Socio-familial risk factors and personal protective variables of academic performance in Secondary Education students

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Abstract

Background: Socio-familial risk factors negatively affect the academic performance of students. The objective of this study consisted in analyzing which personal variables can reduce the negative relationship between socio-familial risk factors and academic performance. **Method:** A sample of 1268 Secondary students was selected, of which 443 had two or more risk factors. The examined variables were the following: Socio-familial, academic goals, causal attributions, academic self-concept, self-efficacy and academic performance. **Results:** The incidence of accumulation of risk factors in the performance was confirmed. We distinguished at-risk students with good and poor performance from the personal variables analyzed, and showed the protective effect of these variables on performance against risk accumulation. **Conclusions:** Based on the identification of risk factors that may hinder performance, the findings offer information to develop both educational intervention strategies that improve performance and personal variables that mediate positively in school outcomes.

Keywords: Adolescence, risk, motivation, academic performance.

Resumen

Factores de riesgo socio-familiares y variables personales protectoras del rendimiento académico de estudiantes de Educación Secundaria.
Antecedentes: los factores sociofamiliares de riesgo afectan negativamente al rendimiento académico de los estudiantes. Este estudio analizó qué variables personales pueden reducir la relación negativa entre factores sociofamiliares de riesgo y rendimiento académico. **Método:** se seleccionó una muestra de 1.268 estudiantes de Secundaria, de los cuales 443 tenían dos o más factores de riesgo. Se examinaron variables sociofamiliares, metas académicas, atribuciones casuales, autoconcepto académico, autoeficacia y rendimiento académico. **Resultados:** se confirmó la incidencia de la acumulación de factores de riesgo en el rendimiento. Se diferenció a los estudiantes en riesgo con buen y bajo rendimiento a partir de las variables personales analizadas, y se mostró el efecto protector de las mismas en el rendimiento frente a la acumulación de riesgos. **Conclusiones:** los hallazgos ofrecen información para desarrollar estrategias de intervención educativa que mejoren el rendimiento, a partir de la identificación de factores de riesgos que puedan obstaculizarlo, y el desarrollo de variables personales que medien positivamente en los resultados escolares.

Palabras clave: adolescencia, riesgo, motivación, rendimiento académico.

Successfully completing secondary education is key to teenagers' futures, as it predicts their professional and social success throughout the life cycle (Serbin, Stack, & Kingdon, 2013). It has been confirmed that the students who do not complete this stage of education are more likely to suffer from economic and health problems and increased rates of high-risk behaviour (Robison, Jaggers, Rhodes, Blackmon, & Churchet, 2017). Secondary education has been considered as a critical educational stage, mainly for those students who live in disadvantaged socio-familial contexts, since during this stage, students tend to decrease their academic performance and, consequently, to be more vulnerable to school dropout or failure (Enríquez, Segura, & Tovar, 2013).

When referring to risk factors associated with poor academic performance, it is considered necessary to differentiate the causes that produce it in order to intervene effectively (McKee & Caldarella, 2016). Within these causes, social factors, associated with demographic or socio-familial variables (e.g., family income, educational level and expectations of parents, etc.) have been shown to have a negative impact on performance (Bullón, Master, Castaño, del Barco, & del Río, 2017; Carrillo, Civís, Blanch, Longás, & Riera, 2018; Fernández-Alonso, Álvarez-Díaz, Woitschach, Suárez-Álvarez, & Cuesta, 2017; Sirin, 2005). Many of these factors have been considered in the present research. For example, employment situation and educational level of parents have been considered in scientific literature as key factors to understand the differences in student performance; being indicators associated with socioeconomic status of families (Callan, Marchant, Holmes, & Flegge, 2017). Thus, unemployment situation of parents has been associated with low economic income and conditions of poverty. It has been confirmed that students from the most disadvantaged socioeconomic contexts and with lower economic resources have

more probabilities to repeat course and fail school (Barr, 2015; Gómez, Muñoz, González, Guerra, & Valenzuela, 2014). With respect to educational level of parents, the performance is lower in students from families with low educational level. This is mainly associated with the fact that these parents have less involvement in the schooling of their children, and they give less importance to good school achievements (Buehler & Gerard, 2013; Merritt & Buboltz, 2015). In this sense, recent studies have found that mothers' low educational level, in comparison with fathers' low educational level, has a greater negative impact on children's performance (Chaparro et al., 2016; Pati, Hashim, Brown, Fiks, & Forrest, 2011).

The expectations of the parents are another of the factors considered by the research when the influence of family context on performance has been investigated (Marcenaro-Gutiérrez & López-Agudo, 2017). It has been found that low expectations of parents towards the schooling of their children affect the development of the expectations that they have about their own academic future (Tan, 2017). Likewise, the direct relationship between the parents' expectations and their socioeconomic status has been confirmed; families with low socioeconomic status have poorer educational expectations for their children (Froiland & Davison, 2014).

In recent years, family composition has also been studied as a variable that can determine academic differences. Recent studies have found that students from single-parent families have lower academic performance (Santín & Sicilia, 2016). Although it is important to add that this has been explained by the combination of various factors that may be associated with a certain family composition: parents spends less time with the child, decrease in the quality of parenting, greater psychological and emotional stress of father or mother and lower income of family unit (Claire & Fuse, 2017; Kalil & Ryan, 2010).The model of accumulation of risk factors postulates that the simultaneous presence of several risk factors produces effects that are more negative than the severity that a single factor can produce (Rutter, 1979, 1987; Sameroff, Bartko, Baldwin, Baldwin, & Seifer, 1998). Therefore, the study of an isolated risk factor may not be a realistic and significant prediction of performance (Pungello et al., 2010). It has been shown that the accumulation of risk factors predicts academic results during several educational stages (Swanson, Valiente, & Lemery-Chalfant, 2012). Likewise, recent research confirms that the accumulation of at least two risk factors increases the probability of school failure, compared to the effects of the isolated study of each one (Chaparro, González, & Caso, 2016; Dietrichson et al., 2017; Ragnarsdottir et al., 2017; Roy & Raver, 2014; Xing et al., 2017).

However, there is growing evidence that the likelihood of reducing the negative effects of risk factors on performance increases when students adopt an active role in their learning, and cognitive, motivational and affective variables are enhanced (Williams & Portman, 2014; Williams et al., 2015). Recent findings confirm that the development of personal variables such as self-efficacy (Cleary & Kitsantas, 2017; Rocchino, Dever, Telesford, & Fletcher, 2017), self-regulation (Wang et al., 2017) or the adequate orientation of academic goals (Williams, Bryan, Morrison, & Scott, 2017) can mitigate the negative effect of socio-familial risk factors on performance in disadvantaged contexts.

This shows that certain personal variables, that have been empirically shown to influence in performance differences, can act as protective factors in the educational achievement of students at risk. Guided by this premise, this study had as main purpose to inquire about the personal factors that can mitigate the negative influence on the academic performance of Secondary Education students with accumulated risk factors. This is particularly important due to the scarcity of studies in the Spanish context that have investigated the academic performance of students of Compulsory Secondary Education with accumulation of socio-familial risk factors. Specifically, three objectives were proposed: a) analyze whether the accumulation of socio-familial risk factors had an impact on performance; b) identify personal variables (academic self-concept, self-efficacy, causal attributions and academic goals) that differentiate between students with risk factors, with good and poor performance; c) explore which personal variables can act as protective factors of the performance of these students.

Method

Participants

Using random sampling by conglomerates, an initial sample of 1,268 students (654 boys and 614 girls) enrolled in Secondary Education in 28 public schools in the Canary Islands was chosen, with an age range between 12 and 17 years (M = 14.21; SD = 1.26). Of these students 26% attended first grade, 26.6% second grade, 22.2% third grade and 25.2% fourth grade.

The selected sample of students with risk factors was made by calculating a *cumulative risk index* (CRI) (see instrument section). From the total sample, 443 students (227 boys and 216 girls) with two or more cumulative risk factors were identified. 23% of these students were enrolled first grade, 27.8% second grade, 26% third grade and 23.3% fourth grade.

Instruments

Socio-family questionnaire. A sociodemographic questionnaire was designed *ad hoc* taking the risk factors as a reference considered in previous research (Prelow & Loukas, 2003; Ruberry, Klein, Kiff, Thompson, & Language, 2018). This questionnaire included the following socio-family variables: work situation of the father and mother, educational level of the father and mother, expectations of the father and mother about the academic future of the student and type of family. In each variable the lower-range response was considered as a risk factor: being unemployed, without studies, null expectations that your child will finish Secondary Education and be a single-parent family. The answers were dichotomized, assigning a value of 0 to the alternatives without risk and 1 to the previous alternatives considered risk. The sum was calculated in order to obtain the CRI, which had a range of 0-7.

In order to evaluate the personal variables, the use of different instruments confirmed their factorial structure and good psychometric characteristics in previous investigations (Quiroga-Garza, García-Sánchez, Treviño, & Willis, 2018; Risso, Peralbo, & Barca, 2010; Rodríguez-Rodríguez & Guzmán, 2018; Santana & Feliciano, 2011).

Causal attributions. The Multidimensional-Multiattributional Causality Scale (Barca, 2000) was used, formed by 24 items with five alternative responses (1 being totally disagree and 5 being totally agree). The instrument includes seven types of causal

attributions: of high performance to ability, of performance to fate, of low performance to little effort, of low performance to professorship, of low performance to ability, of high performance to effort and attribution of high performance to simplicity of signatures.

Self-efficacy. The General Self-Efficacy Scale (Sanjuán, Pérez, & Bermúdez, 2000), formed by 10 items with a Likert-scale response format of 10 points.

Academic self-concept. An adjustment of the content from the questions at the Secondary Education level of the "What Do You Think About Yourself" scale was performed (Rodríguez-Espinar, 1982) keeping the number of items, the format of presentation and the alternative answers. The instrument consists of seven statements with five different responses. In order to know the validity of the adaptation made, an exploratory factorial analysis was carried out with the total sample of this study. The KMO test was from .882 and Bartlett's sphericity test was significant ($p<.001$). The Principal Component Analysis showed a single factor that explained the 60.05% of the total variance. The reliability by Cronbach's α was .88.

Academic goals. The Academic Goals Questionnaire (Núñez & González-Pienda, 1994) was provided. This questionnaire consists of 20 items, grouped into three factors (learning goals, achievement goals and social esteem goals), with five alternative responses: 1 never, 2 rarely, 3 sometimes, 4 frequently and 5 always.

Academic performance was obtained from school records, using the *grade point average* (GPA) of all the subjects in the final evaluation. ≥ 5 GPA was considered as good performance and < 5 GPA as low performance.

Procedure

Teachers and families were informed of the purpose of the study and the evaluation instruments. The parents of the students signed an informed consent and the directors of the centers signed confidentiality documents. The data was collected during school hours in the presence of the classroom tutor, during the 2015-2016 and 2016-2017 academic years.

Data analysis

Both an ANOVA test plus post hoc tests with Bonferroni correction were performed with the total sample in order to determine if there were differences in performance based on the CRI.

With the sample of students at risk (CRI ≥ 2) *Pearson's correlation coefficient* (*r*) was performed to check the relationship between the risk factors and the performance (GPA). The results of *r* were subsequently used for the hierarchical regression analysis.

To identify the personal variables that differentiated the students at risk with low and good performance, a discriminant analysis was made following the *stepwise* method.

Finally, hierarchical regression analyzes were conducted to explore which personal variables can act as protectors of the performance of students with accumulated risk factors.

Results

The results of the ANOVA showed a significant difference in academic performance depending on the number of risk factors

($F_{7,1260} = 28.61$; $p<.001$; $\eta^2 = .13$). Figure 1 shows the distribution of the performance according to the CRI.

As it is observed in Table 1, *post hoc* analysis showed that there were no differences between students with none, one or two risk factors unlike students with a CRI of three or higher. From a CRI of three, the differences were given with students with seven risk factors.

Correlational analysis with the risk sample allowed to identify the nature of the relationship of each risk factor with the GPA. As can be seen in Table 2, except for the risk factor related to the educational level of the father, it was found that all other risk factors maintained a negative significative correlation with the GPA. Which indicated that the presence of these risk factors was related to a decrease in performance.

A discriminant analysis was performed in order to check the variables that differentiated the students at risk with good (GPA ≥
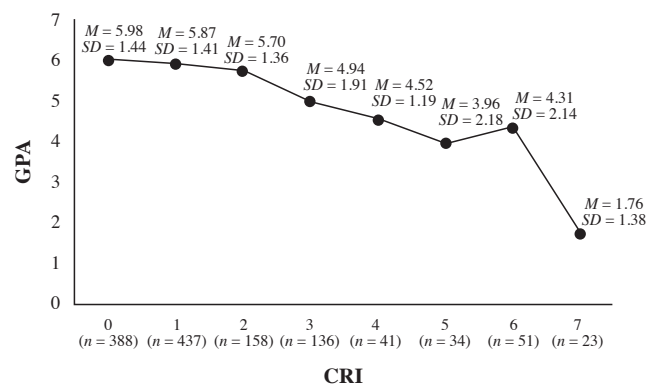

Figure 1. Grade point average (GPA) according to cumulative risk index (CRI)

			95% confidence range		
Pairs	**Average difference**	**Standard error**	**Lower limit**	**Upper limit**	**Sig.**
0 - 3	1.03	.14	.57	1.49	.000
0 - 4	1.45	.25	.67	2.24	.000
0 - 5	2.01	.32	1	3.02	.000
0 - 6	1.66	.22	.95	2.38	.000
0 - 7	4.23	.54	1.52	5.94	.000
1 - 3	.92	.14	.47	1.37	.000
1 - 4	1.34	.24	.56	2.12	.000
1 - 5	1.90	.32	.90	2.91	.000
1 - 6	1.55	.22	.84	2.26	.000
1 - 7	4.12	.54	2.41	5.83	.000
2 - 3	.75	.17	.21	1.28	.000
2 - 4	1.17	.26	.34	2	.000
2 - 5	1.73	.33	.68	2.78	.000
2 - 6	1.38	.22	.62	2.15	.000
2 - 7	3.95	.54	2.21	5.68	.000
3 - 7	3.19	.55	1.46	4.93	.000
4 - 7	2.77	.59	.92	4.62	.000
5 - 7	2.21	.62	.26	4.17	.011
6 - 7	2.56	.58	.74	4.38	.000

Table 1
Differences between number of risk factors in academic performance

Variable	1	2	3	4	5	6	7	8
1. Unemployed father	–							
2. Unemployed mother	.01	–						
3. Father without studies	.36**	-.01	–					
4. Mother without studies	.43**	-.01	.50**	–				
5. Father expects not finishing secondary	-.14**	.08	-.21**	-.20**	–			
6. Mother expects not finishing secondary	-.15**	.07	-.20**	-.18**	.97**	–		
7. Single-parent family	-.02	-.10*	-.13**	-.07	-.06	-.06	–	
8. Academic performance	-.17**	-.12**	.05	-.34**	-.43**	-.43**	-.11**	–
M	.23	.34	.15	.13	.21	.20	.10	5.60
SD	.42	.47	.36	.34	.40	.40	.30	1.64

Table 2
Relationship between risk factors and academic performance

Note: * $p<.05$; ** $p<.001$

5) and bad (GPA < 5) performance. For the selection of variables, the minimum value of Wilk's Lambda (<.001; $F>3.84$) and as an exit criteria for the included variables, $F = 2.71$.

As can be seen in Table 3, the model eliminated four of the variables introduced (attribution of low performance to teacher, attribution of low performance to ability, learning goals and self-efficacy), so that nine of them allow discriminating the students at risk based on their performance. From these nine variables, was obtained a single discriminant function which is responsible for 100% of the variance between the groups (see Table 4). Considering the coefficients, the variables that discriminated the students at risk, with good and low performance, were in order of importance: academic self-concept, CRI, achievement goals, social esteem goals, attribution of high performance to effort, attribution of performance to fate, of high performance to ability, attribution of low performance to low effort and attribution of high performance to simplicity of signatures.

The score of each group in these nine variables can be compared in Figure 2, where their typified average is presented ($p<.001$).

In the hierarchical regression analysis in step 1, age and sex were included as covariates, the CRI score in step 2 and the personal variables were added simultaneously in step 3. Table 5 shows the results of the three models and the standardized Beta coefficients (β) for the steps. The results showed that the CRI score was associated with a significant decrease in performance

and that both age and sex had no significant incidence in any of the models. The harmful effect of the CRI score was maintained even

Table 4
Coefficients of the discriminant function

Variable	Standardized coefficient	Structure coefficient
Academic self-concept	.81	.76
CRI	-.55	-.51
Achievement goals	.47	.39
Social esteem goals	-.42	-.35
Attribution of high performance to effort	.40	.32
Attribution of performance to fate	-.38	.28
Attribution of high performance to ability	.35	-.19
Attribution of low performance to low effort	.28	.15
Attribution of high performance to simplicity of signatures	-.27	-.08

Table 3
Variables introduced in each step

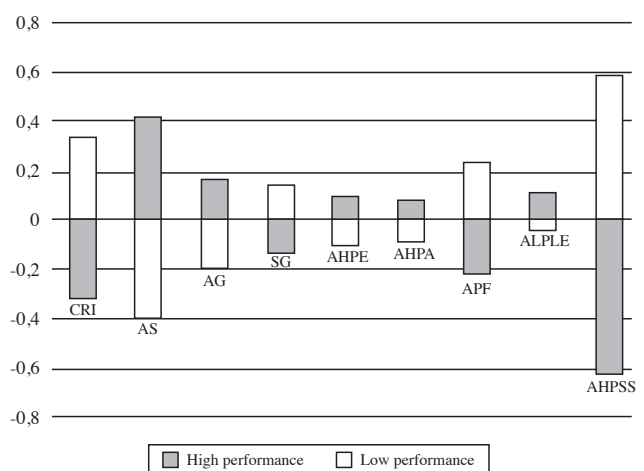| Step	Variable	Lambda of Wilks	F	p
1	Academic self-concept	.82	91.51	.000
2	CRI	.77	64.22	.000
3	Social esteem goals	.74	48.32	.000
4	Attribution of high performance to ability	.73	38.78	.000
5	Attribution of high performance to effort	.71	34.27	.000
6	Attribution of low performance to low effort	.70	30.18	.000
7	Achievement goals	.69	27.20	.000
8	Attribution of performance to fate	.68	24.83	.000
9	Attribution of high performance to simplicity of signatures	.67	23.15	.000

Figure 2. Typified average for the discriminant variables in performance academic. CRI: cumulative risk index; AS: academic self-concept; AG: achievement goals; SG: social approval goals; AHPE: attribution of high performance to effort; AHPA: attribution of high performance to ability; APF: attribution of performance to fate; ALPLE: attribution of low performance to little effort; AHPSS: attribution of high performance to simplicity of signatures

after the introduction of the twelve personal variables, although in step 3 the negative effect of the CRI was lower, since there was a significant decrease in β from model 2 to model 3.

It is also noteworthy that personal variables that had been included as potential performance-protective variables, such as goals of social esteem, attribution of high performance to simplicity of signatures, attribution of low performance to teacher and attribution of low performance to ability, did not have significant incidence. They acted, nevertheless, as performance-protective variables: learning goals, achievement goals, academic self-concept, self-efficacy, attribution of high and low performance to effort and attribution of high performance to ability. Finally, the negative sign of the attribution of performance to fate in its score β showed that a lower attribution of the performance to fate could also act as a protective factor.

Discussion

The purpose of this study was to analyze the influence of socio-familial risk factors on academic performance from the perspective of risk accumulation (Rutter, 1979, 1987), and to identify which personal variables of the student can act as protective factors of the effects of risk factors in performance. The harmful effects of exposure to multiple performance risks were confirmed, as well as certain personal factors can mitigate these effects.

The results obtained support the evidence that the accumulation of risk factors is associated with a decrease in academic performance. This is particularly important because of the low amount of studies that have been addressed from this perspective in the Spanish educational system. In fact, the results in this study are consistent with those found in research conducted in other contexts in which it is clear that the accumulation of risk factors is more harmful than any isolated risk (Burchinal, Roberts, Zeisel, Hennon, & Hooper, 2006; Sameroff et al., 1998; Whipple, Evans, Barry, & Maxwell, 2010). However, so far, the research has not been conclusive regarding the number of accumulated risk factors that have a more negative impact on performance. Lucio et al. (2012) found that the negative impact on performance occurred from the accumulation of two risk factors, while Gutman, Sameroff, & Eccles (2002) reported that this incidence occurred from the accumulation of the three factors. The results of this study aim at this last line, and showed that from the accumulation of three factors the performance is affected negatively, up to the accumulation of seven factors of risk. In addition, no significant differences were found between students who had 1 or 2 risk factors and those who lack socio-family risks. This confirms that the presence of isolated factors or small number of them does not always have to affect academic performance. (Dietrichson et al., 2017; Ragnarsdottir et al., 2017; Roy & Raver, 2014). The set of these findings shows the importance of identifying, as early as possible, the various socio-familial factors that may be affecting the academic achievements of the students; and especially of those who may present three or more risk factors, since the negative effects may persist throughout the different school stages (Swanson et al., 2012).

The relationship found between the different risk factors with academic performance is in line with previous findings (Marchant

	β	t	R^2	R^2 adjusted	Change in F	p
Model 1			.01	.01	2.47	.085
Sex	.08	-1.78				
Age	.06	-1.29				
Model 2			.11	.11	51.11	.000
Sex	-.02	-.44				
Age	-.02	-.43				
CRI	-.33***	7.14				
Model 3			.34	.32	12.31	.000
Sex	-.42	1.01				
Age	-.01	.32				
CRI	.14**	5.86				
Learning goals	.13*	2.53				
Achievement goals	.16**	-3.03				
Social esteem goals	.01	-.15				
Academic self-concept	.44***	8.93				
Self- efficacy	.13**	-2.58				
Attribution of high performance to effort	.18***	-3.43				
Attribution of high performance to ability	.19***	4.07				
Attribution of performance to fate	-.21***	-3.69				
Attribution of low performance to low effort	.18***	3.75				
Attribution of high performance to simplicity of signatures	-.11	1.62				
Attribution of low performance to professorship	-.10	1.11				
Attribution of low performance to ability	.07	-1.61				

Table 5
Hierarchical regression analysis for academic performance

Note: * $p<.05$; ** $p<.01$; *** $p<.001$

& Finch, 2016); although in this study was not confirmed the relationship between the educational level of the father, specifically the father without studies, and the performance. Although in some studies this association is confirmed (Bullón et al., 2017), there is also evidence that it is the mother's educational level that has the highest relationship with performance, being considered one of the most relevant external variables for the performance of the students (Chaparro et al., 2016; Pati et al., 2011). This result follows what was found in previous studies, in which the relationship between mothers' low educational level and academic results of the children has also been confirmed (Marks, 2008). In contrast, the higher educational level of mothers has been associated with improvements in academic scores of the children (Holmlund, Lindahl, & Plug, 2011; Magnuson, Sexton, & Davis-Kean, 2009). The differences found between the relationship of educational level depending on the parents may be due to the fact that mothers continue to have a more protagonist role in education of their children (Harding, Morris, & Hughes, 2015). Thus, mothers with a lower level of education spend less time promoting the educational and cognitive development of their children, compared to those with a higher level of education (Kalil, Ryan, & Corey, 2012). To guide the educational intervention of students at risk, a relevant result of this study revealed that at risk students with good performance had higher scores in academic self-concept, achievement goals, attribution of high and low performance to effort and attribution of high performance to ability; and lower scores on social esteem goals, attribution of performance to fate and attribution of high

performance to simplicity of signatures than at-risk students with low performance.

According to the results, there is a positive moderation of the motivational variables in the academic performance. It was proved that the higher the levels of learning and achievement goals, academic self-concept, self-efficacy, attributions of the effort and ability to the high and low performance and lower level of attributions of the fate to the performance, the lower the negative effects of the accumulation of socio-family risks on performance. There is enough evidence of the positive impact on the academic performance of students' personal variables (Cleary & Kitsantas, 2017; Veas, López-López, Gilar, Miñano, & Castejón, 2017), but thanks to this research, the protective influence that they have specifically with adolescents living in risky contexts is also highlighted.

The results support the importance of promoting motivational variables on students with risk factors to reduce the negative impact on the performance. The size of the sample and the selection procedure used give the results reasonable reliability however, future work should replicate these results by exploring the protective effects of variables related to the school and the professorship, which may also moderate the relationships between accumulated risk and performance (Gustafsson, Nilsen, & Hansen, 2018). This would allow the development of multilevel preventive intervention programs that contribute to the improvement of the academic achievement of all students and especially those most vulnerable to school failure.

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