study of these variables is problematic due to the convergences produced in academic performance, such as motivation, personality, socio-cultural level, etc. (Cano, 2001). In a study done by Broc (2006), studying the relationship between motivation and academic performance in students enrolled in compulsory and post-compulsory secondary education, results show a close, significant positive relationship between motivation and school success or failure. Likewise, self-efficacy is positively related to academic performance, that is, pupils who present a high self-efficacy perception obtain higher academic performance (Contreras, Espinosa, Esguerra, Haikal, Polaina & Rodríguez, 2005). Thus, in any given outcome, not only do the pupil's intellectual capacities intervene, but other types of influencing factors can hinder or boost their performance. These factors include psychological ones, such as aptitudes, motivation, self-concept, etc.; sociological factors, including cultural, socio-economic and environmental; and finally, pedagogical factors, pointing to purely scholastic aspects such as teaching styles, methodologies, and so on (Cano, 2001).

As for the gender variable, the 2006 Pisa report offers differential figures as a function of students' gender. With regard to the Spanish population, significant differences are reflected in the area of reading, with women at a 35% advantage over men, and in mathematics and sciences, where men show an advantage of 4 and 9% respectively, although in this case the differences are not entirely significant (*Ministerio de Educación y Ciencia, 2007*).

This brief review of academic performance, its conceptualization and the characteristics or aspects that can influence it, leaves out certain important variables which can also modify how the student functions. We will focus our attention on three of these that have received researchers' attention for some time, namely, depressive symptomatology, anxiety and selective attention.

Regarding depressive symptomatology in the adolescent population, it is difficult to accurately analyze its prevalence because of the diversity of assessment methods in use, as

well as the heterogeneity of samples in the different studies (Jatobá & Bastos, 2007; Marcotte, Lévesque & Fortin, 2006). Nonetheless, the depressive syndrome in young people has been estimated at 10 to 30% by some researchers (Hammen & Rudolph, 2003). During the period of adolescence, there is an increased difference in the prevalence of depressive symptomatology between boys and girls, where girls present higher rates of depression than do boys (Marcotte, Lévesque & Fortin, 2006).

Similarly, certain social, behavioral and academic problems can be involved in the etiology of depression, showing that there is a relationship between deficits in these areas and depressive symptomatology, both in childhood and in adolescence (Eley & Stevenson, 2000). Bandura, Pastorelli, Barbaranelli and Caprara (1999) argued in one study that not attaining a proposed academic goal could be a factor which gives rise to emotional disturbance (stress and anxiety), which in turn could be a reason for the later appearance of depression, especially if failure is extended over time. Thus, academic failure, in terms of not reaching a goal, would lead to feelings of discouragement and negative self-assessment, typical symptoms of depression. For their part, Herrera and Maldonado (2002) found that among first-year university students, those individuals classified with high rates of academic failure presented a higher level of depression than those that did not fail or those that only failed one subject. However, given that most of these studies are descriptive and look for an association between two variables—not experimental studies nor conducive to establishing cause-effect relations—the relationship between the two variables could also be the inverse, since depression could generate low academic performance.

The study of anxiety in childhood and adolescents has concerned researchers for quite some time. For example, the prevalence of anxiety disorder in adolescents in the general population is between 9 and 21% (Mardomingo, 2005). The characteristic symptoms of this emotional disturbance are very common, and can interfere negatively with social life, general well-being, development of social skills and even with academic performance (Pine, Wasserman & Workman, 1999). There is evidence to think that high levels of anxiety hinder the performance of any task since attention, concentration and effort are not functioning fully (Rains, 2004). By contrast, moderate levels of anxiety produce a state of alert or of tension that can improve performance on tasks that require such alertness (Victor & Rooper, 2002). The latter can be beneficial for academic functioning, as long as the pupil has mechanisms to deal with anxiety, his or her self-esteem is not threatened, and if the task is not highly significant (Con-

treras et al., 2005). High presence of anxiety tends to be associated with a decline in memory and in cognitive functions, which may contribute to the beginnings of new psychiatric disorders (Von Ameringen, Mancini & Farvolden, 2003). In summary, the relationship between academic performance and anxiety symptomatology is complex. Several factors would influence this relationship through a series of multiple interactions, including the individual's affective and cognitive profile, family influences and socio-economic status (Mazzone, Ducci, Scoto, Passaniti, D'Arrigo & Vitiello, 2007).

Regarding gender differences, a study by Locker and Cropley (2004) found differences in anxiety levels, where most measurements of females found high levels of anxiety immediately before tests, along with an increase in negative affect levels. Similarly, gender differences were found in perceived academic competence, where girls reported higher levels of anxiety and depression while at the same time underestimating their academic competence, as compared to boys who showed the opposite tendency and overestimated their competence (Cole, Martin, Peeke, Seroczynsky & Fier, 1999).

Students who suffer from anxiety disorder furthermore avoid classroom activities; for this reason they visit the school nursing station more frequently, reporting a variety of somatic complaints, or even refusing to attend school (Honjo, Nishide, Niwa, Sasaki, Kaneko, Inoko & Nishide, 2001). Due to poor school attendance and the negative behavior often manifest when attending, anxiety disorder may be associated with poor academic performance (Hughes, Lourea-Waddell & Kendall, 2008). Similarly, in research carried out by Von Ameringen et al. (2003), results suggest that children and adolescents with anxiety problems suffer greater risk of failing academically, of dropping out of school, and of not aspiring to higher education, when compared to the normal population. In this line, results from Mazzone et al. (2007) reveal a statistically significant association between high levels of self-reported anxiety and poor academic performance. Thus, children with high levels of anxiety were more likely to have school grades in the failure range, as compared to children with low scores in anxiety.

A third variable related to academic performance is that of selective attention, referring to subjects' capacity, depending on their particular interests at each moment, to dedicate their cognitive activity to what is "relevant" and not to what is "irrelevant" (Botella, 2000). Models that address attention have been evolving over the years. The traditional idea that

attentional capacity has a limited nature is not shared by these models, since attention can be modified through practice and acts as an active, constructive mechanism, by which each person could generate their own attention potential (Álvarez, González-Castro, Núñez, González-Pienda, Álvarez & Bernardo, 2007; Mateo, 2005).

Attention disabilities which some pupils may present are usually accompanied by reduced information processing, thereby affecting learning and academic performance. Some of these attention disabilities may be due to an inability to focus and concentrate, to a lack of motivation for the task, to being unable to flexibly switch their focus of attention in order to monitor two or more important elements, to the lack of an adequate activation level, or simply due to the lack of attentional strategies (Berwid, Curko, Marks, Santra, Bender & Halperin, 2005; Capdevilla-Brophy, Atigas-Pallarés & Obiols-Llandrich, 2006; Miranda-Casas, García-Castellar, Meliá-de Alba & Marco-Taverner, 2004). In a study carried out with students in compulsory secondary education, Tejedor, González-González and García-Senoran, (2008) found that students' use of attention techniques of exploration correlated positively and significantly with overall academic performance in these students. Thus, students that passed the course in June and those that had high academic performance (grade point average higher than 7¹), more frequently used exploration techniques and underlining, than those who did not pass the course in June and who had low academic performance (grade point average lower than 4.9). These results imply that deficiencies in attention capacity could be associated with lower or poor academic performance, although this relationship might also be influenced by other variables such as behavior problems (Barriga, Doran, Newell, Morrison, Barbetti & Robbins, 2002), etc. Nonetheless, there is evidence that attention problems do co-occur with depression in children and adolescents (Angold, Costello & Erkanli, 1999; Jensen, Hinshaw, Kraemer, Lenora, Newcorn, Abikoff et al., 2001), although little is known about the mechanisms underlying this association. Cole, Jacquez and Maschman (2001) argue that attention problems are factors that place children at risk of a deficit in academic performance, also increasing the possibilities that these children would suffer depressive symptomatology. Findings from a study by Herman, Lambert, Ialongo and Ostrander (2007) suggest that early identification of attention problems in students and the consequent intervention and improvement in any associated academic problem would reduce the risk of later suffering depressive symptoms. Based on the theoretical and empirical references available, we could suspect that low

¹ Translator's note: The Spanish grading system is on a scale from 0-10, where 5 is the minimum passing grade.

academic performance in students would be a potential mediator in the relationship that exists between attention deficit and depression. From this we might conclude that there seems to be a tendency toward academic failure in children with attention problems, a fact that might imply greater risk of presenting depressive symptomatology for these children.

Although our study discusses selective attention, other research has focused on sustained attention, finding that students with a deficit in this area usually show problems specifically in learning to read (from 25-40%, according to Willcutt & Pennington, 2000) and in mathematics (from 26-60%, according to Barkley, 1998). These problems cannot be overcome only with the support of medications, since they are due to failures in the executive network (Duncan & Owen, 2000) and in the vigilance network (Merrell & Tymms, 2001; Roselló, 2002).

Similarly, gender differences between men and women have been found in selective attention, such that women show an increase in the costs of visual selective attention tasks when there is an invalid signal, in comparison to men, who benefit from this type of signal. This shows a possible qualitative difference in the way that men and women respond to a selective attention task (Merritt, Hirshman, Wharton, Stangl, Devlin & Lenz, 2007). Likewise, gender differences are found regarding the use of attention techniques and strategies, where these are more frequently used by girls than by boys (Tejedor, González-González & García-Senoran, 2008).

Although a selective attention deficit, anxiety, and depressive symptomatology have been studied occasionally with relation to academic performance, these three variables have not often been studied jointly in Spanish samples. In the present study we set the following specific objectives:

- 1) To detect the presence of emotional disturbance (anxiety), depression and selective attention deficit in students in compulsory secondary education.

- 2) To confirm the association between depression, anxiety, selective attention and academic performance, both in specific academic subjects and in overall grade point average. In this regard, we hypothesize that poorer academic performance will be associated with higher levels of depressive symptomatology, greater anxiety and lower selective attention.

- 3) To describe gender differences in anxiety, depression and selective attention, as well as in academic performance, and how these differences affect the relationships found. Our

working hypothesis leads us to expect higher levels of depression, better academic performance and better selective attention in girls than in boys, as well as similar levels in anxiety.

4) To confirm an association between depressive symptomatology and anxiety and low academic performance. Of all the variables studied, we expect to find that depressive symptomatology and anxiety will be most closely associated with low academic performance.

5) As a specific case under our second objective, we expect to observe differences in academic performance as a function of the level of depressive symptomatology.

6) To determine the degree to which a selective attention deficit, depression and anxiety can predict low academic performance. In line with our previous objectives and with the literature we have consulted, our hypothesis is to expect greater predictive power from depression and anxiety on academic performance.

Method

Participants

Participating in this study were a total of 98 adolescents enrolled in compulsory secondary education schools in Granada province. As for gender, 60 participants were male (61.2%) and 38 female (38.8%). Ages ranged from 12 to 16 years ($M= 13.43$; $SD= 0.99$). To be precise, the sample was composed of 20 twelve-year-olds (20.4%), 31 thirteen-year-olds (31.6%), 33 fourteen-year-olds (33.7%), 13 fifteen-year-olds (13.3%) and one sixteen-year-old (1%). All of these belonged to a normalized, middle-class sociocultural and economic context, selected randomly from two secondary schools in Granada province. Students were chosen from the first and second year of compulsory secondary education, with 40 subjects in the first year (40.8%) and 58 in second year (59.2%).

Instruments

The following information was collected for all students: age, gender and grades received for each subject for the trimester preceding the present study, as reported by their homeroom teacher.

The Spanish version of the State-Trait Anxiety Inventory for children and adolescents (STAI-C) was used to assess anxiety levels in the sample (Spielberger, 2001). The form used

was the one designed for assessing anxiety as a trait, applicable for ages from 9 to 15 years, and comprising 20 items on a Likert scale with 3 response options from “Almost never” to “Often”. The question structure makes it possible to assess a tendency toward anxiety as a relatively stable characteristic of subjects. This propensity, according to the authors, would lead children with a high anxiety trait to more often respond with anxiety toward potentially threatening situations or situations perceived as such. Some sample items are: “I worry about making mistakes”, “It is hard for me to fall asleep at night” and “I worry about what others think of me”. The instrument has been widely used in numerous studies, with demonstrated validity, and it possesses excellent psychometric properties as verified by its internal consistency, over 0.83 on the Kuder-Richardson test (KR-20) in diverse samples in Spanish studies, and by its test-retest reliability (Spielberger, 2001). The Cronbach alpha value in our study was .84.

In order to determine the presence of childhood depression, Kovacs’ *Children’s Depression Inventory* (CDI) was used (1992). This instrument has two scales measuring Dysphoria and Negative Self-esteem. The version used is a Spanish adaptation from Del Barrio and Carrasco (2004). It is composed of 27 items, each of them expressed in three phrasings which show the different intensity or frequency of its presence in the child or adolescent. An example item would be: a) I never feel lonely; b) I often feel lonely; c) I always feel lonely. Determination of whether a score should be considered pathological is decided as a function of the cutoff point that determines the specificity and sensitivity of the test. The instrument’s internal consistency has been investigated by many researchers in different countries since its inception, with most studies showing the instrument to be reliable, for example, the study by Del Barrio, Aluja and Carrasco, (2001) who obtained a Cronbach alpha of 0.82. In our study, the instrument obtained a value of 0.75.

Third, the d2 Test of Attention was applied (Brickenkamp, 2001). It was used in this study in order to assess selective attention and mental concentration. The version used was the Spanish adaptation by Seisdedos (2004). There is a single form of the test, which can be applied individually or collectively, for ages ranging from 8 to 60 years. The instrument is structured in 14 lines with 47 characters, meaning a total of 658 elements. These characters contain either the letter “d” or the letter “p”, marked possibly by one or two small dashes located on the upper or lower part of the letter, either as a pair or individually. The task consists of looking over each line and marking each letter d that has two small dashes (either two above, two

below, or one above and one below). The subject has 20 seconds to look over each of the 14 lines. The resulting scores are as follows: TN, Total Number of items processed; TC, total correct; O, errors of omission; C, errors of commissions (number of incorrect elements marked); TOT, total test effectiveness, $TN - (O + C)$; CON, concentration index $(TC - C)$; TN+, line with the highest number of elements attempted; TN-, line with the least number of elements attempted; and VAR, index of variation or difference $(TN+) - (TN-)$. Our study used only the total score (TOT), or total effectiveness, which according to the authors is the fundamental attention indicator, or attention deficit indicator if the score is low enough. The instrument's stability has been verified, for example, through the test-retest procedure in intervals from 5 to 40 months. In most studies the scores are very reliable ($r > 0.90$), regardless of the statistic used. Cronbach's Alpha reaches a value of 0.98 in some studies (Culbertson & Zillmer, 1998). In our case, the Cronbach Alpha obtained was 0.91.

Procedure

Data was gathered by the researchers themselves, on a collective basis, during the homeroom hour for each class and in its regular assigned classroom. With the homeroom teacher's assistance, students were given the set of assessment instruments face down. Once the tests were distributed to all the students, instructions for the first test were explained. All classes were given the same instructions, as indicated in the respective instruction manuals as well as in the heading of each test. Students were asked whether they had any questions, and were given an appropriate amount of time for completing each test. After finishing the first test, instructions for the second test were explained and so forth, until the three instruments were completed.

Inclusion criteria for participants were as follows: a) age between 12 and 16 years; b) enrolled in a public school; c) voluntary participation in the study, and d) having completed the academic evaluation for each subject in the trimester prior to execution of this study. As for exclusion criteria, certain circumstances that hindered data collection were taken into account; for example, the student was born in another country and did not fully master the Spanish language, or the student had special educational needs.

Statistical Analyses

Several statistical analyses were carried out: descriptive, bivariate correlations (Pearson), and difference of means test. Data analysis was performed using SPSS 15.0.1 software.

Results

Regarding our first objective, to detect the presence of emotional disturbance, depression or selective attention deficit in our sample, an initial descriptive analysis was performed which showed an average depression level in the participants of 11.68 (SD= 5.21), with values ranged from 1 to 25. Regarding anxiety, the mean was 33.60 (SD= 6.73), with a range from 20 to 50. The mean value for selective attention was 298.77 (SD= 59.90), with scores ranging from 140 to 429. Statistics can be seen in Table 1. If we take into account the possible range of scores for the three tests, the mean expressed as well as the standard deviation for the three variables, we can observe that the subjects participating in our study generally show medium levels of anxiety as well as selective attention, with a slight tendency toward lower scores in the case of depressive symptomatology. In all cases there were normal distributions. Regarding academic performance, participants' grades tended to be medium to low, with the mean score falling slightly below 5 for most subjects as well as for overall achievement.

Table 1. Descriptive statistics

	Mean	Std. Dev.	Min.	Max.
<i>Total score for anxiety</i>	33.60	6.729	20	50
<i>Total score, depressive symptomatology</i>	11.68	5.212	1	25
<i>Total d2 score (Attention)</i>	298.77	59.902	140	429
Academic performance: grades (10-point scale)	Mean	Std. Dev.	Min.	Max.
<i>Natural sciences</i>	5.02	1.932	1	9
<i>Social sciences, Geography and History</i>	4.48	2.437	1	10
<i>Physical education</i>	5.40	1.674	1	8
<i>Art</i>	4.37	2.012	1	9
<i>Language Arts</i>	4.95	1.939	1	9
<i>English as a foreign language</i>	4.51	2.305	1	10
<i>Mathematics</i>	4.30	2.276	1	9
<i>Music</i>	5.11	2.839	1	10
<i>Overall academic performance (grade point average)</i>	4.74	1.732	1	9

Regarding our second objective, in order to determine a possible general association between academic performance, depression, anxiety and selective attention, a Pearson correlation between all these variables was carried out. Results are shown in detail in Table 2.

Table 2. Correlation between academic performance, depression, anxiety and selective attention

	Depression	Anxiety	Attention
<i>Anxiety</i>	.578 (**)		
<i>Attention</i>	-.161	-.259(*)	
<i>Grade Point Average (8 subjects)</i>	-.407(**)	-.016	.014
<i>Mathematics grade</i>	-.420(**)	-.146	.248(*)
<i>Science grade</i>	-.331(**)	.065	.046
<i>Geography and History grade</i>	-.323(**)	.012	.009
<i>Physical Education grade</i>	-.221(**)	-.142	.067
<i>Language Arts grade</i>	-.431(**)	-.061	.139
<i>English grade</i>	-.336(**)	.078	.056
<i>Art grade</i>	-.272(**)	-.014	-.047
<i>Music grade</i>	-.231(*)	.043	-.292(**)
** The correlation is significant at the level of 0.01 (bilateral)			
* The correlation is significant at the level of 0.05 (bilateral)			

As we can observe, depressive symptomatology is the variable that presents the most significant association with all the academic performance indicators. In this sense, greater levels of depressive symptomatology are associated with poorer academic performance as expressed by all the grades taken into account. This relationship was not found with regard to anxiety, where levels were not associated with significant changes in academic grades. As for selective attention, this variable was associated only with the mean score in the mathematics grade, and inversely with performance in music. Table 2 expresses results that indicate that higher levels of anxiety are significantly associated with greater levels of depressive symptomatology in participants, as well as with lower levels of selective attention. By contrast, no significant relationship was found between depressive symptomatology and selective attention.

Our third objective sought to find gender differences in academic performance, depressive symptomatology, selective attention and anxiety. To do so, we first performed an analysis of independent bivariate correlations, taking subsamples of boys on one hand and girls on the other. Results are detailed in Table 3, showing a rather similar correlation pattern. One of the more interesting results is that, for the subsample of boys, depressive symptomatology is associated negatively (at a significance level of .05) with selective attention, while this relationship was not found in girls. Similarly, depressive symptomatology in boys was more significantly associated with low academic performance than in the case of girls. Another striking difference is that for the sample of boys, the presence of anxiety is associated

with lower levels of selective attention, while in girls this correlation is not significant. These results shed more light on the correlations found in the overall sample, as detailed in Table 2. Finally, selective attention is still not associated significantly with overall academic performance.

Table 3. Correlations according to gender

Correlations in the girls subsample			
	Depressive Sympt.	Anxiety	Attention
<i>Anxiety</i>	.792(**)		
<i>Attention</i>	-.042	-.180	
<i>Grade point av. (8 subjects)</i>	-.347(*)	-.102	-.134
Correlations in the boys subsample			
	Depressive Sympt.	Anxiety	Attention
<i>Anxiety</i>	.530(**)		
<i>Attention</i>	-.307(*)	-.296(*)	
<i>Grade point av. (8 subjects)</i>	-.364(**)	.014	.154
** The correlation is significant at the level of 0.01 (bilateral)			
* The correlation is significant at the level of 0.05 (bilateral)			

In addition, a difference of means test for the variables shown in Table 4 was also carried out in conjunction with this objective. Results indicate significant differences between boys and girls in mean academic performance, with girls having the advantage. Likewise, significant differences were found in depressive symptomatology, reaching higher levels in the boys. As for anxiety and selective attention, the data show similar levels for both genders, with no significant differences found.

Table 4. Differences by gender in mean academic performance, depressive symptomatology, anxiety and selective attention

Dimension	Boys (n=60) Mean (SD)	Girls (n=38) Mean (SD)	t df (1.96)	P
<i>Grade point average</i>	4.36 (1.73)	5.34 (1.57)	2.81	.006
<i>Depression</i>	12.85 (5.06)	9.84 (4.97)	2.89	.005
<i>Anxiety</i>	33.53 (7.44)	33.71 (5.51)	.14	.893
<i>Selective attention</i>	305.22 (61.25)	288.58 (57.02)	1.35	.182

Our fourth objective seeks to more precisely determine the relationship between depression and academic performance, as well as between anxiety and academic performance, for our participants. For this purpose the sample was divided at the 33rd and 66th percentiles

for depression and anxiety, in order to establish three homogeneous groups. From these we proceeded to look for possible differences in grade point average between students with high, medium and low levels of depressive symptomatology and anxiety. Next, an analysis of variance was carried out with their respective, post-hoc Least Significant Differences tests (hereafter, LSD), whose results are shown in Table 5. Grade point average was considered a dependent variable and depression and anxiety levels as factors, respectively. Results showed significant differences in the level of grade point average [$F(2,95) = 8.86; p < 0.00$], according to subjects' membership in the different depressive symptomatology groups. A greater level of depressive symptomatology is unquestionably associated with lower academic performance.

Table 5. Analysis of differences in academic performance according to depression and anxiety levels

Dependent variable: Grade point average				
	I) Depression groups	J) Depression groups	Difference of Means (I-J)	Sig.
LSD	(I) Low depression (n=36) Mean: 5.47, SD: 1.61	(J) Medium depression (n=37) Mean: 4.73, SD: 1.59	.74	.05
	(I) Low depression	(J) High depression (n=25) Mean: 3.71, SD: 1.63	1.76	.00
	(I) Medium depression	(J) High depression	1.02	.01
	I) Anxiety groups	J) Anxiety groups	Difference of Means (I-J)	Sig.
LSD	(I) Low anxiety (n=42) Mean: 4.71, SD: 1.72	(J) Medium anxiety (n=28) Mean: 4.90, SD: 1.83	.20	.66
	(I) Low anxiety	(J) High anxiety (n=28) Mean: 4.62, SD: 1.70	.08	.85
	(I) Medium anxiety	(J) High anxiety	.28	.55

In order to further explore the relationship between anxiety and selective attention with academic performance, the corresponding analyses of variance were performed, taking these variables as independent, and grade point average as a dependent variable. Neither se-

lective attention [$F(81.16) = .73; p=0.83$] nor anxiety [$F(28.69) = 1.36; p=0.15$] presented a significant association with academic performance. The analysis by levels shows the greatest differences in the grade point average between the medium and high anxiety groups, without this tendency reaching significance for our sample.

Finally, Table 6 shows the results of the regression analysis carried out in order to analyze which of the variables under consideration can best predict academic performance.

Table 6. Multiple regression analysis: academic performance, depression, anxiety and selective attention.

Criterion	Predictors	Beta	Sig.
<i>Academic performance</i>	Depression	-.598	.00
	Anxiety	.331	.00
	Selective attention	-.003	.97
F (4,4) = 9.80; p < 0.00			
R = .49; R ² = .24; corrected R ² = .21			

The model explains 21% of the variability of the grade point average, according to the corrected R². Our results point to depressive symptomatology and anxiety as the variables with greatest predictive power for academic performance. The negative beta value in relation to depressive symptomatology concurs with the negative sign of this variable's correlation with academic performance, for both individual grades and grade point average, as detailed in Table 2.

Discussion

Academic performance may be influenced by a multiplicity of variables, including such factors as socio-economic level, family structure, socio-cultural level, personal motivation, individual capacities and skills, time and effort dedicated to study and to academic work, etc. (Cano, 2001). In our research we have analyzed certain psychological variables, for the purpose of understanding to what extent these can be associated with or may even predict school performance.

Our data indicate that the sample used in our research is formed by adolescents who in general are not characterized by depressive or anxiety symptomatology, according to the as-

assessment criteria for their scores on instruments used for this population. However, their attention capacity is low and this may have repercussions on certain academic aspects, as several authors argue (Barkley, 1998; Willcutt & Pennington, 2000). Most of the results place our subjects in the middle of the normal range with regard to the functioning of these three variables. Regarding academic performance, as measured by the grade point average of the 8 core subjects in their educational program, our participants fall in the middle to low range, with a grade point average at around 5, and even more often below the passing grade.

Results from the correlation analysis confirm our hypotheses *grosso modo*, for example by showing a significant negative relationship between depression and academic performance. This association clearly indicates that students who show greater depressive symptomatology obtain a lower grade point average for their academic performance. More specifically, this negative association is even greater in relation to specific academic performance for the subjects of mathematics and language arts. Other research concurs with these results, arguing that depression could be a risk factor for low academic performance in adolescent students (Reinherz, Giaconia & Hauf, 1999), or even in university samples, where it was found that subjects who showed a greater level of depression were those who had been classified as subjects with low academic performance (Herrera & Maldonado, 2002).

We also found a significant positive relationship between depression and anxiety, such that students with a high level of anxiety also score higher in levels of depression. In this line, Bandura et al. (1999) have argued that not meeting a proposed academic goal could cause emotional disturbance, stress and/or anxiety in the pupil, leading to his or her propensity toward the beginnings of a depression.

As for anxiety, our results indicate a negative association with attention. Students with a high score in anxiety levels show low levels of selective attention. The lower the anxiety trait, the greater the attentional capacity. Contreras et al. (2005) indicated precisely that maintaining high levels of anxiety may interfere in learning complex tasks; therefore, attention is affected and in particular, reduced. However, anxiety is not significantly associated with academic performance in any sense, according to our results. This may be due to the fact that participants in our study obtained mid to low scores in anxiety: the presence of subjects on the other end of the anxiety spectrum might be reflected in different results, making this a limitation of our study. On the other hand, perhaps the academic characteristics of our sample,

where we observe mid to low performance, can explain this result which contradicts other studies where academic performance has been related to the presence of anxiety (Rains, 2004; Wittchen, Stein & Kesler, 1999). Even though a direct association between anxiety and performance is not shown, we must note that anxiety in our sample is associated with depression, and this in turn with low academic performance, implying a possible indirect association between anxiety and academic performance. This situation is worthy of further inquiry. One possible limitation of our study has to do with the mediating role of depressive symptomatology, which has not been defined in much detail. It would be interesting in this sense to carry out an estimate of this mediation through structural models, an objective which remains for later studies.

Finally, correlation results show that selective attention possesses a positive, significant relationship with mathematics achievement, and a negative relationship with achievement in music, although for other academic performance indicators no significant association was found. This seems to indicate that students who reach moderate levels of attention perform better in mathematics, but by contrast, high levels of selective attention would produce interference and low performance in music. According to Barkley (1998), when a student suffers attention deficit, he or she usually shows problems in learning, specifically in mathematics. Our results with regard to mathematics may be interpreted along the lines that the complexity of more abstract or complicated subjects like mathematics, and achievement in these subjects, are more associated with selective attention, requiring higher levels of selective attention than do other subjects, where assimilation of concepts is less precise. The result found with regard to music might also be explained by characteristics of learning this discipline and aspects inherent to the discipline itself. Performance for this subject may be based on procedural aspects such as practice and repetition, where selective attention might be associated with lower performance. These conjectures and hypotheses, which would uphold the differences found between different subjects in the school curriculum, require more detailed future studies where other dimensions of the attention construct are taken into account.

As for gender differences, results show that there are significant differences between male and female subjects in their grade point average, in favor of the girls, and in depressive symptomatology, which shows higher levels in boys. This result does not seem to agree with the literature reviewed (Marcotte, Lévesque & Fortin, 2006; McCarty et al., 2008), where it is argued that the female gender, not the male gender, is where we see greater levels of depres-

sion associated with lower academic performance. This contradictory result could once again be due to the peculiarities of the study sample, as indicated above. Given the characteristics of our participants, where the male subjects show significantly lower performance than do female subjects, it is logical on one hand that they would show greater depressive symptomatology. Elsewhere, no significant differences were found between males and females for either mean anxiety levels or for selective attention. These two results also seem to contradict the literature reviewed, where females were found to show greater levels of test anxiety and they were more likely to underestimate their academic competence than were males (Cole et al, 1999; Locker & Cropley, 2004). Similarly, there are studies which show that females show a greater cost in selective attention tasks (Merrit et al., 2007). By contrast, our results agree with studies where significant gender differences were not found in studying the variables of anxiety and selective attention, neither in educational contexts nor in relation to academic performance. For example, Fernández-Castillo and López-Naranjo (2006) did not find significant differences in emotional disturbance between fathers and mothers with hospitalized children. At any rate, we affirm that further efforts are needed in order to elucidate these trends in the data.

The analyses of variance performed in the fourth group of results point to depression only as the variable which is unmistakably related to academic performance, thus fulfilling 50% of our working hypotheses. The LSD tests indicate that greater levels of depressive symptomatology are related to poorer levels of academic performance, as is shown in Table 5. This result concurs with the literature reviewed, where depressive symptomatology is related to low performance in students from both secondary and university education (Herrera & Maldonado, 2002).

Lastly, regarding our fifth objective, a multiple linear regression model was designed which simultaneously introduced trait anxiety, depressive symptomatology and selective attention as predictors, and as criterion, the grade point average of the 8 core subjects of the curriculum. As can be seen in Table 6, the model is useful for predicting academic performance. Of the variables included, depression clearly predicts low academic performance, a result which concurs with the correlation and variance analyses carried out above. In previous results we had observed that the direct association between anxiety and performance was not significant, but that anxiety is associated with depression and the latter with low academic performance. The current regression analysis, where all variables are included simultaneously,

gives relevance to anxiety, where it seems to be associated with better academic performance when the effects of depression and attention are controlled. Therefore, anxiety could be a beneficial variable in terms of academic performance when it is present in medium levels such as those found in our sample. This result concurs moreover with other studies which found a possible influence of anxiety on academic performance, mediated by variables such as depression and selective attention (Bandura et al., 1999; Locker & Cropley, 2004; Rains, 2004; Zeidner & Schleyer, 1998).

Finally, in Table 6 we can observe that selective attention, as with the trend seen in the previous statistical analyses, does not present a predictive capacity for academic performance. However, let us recall that while the correlation analyses concur with this result overall, in specific types of learning such as mathematics, greater attention is associated with better levels of performance; whereas in music, lower levels of selective attention are associated with better grades. It seems clear that the relationship between selective attention and specific performance in certain academic subjects also deserves further research effort.

Regarding this study's possible limitations, as we have mentioned, the participants' grade point is in general quite low, such that we would recommend replicating the study with a broader sample and with students who have more diversified grades. Similarly, other important variables were not included in our approach; these could be taken into account in further studies. Some interesting examples are aspects such as time and effort devoted to study and to academic work; cognitive, behavioral and attitudinal variables; aspects inherent to family functioning; socio-economic and cultural level; personal motivation; individual capacities and skills, and so on (Cano, 2001).

The relationship between depression and academic performance as seen in our results requires, nonetheless, further research efforts in order to establish more refined relationships, given the quantity of variables that can be involved in this association. In fact, obtaining a mid-level or low grade can be a variable which gives rise to depression, which as we have seen can in turn predict low academic performance. These issues and the marked bidirectional effect of the relationship between these variables calls for further inquiry.

In conclusion, and in reference to practical implications of this study, it would be advantageous for educators to take into account students' levels of depressive symptomatology.

By early detection of a moderate or significant presence of depressive symptomatology in students, and by applying suitable care or treatment, it would be possible to contribute toward improved academic performance in these pupils. As we have seen in discussing our research results, although depression and anxiety are the only variables that show a significant relation with academic performance, the other variable of selective attention appears to also affect certain school subjects if not overall performance, meaning that it also requires assessment and control. Thus, it is feasible to think that students with good psychological health would be prepared to achieve good academic grades, which in turn would motivate them even further to continue their studies and to take advantage of their capacities and skills, as well as to prevent the later appearance of mental health problems, as has been reported.

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