

Article

Conceptual Model for Explaining Academic Achievements and Social Functioning of Students with and without Learning Disorders

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Abstract: The purpose of the study was to develop a comprehensive model that examines whether motor abilities and socioemotional adjustment contribute to the academic achievement and social functioning of students. Participants were 733 children, aged 6.04–13.72 years. Among them, 642 were typically achieving children, and 91 were children with learning disorders (LD). Measurements were: Children’s Sense of Coherence Scale, Children’s feelings of loneliness and social dissatisfaction, The Social Skills Rating System, and The Test of Motor Impairment–Henderson Revision. Results showed that LD explains all dependent variables in the model. According to this model, there is a valid reason for the controversy that still exists between policy makers who focus on academic achievement and early childhood educators who emphasize social skills and behavior.

Keywords: academic achievements; social functioning; learning disorders



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1. Conceptual Model for Explaining Academic Achievements and Social Functioning of Students with and without Learning Disorders

The Salutogenic model [1,2] assumes that throughout their lives, people move along a health ease/dis-ease continuum. This model focuses on the factors affecting a person’s movement toward the healthy end of the continuum, with individuals dynamically shaping their lives through areas of competence and a sense of coherence [3,4]. In addition, the Salutogenesis approach recognizes the existence of various factors that improve health. Antonovsky [5] proposed the idea of Generalized Resistance Resources (GRRs), which can be anything that helps with stressors, such as social support or a positive self-concept. This is followed by the concept of a sense of coherence, where an individual feels confident that his/her internal and external environment is predictable and that things will develop in an expected manner. Hence, in the current study, we will briefly review the literature concerning the proficiencies, skills, and abilities that have been hypothesized as being GRRs (protective factors) and those that may act as risk factors to students’ academic performance and social functioning. However, while extensive research was conducted with one or a few variables at a time, we will try to use the findings of our study to weave the related variables into one comprehensive model, which relies on the Salutogenic model, and illustrate the factors accounting for variance in children’s academic and social performance. Specifically, we will compare typically developing students with students with learning disorders (LD).

The following are variables hypothesized to be GRRs that enhance students’ academic achievement and social functioning in our proposed conceptual model.

The first variable was motor proficiency (MP), a global term used in this study to describe the level of fine motor skills and ball skills. It was proven that motor proficiency in fundamental motor skills during childhood is significantly important to social, cognitive, physical, and emotional state and development, as well as to well-being [6–8]. From a

movement and developmental perspective, childhood is a critical time for the development of MP [9,10] and especially of fine motor skills, since these play a key role in many activities of daily living such as self-care, feeding, and dressing [11], and they enable participation in play, education, and social interaction [12]. In addition, MP enables children to successfully participate in various structured and non-structured types of physical activity (PA) [10,13].

It is estimated that up to seven percent of all school children are diagnosed with Developmental Coordination Disorder (DCD) [14]. The movements of children with DCD frequently lead to performance difficulties in activities of daily living [14,15], academic achievement [14], and physical games that typically developing (TD) children perform easily.

The second variable was social skills, which are considered important for childhood development, especially due to their positive association with several indicators of adaptive functioning, such as satisfactory relationships with peers and adults [16,17], good academic performance [18], positive social status among peers [19], and a lower frequency of behavioral problems [20]. Prosocial behavior is also related to subjective well-being [21]. The relationship between social skills and academic achievements has been examined, and it appears that children with low social skills or a small number of peer relationships show more behavioral problems, emotional difficulties, and problems in learning, even dropping out of school (e.g., [18]). Others [22,23] found that low academic achievement at ages nine and ten predicted school failure experiences in adolescence, such as suspensions, expulsions, and not graduating on time, as well as the likelihood of a major depressive episode in young adulthood for girls.

Studies with LD children found that they are less popular and have a higher isolation index compared with their peers, possessing fewer friendships [24,25] and presenting a lower number of positive social behaviors [26]. Children with LD present problems in their interpersonal relationships [27] since they employ destructive and ineffective strategies [28], as well as misconduct in the classroom, showing an inability to cooperate and establish positive relationships with their classmates [29].

The third variable chosen for inclusion in our comprehensive model is behavioral skills, which were found to account for a substantial portion of children's early academic achievements [30]. In particular, early self-regulation has been identified as a key predictor of both current and later academic achievement [31]. However, little is known about the mechanisms by which early self-regulation predicts young children's emergent academic achievement. One potential mechanism that was suggested is the child's social functioning [32].

As opposed to behavioral skills, behavioral problems in children have important implications for their health and well-being [33]. Children with behavioral problems are more likely to have poor academic performance, repeat a grade in school, face school suspension or expulsion, and develop behavioral problems in adulthood, as well as being less likely to engage in social activities outside of school [33]. Children with LD show various types of behavioral problems, such as attention problems, hyperactive behavior, and externalizing behavior, especially at younger ages [34]. In addition, they engage in violent behavior at twice the rate of their peers without LD [35]. Concerning gender differences, there is evidence that girls with LD may be more vulnerable to academic failure compared with boys with LD [36].

We chose two constructs that represent socioemotional adjustment for inclusion in our hypothesized model: loneliness and sense of coherence. What follows is a short description of studies that report the linkage between these constructs and students' success.

Loneliness—refers to the frustration experienced when individuals feel that their basic need for relatedness is not met as expected [37]. Loneliness is one's subjective feeling of social isolation, regardless of one's actual social status [38]. Most critical to our study, loneliness has been considered to be a distressful emotional experience that affects children's quality of life, as well as a major developmental risk for their future adjustment [38,39]. Moreover, compared with those who are not lonely, lonely children have been found to display lower academic achievement [40].

Sense of coherence (SOC)—is a global orientation of viewing life as manageable and meaningful. It is a personal way of thinking, being, and doing, with confidence to use and to re-use individual resources [4]. Children with high SOC feel in control of their lives. When they face a stressful situation, they are able to select the strategy that seems most appropriate for coping with the stressor. Studies have shown evidence for SOC as early as in preschool children [41]. Those who were identified as at risk of developing LD experienced a lower SOC, were less accepted by their peers, and were rated by their teachers as demonstrating fewer competencies and more academic competence and social interrelation difficulties [41].

The uniqueness of the current study is manifested by examining variables concerning children's socio-emotional functioning from their own perspectives and from homeroom teachers' perspectives. In addition, we included the children's motor functioning with the examined variables, considering that approximately 50% of the children with LD also exhibit significant motor problems [42], which in turn significantly influence their health-related quality of life [43]. Taking all the relevant constructs reviewed here into account and finding a conceptual model that will explain the relationships among them, will pave the way for education professionals, teachers, and school psychologists to develop adapted intervention programs to increase students' success.

Hence, the purpose of the current study was to develop a comprehensive model that can explain the relationships among variables that contribute to children's success, especially in terms of academic achievements and social functioning. More specifically, a model that examines whether motor abilities—specifically, fine motor skills, ball skills, and socioemotional adjustment—feelings of loneliness, and a sense of coherence contribute to academic achievement and social functioning of students with and without LD.

2. Method

Participants

The participants were 733 children, 359 boys and 374 girls, aged 6.04 to 13.72 years ($M = 8.82$; $SD = 1.54$), attending general education classes (1st–5th grade) from two Israeli public schools. Among them, 642 (6.87%) were typically achieving children, and 91 (12.4%) were children with LD (46 boys, 45 girls). In accordance with the educational policy of the Israel Ministry of Education, all 91 children in this group had undergone previous psycho-educational evaluations that yielded an LD diagnosis based on the DSM-IV-TR [44]. The DSM-IV-TR criteria comprised: (a) substantially lower achievements (2+ standard deviations below average) on standardized tests in reading, writing, and/or mathematics than those expected for age, schooling, and level of intelligence; and (b) an average IQ level ranging from 85 to 115. As confirmed by school counselors, the 91 children's prior DSM-based diagnosis of LD in reading, writing, and/or mathematics also underwent a validation process by the schools' psycho-educational team and by the national Ministry of Education committee in order to verify the diagnosis based on full access to diagnostic evaluation details, recommend appropriate remedial treatments, and authorize the appropriate level and type of accommodations for everyday study.

3. Measures

3.1. Children's Instruments

The four self-report measures for the children were used as follows:

(1) Children's Sense of Coherence Scale [45]. This children's self-report scale consists of 16 items tapping into three dimensions of children's sense of confidence in the world: (a) sense of comprehensibility—feeling that one understands one's environment, (b) sense of manageability—feeling in control and confident that positive rewards are available, and (c) sense of meaningfulness—motivation and interest in investing effort into different tasks. The scale asked children to read the items and to rate how frequently they experienced the feelings described in an item on a 4-point scale (1 = never, 4 = always). Antonovsky [5] recommended the computation of a single total score tapping into a global sense of coherence.

In the current sample, the acceptable Cronbach alpha for the 16 items ($\alpha = 0.79$) allowed us to compute a total coherence score by summing up the 16 items. Higher scores reflected a higher sense of coherence.

(2) Children's feelings of loneliness and social dissatisfaction, which were assessed using Asher and Wheeler's [46] modification of a 24-item self-report questionnaire developed by Asher, Hymel, and Renshaw [47]. This questionnaire contains 16 items that focus on feelings of loneliness and social dissatisfaction in school, as well as eight filler items. The 16 primary items assessed four aspects of loneliness feelings: (a) children's feelings of loneliness, (b) children's appraisal of their current peer relationships, (c) children's perceptions of the degree to which important relationship needs are being met, and (d) children's perceptions of their social competence. The children responded to each item on a 5-point Likert scale. Total scores can range from 16 to 80, with higher scores indicating greater loneliness and social dissatisfaction. Reliability of the 16 items in the present sample ranged from $\alpha = 0.87$ to $\alpha = 0.93$.

3.2. Teachers' Instrument

The *Social Skills Rating System (SSRS)* is a multi-rater social behavior scale standardized from the results of over 4000 students from 19 states. The present study used the Hebrew adaptation [48] of the elementary school SSRS-T form (the SSRS-T form). The SSRS-T is a 57-item rating scale designed to assess students' social skills in three domains: (a) social skills (30 items), (b) problem behaviors (18 items), and (c) academic competence (9 items). Each SSRS-T domain took about 20 min for the teacher to complete.

- (a) The 30-item measure of social skills consists of three subscales with 10 items in each, on a 3-point frequency dimension (often true, sometimes true, and never true). The social skill dimensions, as measured by factor-based subscales, were cooperation, assertion, self-control, responsibility, and empathy. Cooperation includes behaviors such as helping others, sharing materials, and complying with rules and directions. Assertion includes initiating behaviors, such as asking others for information, introducing oneself, and responding to the actions of others. Self-control includes behaviors that emerge in conflict situations and non-conflict situations that require taking turns and compromising. Responsibility includes behaviors that demonstrate the ability to communicate with adults and regard for property or work.
- (b) Problem behavior domains. Teachers rated specific student behaviors according to how often they occurred (0 = never, 1 = sometimes, and 2 = very often). A total social skills scale score was computed, with a range of 0–60.
- (c) Academic achievement, which was measured by a rating scale that requires a teacher to read nine questions. Four of the questions pertain directly to performance in reading or math, while five questions concern the student's overall academic performance, motivation, parental encouragement, intellectual functioning, and classroom behavior. In addition, The Academic Competence Scale on the SSRS-T requires teachers to rate each student relative to other students from the lowest achievers to the highest achievers (1 indicates that the student is performing in the lowest 10% of his or her class, 2 indicates they are performing in the next lowest 20%, 3 indicates they are functioning in the middle 40% of the class, 4 indicates they are performing in the next highest 20% of the class, and 5 indicates that the student is performing in the highest 10% of the class). Standard scores ($M = 100$, $SD = 15$) for each scale are provided.

Higher total scores on the social skills scale indicate a more frequent exhibition of desired or acceptable behaviors, whereas higher total scores on the problem behavior scale suggest more frequent displays of undesirable or unacceptable behaviors at school. In the current study we followed Ogden [49], who separated social skills from the entire SSRS and conducted a factor analysis on that portion. In addition, the items in the academic achievement part of the SSRS are measured on a different scale (five points) than the social skills or the behavioral problems (three points). Therefore, we considered each subdomain as a separate construct throughout this study. In the current study, the internal consistency

estimates were 0.95 for social skills, 0.92 for problem behavior, and 0.96 for academic competence. LD was considered as a categorical value (0 = without LD; 1 = with LD).

3.3. Motor Proficiency Instrument

The Test of Motor Impairment–Henderson Revision (TOMI) [50] was used to evaluate motor function. The test is composed of four age bands that span the elementary school years (5 to 14 years old). All four age bands were used in this study. The TOMI consists of eight categories of motor functioning. (a) Manual dexterity (defined in our study as fine motor skills): 1. speed and sureness of movement of each hand, 2. coordination of both hands for performance of a single operation, and 3. hand-eye coordination using the preferred hand. (b) Balance: 1. static balance-control and balance of the body while immobile, 2. dynamic balance-control of the body in rapid movement, and 3. dynamic balance-control and balance in slow movement. (c) Ball skills: 1. catching, 2. throwing. For most of these items, two or three trials are allowed if the child fails to achieve the pass criterion. After the assessment, the raw score of each item is converted into a scaled score ranging from 0 to 2 (0 = pass, 1 = partial failure, and 2 = failure). A score of 1 indicates that the child's performance falls below the lowest 15%, while a score of 2 indicates a definite problem [50]. Validity of the TOMI is reported in the test manual with reference to empirical studies demonstrating agreement between children's performances on the test and assessments by teachers [50–52]. Further support of the construct validity of the TOMI was established by Riggen, Ulrich, and Ozmun [53], who reported 88% agreement between the TOMI and the Bruininks-Oseretsky Test of Motor Proficiency-Short Form in identifying children with a definite motor difficulty. Test-retest reliability in the current study was 0.75 with different testers.

4. Procedure

Before commencing the study, consent was obtained from The Israeli Ministry of Education and parents, principals, and teachers. Then, the TOMI was individually administered to each consenting child in the school gymnasium, during a time of almost 25 min, by 10 research assistants with B.A. and/or M.A. degrees, qualified in adapted physical education with five or more years of teaching experience. All of the research assistants had participated in a workshop that trained them to administer and score the TOMI. Subsequently, they introduced the SSRS-T and its procedure to all the homeroom teachers of the children who participated in the research. The teachers were provided with instructions regarding administration protocol on an individual basis. Each teacher scored 30 to 35 children.

Then, the homeroom teachers completed the SSRS-T form for all the children. After a short explanation and a few trial items, all children completed the “children's feelings of loneliness and social dissatisfaction” questionnaire. Completion of the questionnaire took about 15 min.

5. Results

Model Description

To test our theoretical expectation, we built a path analysis model, which is a specific case of structural equation modeling. The choice of calculated indicators or scales rather than latent factors was the result of twofold reasoning. Firstly, indicators were either the mean performance of a series of tests (the exogenous variables) or mean values across known and valid survey instrument items. These instruments underwent preliminary validation through a combination of exploratory and measurement analyses. Secondly, the path analysis modeling choice reduced model complexity and ability to explain results, especially with respect to academic performance—a direct observed measurement versus behavioral scales—item means as outcomes.

Figure 1 illustrates the concept of this model.

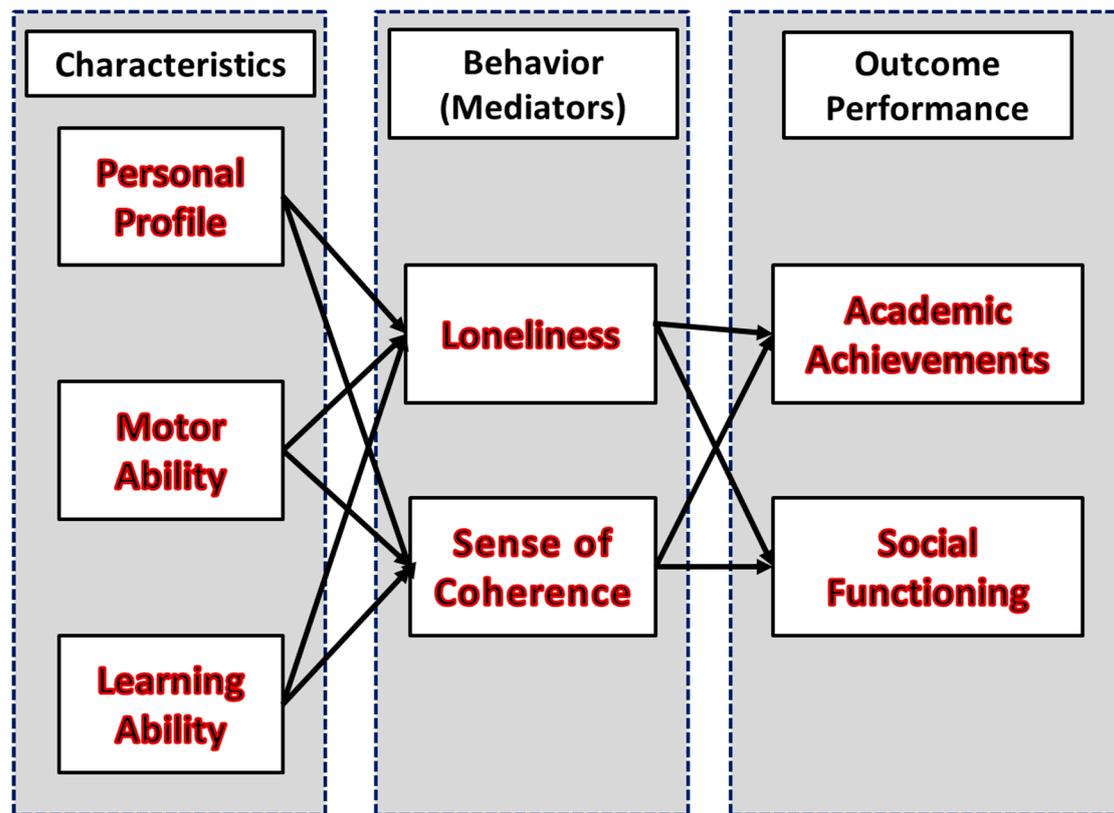


Figure 1. Students' characteristics are exogenous to the model and are expected to have an effect on their behavior, which in turn is expected to affect their performance. The model flows from personal attributes toward outcome performance through behavior. In other words, the major argument of this model is that behavior may mediate the association between characteristics and eventual performance. Note that this hypothesized flow has no time dimension, thus conclusions should be expressed with caution. Path analyses require large samples. In this study, sample size exceeds 700 respondents, thus providing power for empirical analysis.

A conceptual path analysis framework for hypothesis testing.

Empirical results are shown in Figure 2. The figure shows standardized coefficient estimates, whereas the table shows these same estimates in their unstandardized form. The empirical model expands on the conceptual model in re-measuring the following characteristics: time-constrained fine motor skills tasks, time-unconstrained fine motor skills tasks, graphomotor skills, and ball throwing and catching skills. In this model, the final dependent variables are learning ability by means of academic achievements, behavioral problems, and social functioning.

Figure 2 presents each variable as a box and a straight arrow from one box to another for regression estimates. A double-headed arch represents a correlation between two boxes' variables. Note that a variable may function both as a dependent and as an independent variable with respect to its structural location.

High correlations were found between the final dependent variables. Behavioral problems are negatively correlated with academic achievements and social functioning ($r = -0.41, p < 0.001$; $r = -0.70, p < 0.001$, respectively). However, academic achievements and socially functioning are positively correlated ($r = 0.64, p < 0.001$). For each dependent variable, the percent variance explanation (R^2) is provided. The difference between the estimates presented in Figure 2 and in Table 1 is in standardization. Standardized estimates vary between -1 and 1 and are comparable within each equation. Based on these values, a sense of the contribution of each explanatory variable to the overall explanation of the dependent variable can be evaluated. Only significant coefficients ($p < 0.05$) are added to the figure, while all path coefficients are shown in the table. Girls show higher levels of

social functioning and lower levels of behavioral problems compared with boys ($b = 0.17, p < 0.001$; $b = -0.20, p < 0.001$, respectively). This pattern repeats for age as students grow older ($b = 0.10, p < 0.01$; $b = -0.06, p < 0.05$).

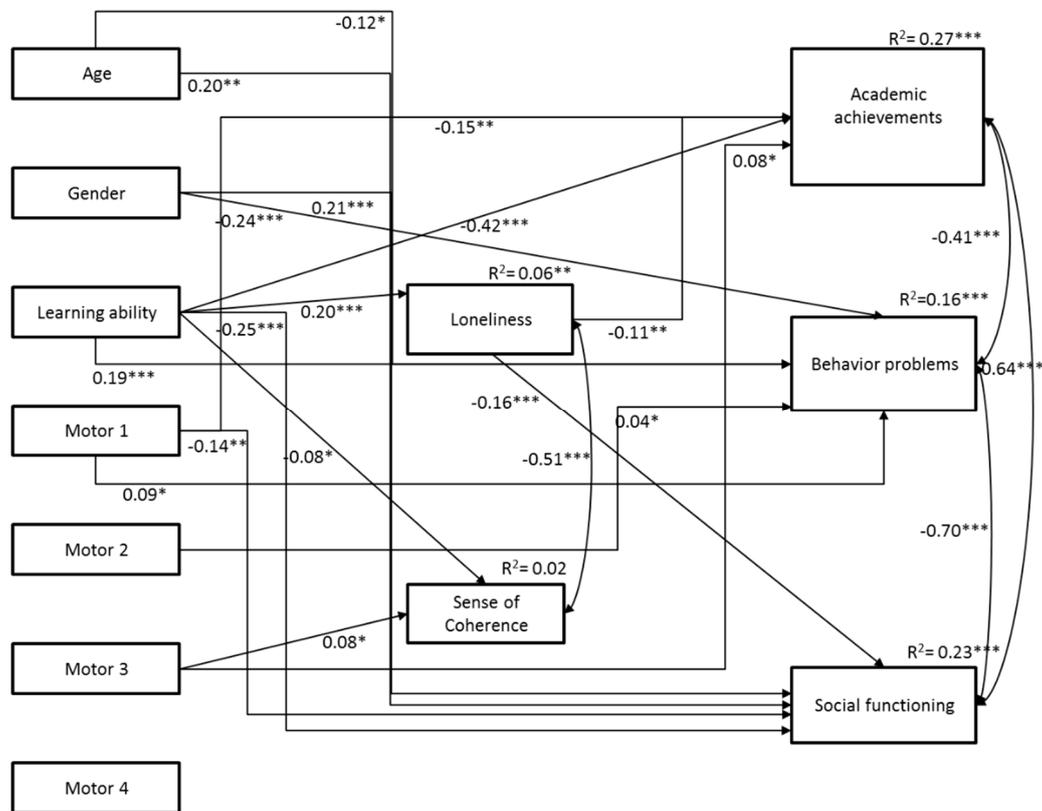


Figure 2. Path analysis model results and standardized coefficients. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

Table 1. Internal consistency and descriptive statistics for study measurements.

	Number of Items	Mean Score	Standard Deviation	Consistency (Cronbach Alpha)
Motor Measures				
Precision and Time	2	21.81	4.92	0.76
Precision No Time	1	28.96	15.08	-
Follow the Ball	1	1.7	2.13	-
Catching the Ball	1	8.12	2.11	-
Outcome Measures				
Sense of Coherence	15	3.2	0.36	0.66
Loneliness	16	1.93	0.63	0.79
Academic Achievements	8	3.82	0.99	0.96
Behavioral Problems	18	0.44	0.4	0.92
Social Functioning	30	1.39	0.41	0.95

Students with learning disorders show a lower coherence level and higher loneliness, as well as lower social functioning and a higher level of problems ($b = -0.09, p < 0.05$; $b = 0.38, p < 0.001$; $b = -0.31, p < 0.001$; $b = 0.23, p < 0.001$, respectively) and a lower level of academic achievement ($b = -1.27, p < 0.001$). In other words, learning disorders explain all dependent variables in this model. Fine motoric skills subject to a time constraint are found to have a negative effect on social functioning and academic achievements ($b = -0.01, p < 0.01$; $b = -0.03, p < 0.01$, respectively).

Empirical results are shown in Table 2.

Table 2. Path model results—unstandardized coefficients.

	Coherence	Loneliness	Academic Achievements	Behavioral Problems	Social Functioning
Age	−0.003	−0.08	0.10 **	−0.06 *	−0.05
	−0.03	−0.05	−0.03	−0.03	−0.07
Gender	−0.03	−0.08	0.17 ***	−0.20 ***	0.02
	−0.03	−0.05	−0.03	−0.03	−0.07
Learning Disorders	−0.09 *	0.38 ***	−0.31 ***	0.23 ***	−1.27 ***
	−0.04	−0.08	−0.04	−0.05	−0.11
Precision and Time	−0.002	0.01	−0.01 **	0.01	−0.03 **
	−0.003	−0.01	−0.004	−0.004	−0.01
Precision No Time	0.001	0.002	−0.001	−0.002	−0.003
	−0.002	−0.003	−0.002	−0.001	−0.004
Follow the Ball	0.01 *	−0.01	−0.02 *	0.01	−0.04 *
	−0.01	−0.01	−0.01	−0.01	−0.02
Catching the Ball	0.001	−0.01	0.003	0.01	0.01
	−0.01	−0.01	−0.01	−0.01	−0.02
Sense of Coherence			0.07	−0.11 *	0.17
			−0.04	−0.05	−0.11
Loneliness			−0.11 ***	0.06 *	−0.17 **
			−0.03	−0.03	−0.06
R ²	0.02	0.06 **	0.23 ***	0.16 ***	0.27 ***
	−0.01	−0.02	−0.03	−0.02	−0.03

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$; Model fit indices: CFI = 1.00; TLI = 1.00; $\chi^2 = 2.76$, $p = 0.43$; RMSEA < 0.001.

Further indirect analyses were performed using the structural form of the model. Table 3 shows three paths in which the effect of the independent variable on the dependent variable may be explained indirectly through a mediator, in addition to the direct effect. Specifically, the learning ability factor showed a positive direct effect on social functioning and learning potential, yet these effects could also be explained indirectly by loneliness. Similarly, the effect of learning disability on social functioning was found to have a mediation effect caused by loneliness. Like the first two, this indirect effect is only complementary to the direct effect of learning disorders on social functioning.

Table 3. Indirect effects—unstandardized coefficients.

Independent	Mediator 1	Dependent Variable	Independent → Mediator1	Mediator → Dependent	Independent → Dependent	Indirect	95% CI	Total
LD	Loneliness	Academic achievements	0.38 *** (0.08)	−0.11 *** (0.03)	−0.31 *** (0.04)	−0.04 ** (0.01)	[−0.07, −0.02]	−0.36 *** (0.04)
LD	Loneliness	Behavioral problems	0.38 *** (0.08)	0.06 * (0.03)	0.23 *** (0.05)	0.02 (0.01)	[0.002, 0.04]	0.26 *** (0.04)
LD	Loneliness	Social functioning	0.38 *** (0.08)	−0.17 ** (0.06)	−1.27 *** (0.11)	−0.07 * (0.03)	[−0.12, −0.01]	−1.35 *** (0.11)

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

6. Discussion

This study presents a model that describes the relationships between motor proficiency, behavioral skills, and social skills, mediated by loneliness and sense of coherence as predecessors to academic success and social functioning, among students with LD and typically developed students.

As hypothesized, behavioral problems had a negative relationship with academic performance. These results are in line with previous studies which found that behavioral and social skills account for a substantial portion of children's early academic achieve-

ments [18,54]. Similarly, children who are not behaviorally proficient are at greater risk not only of later behavioral problems but also of academic failure relative to their peers [55].

Concerning gender differences, there are a vast number of empirical studies that have established that teachers perceive and act towards boys and girls in a different manner. Different teachers' expectations, including their stereotypes of boys and girls, are shown in various areas of teaching, for example when asking students questions, when punishing students for their misbehavior, and when assessing students' outcomes [56]. Studies show that teachers tend to communicate less with boy students than with girl students and perceive their communication with boys as a form of behavioral control. Teachers usually praise, criticize, and correct boys more often than girls. Although teachers usually punish boys more severely than girls for the same misbehavior, girls are more often punished inappropriately when demonstrating behavior that is in the teachers' opinion more characteristic of boys [57].

Indeed, the current study's expectations that males will exhibit higher behavioral problem scores than females were confirmed. Thirty years of research in the school environment, and nothing has changed. The question of how to decrease the gap between teachers' knowledge and performance is still an important issue that should be addressed.

Fine motor skills and social functioning in our study can be explained by the fact that fine visual motor skills require precision and hence involve self-regulatory functions that indirectly influence academic achievement [58]. The fine motor skills subtest in our study is composed of activities involving the manipulation of objects with an added component: a time pressure (e.g., placing as many pegs on a board as possible in 10 s). McHale and Cermak [59] found that children spend between 30% and 60% of their school day performing fine motor tasks. Activities involving manipulation of writing implements such as pencils require perhaps the most important skills regarding academic achievement, with paper- and pencil-based activities making up as much as 85% of the time spent engaged in fine motor tasks [11]. In handwriting, there is a trade-off between speed and legibility (the "readability" of a person's hand writing), which is heavily influenced by self-control. The automatic production of alphabet letters is important in the early stages of learning to write, and the child's inability to acquire this automaticity will adversely affect their speed of writing.

As for the differences between children with LD and typically developed children, we found that children with LD reported lower levels of coherence and higher level of loneliness than their typically developed peers. These results supported the findings of earlier studies [26,38,41].

However, expected differences in motor performance between students with and without LD were not found in the current study, even though they were in other studies [60]. We attribute this difference to the fact that in our study, we focused on a general relation between motor performance and LD, without taking into account the fact that LD is a heterogeneous condition that includes reading disorders, mathematical disorders, and/or disorders of written expression [44]. According to Vuijk and colleagues [61], the relationship between motor skills and LD may in fact vary depending on different areas of academic performance (i.e., reading, spelling, and mathematics) and the kind of motor skill. If this is indeed the case, it is suggested that future studies investigate the specific relations between different subsets of gross motor skills (i.e., ball skills) and different domains of academic performance (i.e., reading, spelling, and mathematics) in children with LD.

Lastly, we found that among the motor performance abilities that were tested in the current study, only fine motor skills, subject to a time constraint and moderated by loneliness and sense of coherence, had a negative effect on academic achievements and social functioning. Since earlier studies reported similar results [62], we expected this trend as well. Nevertheless, ball skills were not related to the academic achievements and social functioning of our participants. We followed others who investigated the relationship between gross motor abilities and academic achievements [63]. However, unlike others who also examined balance [64] or locomotor fundamental motor skills such as running and

jumping [63]), we specifically examined ball skills due to the fact that ball game activities are prevalent among children [65].

Several limitations should be mentioned. First, the measurement of social skills and problem behaviors used in the current study is based on the students' homeroom teachers' reports. Results may have been different if observational measures related to a child's social skills and problem behaviors had been utilized [66]. Homeroom teacher reports may be able to capture both the child's interactional patterns and the teacher's perceptions of the child [67], but these may be biased. Nevertheless, prior research in this area used the same measure in the same context [68–70]. Therefore, we recommend that in addition to the direct measures of behavioral problems and academic achievement, future research should consider undertaking direct observation of the child's social skills and problem behaviors. Second, these measures were standardized 25 years ago. Current standards would indicate that the test would be more appropriate within a 10-year time period. Third, the current study involved a group of LD students who were treated as homogenous group. It is possible that the results would have been different for the variables that were examined if the heterogeneity of the LD sample had been considered in terms of the specific learning disorders comprising the LD sample.

The uniqueness of the current study relies on the inclusion of motor components as part of a model that explains academic achievement and social function. While earlier studies examined the relationships between various variables and academic achievements [41] or social functioning [26,38], we weaved them all into one comprehensive model that illustrated the relationships among the variables and the outcomes sought. The bigger picture that the model gives us reflects the understanding that there is a valid reason for the controversy that still exists concerning which dimensions of children's development should be emphasized. While policy makers focus on academic achievement, early childhood educators emphasize social skills and behavior, which can be justified in their own right because they both contribute to academic success [71].

In summary, our study proved that behavioral skills and social functioning are antecedents of academic success from the first to the fifth grade of elementary school. Such important data suggest that for some children interventions should begin as soon as they start their first year of elementary school. Determining the relative contribution of each variable to children's academic achievement is important, as this can help identify the skills on which early education programs should focus. School interventions should include careful examination of different profiles of behavioral problems in terms of internal/external behavioral problems and their unique effect on academic performance and social functioning. In addition, it is important for educators to identify student and environmental characteristics that can be modified in school practice to promote better academic performance.

7. Practical Implications

Given that appropriate behavioral skills are a protective behavior, developing early identification programs and methods to enhance positive behavioral skills in school classrooms are essential. Moreover, since we found that students with LD are at higher risk than their peers of developing socio-emotional problems, the application of socio-emotional learning programs is suggested. Such programs encompass interventions for improving socio-emotional skills, which, according to the Collaborative for Academic, Social and Emotional Learning organization [15], as mentioned by Pereira and Marques-Pinto [72], cover several domains: self-awareness, social awareness, self-management, relationship skills, and responsible decision-making. Likewise, schools should empower children with low academic achievements. It seems that applying an interdisciplinary intervention approach implemented by professional staff, along with personal and academic support provided by homeroom teachers, may be especially important for students with LD. Since homeroom teachers have a great influence on students, in-service workshops should be required for

developing awareness regarding their approach toward students in general and toward students with LD in particular.

It is recommended that schools include fine motor skills subject to a time constraint in the evaluation of children's preparedness for school, as well as in the first years of elementary school and at the beginning of each school year, in order to detect the children at risk of low academic achievement and low social functioning.

A major concern that arose from the current study's results is the issue of decreasing the gap between teachers' knowledge and their efforts to have the same attitude towards boys' and girls' behavior and activities. If we want to increase gender equality, workshops should be integrated into teachers' professional development and teacher education programs so that this goal will be achieved at last.

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