# Social skills and academic achievement: the mediating function of cognitive competence

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## Abstract

Several studies have highlighted the correlation between social skills and academic achievement. Nevertheless, the processes implied in this association are not clear enough. This paper aimed at testing the hypothesis of cognitive competence as a possible mediator variable linking social skills and academic achievement. 80 children of both sexes (age average = 8.15 years old) were evaluated by the Columbia intelligence test, the Social Skills Rating System (SSRS-BR) and a School Achievement Test (SAT). GLM analysis confirmed the initial hypothesis of the cognitive competence mediating the instrumental as well as the enabler function of social skills on the academic achievement. Implications for early school interventions to promote social skills and possible directions for future researches are discussed.

**Keywords:** Academic achievement, Social skills, Learning disabilities, Mediation relationships.

## Habilidades sociais e rendimento acadêmico: a função mediadora da competência cognitiva

## Resumo

Vários estudos têm destacado a correlação entre habilidades sociais e desempenho acadêmico. No entanto, os processos implicados nesta associação não estão suficientemente claros. Este trabalho teve como objetivo testar a hipótese de que a competência cognitiva é uma variável mediadora que possibilita relacionar habilidades sociais e desempenho acadêmico. 80 crianças de ambos os sexos (idade média = 8,15 anos) foram avaliadas pelo teste de inteligência Columbia, o *Social Skills Rating System* (SSRS-BR) e o *School Achievement Test* (SAT). A Análise GLM confirmou a hipótese inicial de a competência cognitiva mediar o instrumental, assim como da função facilitadora das habilidades

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sociais no rendimento acadêmico. Implicações para intervenções escolares precoces com o ojetivo de promover habilidades sociais são discutidas, assim como possíveis direções para pesquisas futuras.

**Palavras-chave:** Desempenho acadêmico, Habilidades sociais, Dificuldades de aprendizagem, Mediação de relacionamentos.

# Habilidades sociales y rendimiento académico: la función mediadora de la competencia cognitiva

## Resumen

Varios estudios han puesto de relieve la correlación entre las habilidades sociales y rendimiento académico. Sin embargo, los procesos implicados en esta asociación no son suficientemente claros. Este estudio pretende probar la hipótesis de la competencia cognitiva como una variable mediadora que permite unir las habilidades sociales y el rendimiento académico. 80 niños de ambos sexos (edad media = 8,15 años) fueron evaluados a través de la prueba de inteligencia de Columbia, el *Social Skills Rating System* (SSRS-BR) y el *School Achievement Test* (SAT). El análisis GLM confirmó la hipótesis inicial de la competencia cognitiva como mediadora del instrumental, así como la función facilitadora de las habilidades sociales en el rendimiento académico. Se discuten las implicaciones para precoces intervenciones de la escuela para promover las habilidades sociales y posibles direcciones para futuras investigaciones.

**Palabras clave:** Rendimiento académico, Habilidades sociales, Problemas de aprendizaje, Mediación de relaciones.

The role of social skills and social competence as a protective factor for the academic success and as predicting positive developmental outcomes have been broadly acknowledged (Caprara, Barbaranelli, Pastorelli, Bandura, & Zimbardo, 2000; Crews, Bender, Vanderwood, Cook, Gresham, & Kern, 2007; DiPerna, 2006; DiPerna, Volpe, Elliott, 2005; Severson & Walker, 2002). Inversely, a number of studies has found significant correlation among social skills deficits, behavioral and learning problems (Bandeira, Rocha, Souza, Del Prette, & Del Prette, 2006; Rimm-Kaufman & Chiu, 2007; Rutherford, DuPaul, & Jitendra, 2008). Throughout the school years, students with learning difficulties, compared to students with satisfactory academic achievement, are generally evaluated as less popular, less cooperative, more rejected by their peers, less empathic and with poorer verbal and non-verbal communication skills (Guifford-Smith &Brownell, 2003; Maag, 2005, 2006; Walker, Ramsay, & Gresham, 2004). Taken together, these evidences suggest that academic success involves, in a broad sense, both academic and interpersonal factors as pointed out by some studies (Z. A. P. Del Prette, Del Prette, Oliveira, Gresham, & Vance, in press).

Nevertheless this well-documented empirical association between low social competence and low academic achievement, the nature of this relationship remains unclear. Why does it happen? What are the mechanisms involved here? How do social skills work in promoting academic success, or reversely, how do social skills deficits hinder it? Some hypotheses have been postulated as possible and pertinent.

A first hypothesis is that, given the interpersonal nature of the teaching-learning process, social skills have an instrumental or enabling function on academic learning (Diperna, 2006; Z. A. P. Del Prette & Del Prette, 2005; Eisenhower, Baker, & Blacher, 2007; McClelland, Acock, & Morrison, 2006; Molina & Del Prette, 2006). In other words, to succeed in this process, social skills are required of the student, for example, to ask and reply questions, to participate in debates, to ask for help, to help peers and so on. This hypothesis is supported by an illustrative study involving 294 Italian children with an age average of 8.5 (Caprara et al., 2000). This study found a significant and cumulative effect of pro-social behaviors (helpfulness, sharing, kindness, and cooperativeness) on academic achievement (as well as on the child's

sociometric status) as long as five years later social skills were even more predictive of academic achievement than antisocial behaviors. In Brazil, another longitudinal study produced quite similar results (Pizato, 2010) and, an experimental one (Molina & Del Prette, 2006) showed that social skills training produced improvement in social repertoire as well as in academic achievement, while academic training improved only academic achievement.

Therefore, a question could be asked: are these results discharging the role of intelligence, or, at least cognitive competence, in the learning process? Traditionally, academic success has been related - and to some degree attributed - to cognitive resources (Yen, Konold, & McDermott, 2004). Even considering the recent controversy concerning the role of intelligence in the identification of specific learning disabilities (Gresham & Vellutino, 2010), its function in favoring learning could not be denied. So, the question could be rephrased as: what is the possible role of cognitive competence in the relationships between social skills and academic achievement?

This leads to a second hypothesis, focused by this study: the empirical relationship between social skills and academic achievement could be mediated by other processes and variables, a possible candidate being the cognitive competence. Thus, it could be pertinent to inquire: what is the possible impact of social skills on cognitive competence? Or in the reverse direction: could cognitive competence foster social skills and in this way improve the learning process? Based on these questions, the present study aimed at analyzing the relationship between the social skills repertoire, academic achievement and cognitive competence, exploring the possible function of cognitive competence as a mediator in the relation between the other two variables.

## Method

### Participants

80 Brazilian children (average age = 8.15 years; SD = 0,68), 57.5% boys and 42.5% girls participated. Regarding the socioeconomic level, according to the Brazil Criterion Questionnaire[1], the majority was classified in the low socioeconomic level (Classes D=38.8% and C=38.8%) and a small proportion in the middle and high economic level (B2=15%, B1=3.8% and A2=3.8%). Participants were students from the second (73.8%) and third (26.2%) grades of an elementary public school[2]. Family members (mothers=63; fathers=7; others=10) and seven of their teachers participated in the evaluation of the children's social skills.

### Instruments

*Social Skills Rating System, Brazilian Version (SSRS-BR).* Inventory originally produced by Gresham and Elliott (1990). The Brazilian version, validated by Bandeira, Del Prette, Del Prette, and Magalhães (2009) showed a satisfactory index of internal consistency and test-retest temporal stability. SSRS-BR evaluates social skills, behavior problems and academic competence of children. In this study, only the total score of social skills, as evaluated by parents and teachers, was used: they were required to estimate the frequency (Never, Sometimes, Always) at which the child displayed each of the skills described in the instrument, then sum them up, producing a total score referred to in percentiles.

*School Achievement Test (SAT).* This instrument, also validated in Brazil (Stein, 1994), is composed of academic exercises that produce raw scores on reading, writing and arithmetic achievement skills. The overall scores (used in this study) are converted into ranks, thus classifying the child into the lower, medium or higher rank. SAT reliability indexes (alpha's coefficient) are reported for

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[1] The Brazil Criterion Questionnaire (BCQ) classifies the respondent, based on durable consumer goods and schooling level, in one of five classes: three of greater acquisitive power, subdivided into seven levels (A1, A2, B2, B3, C1, C2, D and E). In 2008, BCQ version subdivided class C into C1 and C2, but in this study the original classes were used. See: http://www.abep.org/codigosguias/Criterio_Brasil_2008.pdf.

[2] In Brazil, Elementary School corresponds to the schooling, guaranteed by the government to all children from six to 14 years of age.

Writing=0.95, Arithmetic=0.93, Reading=0.99 and Total=0.99 (Stein, 1994).

*Columbia Mental Maturity Scale.* The Columbia test (Burgemeister, 2001), also individually administered, evaluates abstract or categorical thinking, based on a series of figures set out on cards (between 55 and 66) adapted to the child's age range. Each card has three to five figures and the child must select the one he/she considers to be different or not related to the others. To do so, the child has to establish a rule for organizing the figures, as well as to exclude only one. The final score of cognitive competence is expressed by percentile ranks. This instrument, adapted to Brazil, showed precision coefficients (split-half method) varying between 0.82 and 0.93 (Burgemeister, 2001).

### Procedure

The project was approved by a Brazilian Committee of Ethics (CEP/UFSCar no. 134/2005) and all ethical standards concerning research with human beings were attended. Children completed the instruments on an individual basis, along sessions conducted by the first author in an isolated room. The teacher was given the student's name and the basic instructions to complete the SSRS-BR. The family member evaluated his or her child in a meeting held at the school.

The relationship between variables, based on a mediation method (Baron & Kenny, 1986; Frazier, Barron, & Tix, 2004), focused the three variables of interest as the model in Figure 1 (Baron & Kenny, 1986; Frazier et al., 2004).
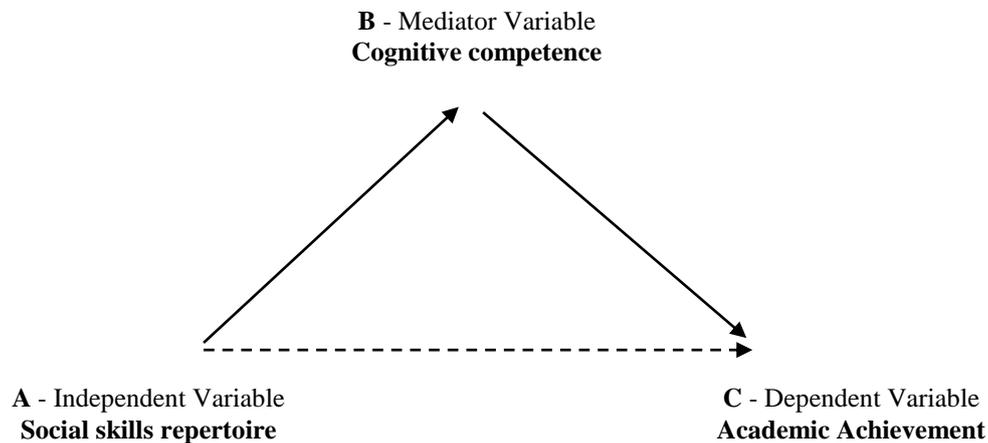
**B** - Mediator Variable
**Cognitive competence**

**A** - Independent Variable                               **C** - Dependent Variable
**Social skills repertoire**                               **Academic Achievement**

**Figure 1 – Mediated relationship between variables: A predicts C mediated by B**

According to this model, the mediating function of the third variable (B, cognitive competence) occurs when, given three regression equations, the following conditions are fulfilled (Baron & Kenny, 1986): (1) the independent variable affects the mediator variable in the first equation; (2) the independent variable affects the dependent variable in the second equation; (3) the mediator variable affects the dependent variable in the third equation, with the achievement of the independent variable in this same equation being observed again. Mediation is confirmed if, in the third equation, the independent variable is less effective and the mediator variable is more effective over the dependent variable (Baron & Kenny, 1986). If

the independent variable has no more effect on the third equation when the mediating variable is controlled, a complete measurement is found (Baron & Kenny, 1986).

According to Kenny (2008), the effect of the independent variable on the dependent variable should decline in the regression analysis even if the mediator variable does not affect it. However, as Fife-Schaw (2008) advised, using the Sobel test and the Aroian[3] test to control the standard errors of regression analyses, it is possible to obtain a similar treatment based on the Z-test, thus avoiding false positives (Fife-Schaw, 2008; Kenny,

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[3] Available at:
http://www.psy.surrey.ac.uk/cfs/p3.htm.

2008). If the result of these two tests is significant (p<0.05 given by z>1,96), then the mediator effect, also known as the indirect effect, is confirmed (Fife-Schaw, 2008; Kenny, 2008). To prevent the nested effect associated to multiple evaluators for the SSRS-BR, an alternative Type III GLM (General Linear Model) was applied.

## Results

Descriptive and inferential statistical analysis was applied to the scores. Concerning the sample normality, Kolmogorov-Smirnovtest showed that the *social skills* (.058, p=.200) and *cognitive competence* (.063, p=.200) scores presented normal distribution, in contrast to the *academic achievement* (.173, p<0.001) which was transformed into z scores normalization. Regression analyses were undertaken for the mediator variables (Baron & Kenny, 1986; Frazier et al., 2004). Since the social skills scores, as evaluated by the family member/significant other, did not correlate with the other scores, they were excluded from the latter statistical analyses. The children's results in the variables of interest in this study are presented in Table 1.

As for Table 1, the achievement of the individuals in all the measurements of interest was on the mean point of the range or just slightly lower. A partial mediator function was evidenced by the decrease in the third correlation equation between social skills and academic achievement (N=80, $\beta$=0.102, p<0.01). Table 2 shows this significant result in more detail.

As for Table 2, an $R^2$=0.742 in the third equation, social skills mediated by cognitive competence, explained 74 percent of the variance in academic achievement, while in isolation, an $R^2$=0.694, social skills were responsible for 69 percent of the variance in academic achievement (plus 5%). When the Sobel test was administered to ascertain the reliability of this result, an acceptable index was obtained for the mediation effect (Z=2.14; p<0.05). The Aroian test also confirmed the mediator effect (Z=2.14; p<0.05). Complementing these findings, the GLM analyses, which controlled the power of influence from different teachers as evaluators, ran a good observed power (0.800).

Another analysis was more detailed, based on items of SSRS-BR as shown in Table 3. Their correlation with cognitive competence and academic achievement was processed.

**Table 1 – Children's scores in three measurements of interest**

| Variables | N | Mean | SD | Range of scores |
|---|---|---|---|---|
| Academic achievement | 80 | 67.35 | 35.50 | 0-143 |
| Cognitive competence | 80 | 31.54 | 8.83 | 0-100 |
| Social skills | 80 | 32.98 | 11.71 | 0-60 |

**Table 2 – GLM Analysis of the mediating function of cognitive competence between the social skills and academic achievement variables**

| | Mediation Equations | N | B | SE | Eta Squared | Observed Power | $R^2$ |
|---|---|---|---|---|---|---|---|
| *First* | Social skills x cognitive competence | 80 | 0.178 | 0.083 | 0.060* | 0.561 | 0.238 |
| *Second* | Social skills x academic achievement | 80 | 2.126 | 0.006 | 0.150** | 0.941 | 0.694 |
| *Third* | Cognitive competence x academic achievement | 80 | 2.939 | 0.008 | 0.168*** | 0.962 | 0.742 |
| | Social skills x academic achievement | 80 | 1.603 | 0.006 | 0.102** | 0.800 | |

*Note:* *p<0.05; **p<0.01; ***p<0.001.

**Table 3 – Pearson correlation between item values of social skills item (teachers version of SSRS-BR), cognitive competence (CA on Columbia Test) and academic achievement (AA on SAT) (N=80)**

| SSRS-BR items | CCp | p | AA | P |
|---|---|---|---|---|
| 29. Easily makes transition from one classroom activity to another | 0.398 | 0.000 | 0.391 | 0.000 |
| 13. Shows interest in a variety of things | 0.367 | 0.001 | 0.467 | 0.000 |
| 16. Produces correct schoolwork | 0.332 | 0.003 | 0.416 | 0.000 |
| 04. Compromises in conflict situations by changing own ideas to reach agreement | 0.321 | 0.004 | 0.367 | 0.001 |
| 08. Uses free time in an acceptable way | 0.291 | 0.009 | 0.429 | 0.000 |
| 02. Introduces herself or himself to new people without being told | 0.278 | 0.012 | 0.445 | 0.000 |
| 06. Says nice things about himself or herself when appropriate | 0.273 | 0.014 | 0.355 | 0.001 |
| 12. Controls temper in conflict situations with adults | 0.254 | 0.023 | 0.375 | 0.001 |
| 23. Volunteers to help peers with classroom tasks | 0.261 | 0.019 | 0.256 | 0.022 |
| 20. Follows your directions | 0.255 | 0.023 | 0.251 | 0.025 |
| 24. Joins ongoing activity or group without being told to do so | 0.224 | 0.046 | 0.275 | 0.013 |
| 15. Uses time appropriately while waiting for help | 0.215 | 0.056 | 0.292 | 0.009 |
| 07. Invites others to join in activities | 0.191 | 0.089 | 0.152 | 0.178 |
| 22. Cooperates with peers without prompting | 0.179 | 0.113 | 0.345 | 0.002 |
| 18. Accepts peers' ideas for group activities | 0.158 | 0.162 | 0.238 | 0.033 |
| 26. Ignores peer distractions when doing class work | 0.155 | 0.171 | 0.071 | 0.531 |
| 28. Attends to your instructions | 0.154 | 0.174 | 0.140 | 0.215 |
| 19. Gives compliments to peers | 0.123 | 0.278 | 0.119 | 0.294 |
| 03. Appropriately questions rules that may be unfair | 0.115 | 0.308 | 0.194 | 0.085 |
| 17. Appropriately tells you when he or she thinks you have treated him or her unfairly | 0.101 | 0.373 | 0.192 | 0.089 |
| 30. Gets along with people who are different | 0.099 | 0.383 | 0.260 | 0.020 |
| 25. Responds appropriately when pushed or hit by other children | 0.096 | 0.396 | 0.229 | 0.041 |
| 11. Responds appropriately to teasing by peers | 0.095 | 0.401 | 0.292 | 0.009 |
| 09. Finishes class assignments within time limits | 0.091 | 0.423 | 0.090 | 0.429 |
| 14. Initiates conversation with peers | 0.070 | 0.538 | 0.309 | 0.005 |
| 27. Keeps desk clean and neat without being reminded | 0.036 | 0.754 | 0.002 | 0.988 |
| 21. Puts work materials or school property away | 0.030 | 0.792 | 0.107 | 0.344 |
| 10. Makes friends easily | 0.015 | 0.896 | 0.173 | 0.125 |
| 05. Responds appropriately to peer pressure | -0.056 | 0.625 | 0.205 | 0.068 |
| 01. Controls temper in conflict situations with peers | -0.079 | 0.486 | -0.074 | 0.514 |

It was found that eleven out of the 30 SSRS-BR items showed significant correlation with cognitive performance and academic competence. Seven additional items were significantly correlated only with academic competence.

## Discussion

The results of this study support the hypothesis of social skills as academic enablers (Diperna, 2006; Caprara et al., 2000; Crews et al., 2007; DiPerna, 2006; DiPerna et al., 2005; Severson & Walker, 2002) and, in addition, of their possible influence on academic achievement by means of cognitive

competence. In other words, under a mediation model, the enabling or instrumental function of social skills on academic learning (DiPerna et al., 2005; Eisenhower et al., 2007) could be partially mediated by the child's cognitive competence[4]. Although the correlation between the variables is weak, the amount of data was very consistent with acceptable index of confidence, thus strongly supporting this mediation hypothesis.

The results also made it possible to identify the specific social skills that most contribute to cognitive competence and,

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[4] According to additional regression analyses, the reverse was not confirmed, which also reinforces the previous hypothesis.

indirectly, to academic competence. Such skills could be related to the child's motivation or curiosity directed to school activities, (items 29, 13, 16), cooperation and involvement with peers and with the ongoing activities (items 23, 20, 24), some self-control when dealing with school requirements (items 04, 08, 12*)* and a good self-esteem (02, 06). The items that presented a significant correlation with academic competence fall, in a certain way, into these categories also, and could be taken as variations of them. All these items are in consonance with the literature on academic enablers (Caprara et al., 2000; Diperna, 2006; McClelland, Cameron, Wanless, & Murray, 2007; Yen et al., 2004) and academic social skills in general (Z. A. P. Del Prette & Del Prette, 2005; Molina & Del Prette, 2006).

The social skills most related to cognitive competence imply some behavior flexibility to access and to deal with multiple stimuli and varied information. For example, *easily makes transition from one classroom activity to another* or *shows interest in a variety of things* presupposes not persisting in a limiting task and to trying out new tasks or strategies to complete the ongoing activity. To *use free time in an acceptable way* requires discriminating, under a relatively restricted set of conditions, the possibilities to explore different stimulation demands. So, social skills, by their nature, could provide children with the behavioral flexibility required to deal with the different interpersonal demands in the classroom (Z. A. P. Del Prette & Del Prette, 2005). Certainly future studies could explore their possible relationship with the cognitive flexibility (e.g., flexibility to use different cognitive schemes according to task requirements).

Taken together, the results of this study make a point for understanding "how" and "why" social skills could be related to academic achievement, converging into the suggestions of Caprara et al. (2000) that the intellectual development of children is also influenced by the quality of interpersonal relationships with teachers (DiLalla, Marcus, & Wright-Phillips, 2004) and peers (Guifford-Smith & Brownell, 2003). This effect is possibly related to the use of social skills in the exploration of the environment, in assuring positive educational contingencies and in amplifying cognitive stimulation (*input*) in the academic context

The unexpected lack of significant correlations of the children's social skills repertoire, evaluated by family members, with academic achievement and with cognitive competence may derive from the social skills specificity (A. Del Prette & Del Prette, 2010), in this case, for the school context influence on the other variables focused on this study, all strongly related to school success.

Considering the usual starting age of the children's schooling (around seven years of age in this sample), one may suppose an initial period of intense adaptation to school during which the demands for mastering new social skills possibly creating demands for cognitive processing and competence. This period is possibly critical to foster qualitative, as well as quantitative changes in their social knowledge (Crick & Dodge, 1994). It would be interesting if future researches could show the magnitude in which the social and cognitive processes would be correlated in this developmental phase.

One limitation of this study is that Baron's method has been criticized because it cannot securely indicate the direction of influence between variables. Nevertheless, this method is still used (e.g, Segrin, Hanzal, Donnerstein, Taylor, & Domschke, 2007; Wilks & Croom, 2008) and certainly new studies could compare the present results with further ones, produced by other methods.

Despite the limitations of this study, it is possible to explore some of its practical implications. They add empirical support for social skills programs in the school as a potential strategy for overcoming learning difficulties, as highlighted by other studies (Caprara et al., 2000; Diperna, 2006; McClelland et al., 2006). This alternative is pertinent when one considers that deficits in social skills are associated with behavioral problems that compete with academic achievement (Pizato, 2010) and tend to remain stable throughout time or to worsen if not overcome by the age of 12 (Z. A. P. Del Prette & Del Prette, 2005; Loeber, 1991).

The application of social skills programs has still barely been explored in Brazil, but these could be established in the school curriculum and monitored concerning their effects on child learning and development (Z. A. P. Del Prette & Del Prette, 2005, 2008). To summarize, the set of results obtained from this study reinforces the idea that an elaborated or

deficient repertoire of social skills may favor or compromise the academic success through its possible impact on cognitive competence. This data also broadens understanding about the social function of the school on the more global development of the child. The ability to adjust to the school environment has, therefore, important implications for the children's long-term behavioral adjustment, social engagement at school, and academic success (Eisenhower et al., 2007; Marturano & Loureiro, 2003).

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