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Development and Validation of Screening Tool for Identification of Slow Learners

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Abstract

This study aimed to develop and validate a screening tool for the identification of slow learner students studying in special needs schools of Punjab. For this purpose, a systematic scale development procedure was adopted. The first phase of the study involved item generation through literature, focus group discussions, and interviews. The content validity index was established using the Lawshe approach followed by a pilot study. Further, construct validity was established through exploratory factor analysis (EFA) on a sample of 356 students with an age range of 6 to 15 years (M = 10.70, SD = 2.24) recruited from different regions of Punjab. EFA resulted in 37 items distributed into four domains namely, cognitive skills domain, academic performance domain, social skills domain, and emotional and behavioral problems. The Cronbach alpha indicated excellent internal consistency of the items (α = 93). In study two, the four-factor structure was validated with an independent sample of 403 slow learners. The confirmatory factor analysis revealed a good model fit to the data; thus, all 37 items were retained. The contrasted groups approach was used to establish the criterion-related construct validity of the screening tool. The results showed that the screening tool can effectively distinguish between slow learners and normal children. This study provides valuable insights into the characteristics of slow learners in our cultural context and presents a comprehensive screening tool that can be utilized by institutions to help identify and support slow learners.

***Keywords*:** confirmatory factor analysis, criterion-related construct validity, exploratory factor analysis, slow learners, screening tool

Introduction

Slow learning is a condition significantly marked by poor cognitive functioning, struggles with mental organization, an inability to generalize

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learned material across different situations, and the need for increased practice to comprehend academic concepts (Shaw, 2022). These students often face continuous academic problems and may not meet the eligibility criteria for enrollment in specialized education institutions that are dedicated to various developmental disabilities, such as physical, visual, and hearing impairments, as well as intellectual disabilities. They are hence typically put in the regular classrooms of mainstream schools or in special education institutes that are specifically structured to meet the exclusive learning needs of slow learners (Cheon, 2024).

Absence of clear standards for defining slow learners is a significant challenge for psychologists and teachers working in institutions that serve these students. The existing standard and classification systems and support systems designed to help these learners are often ineffective and, in other cases, counterproductive. In line with this, such children have been subject to discrimination, isolation, and neglect by various stakeholders in learning institutions in the past (Malik et al., 2012).

Empirical literature has also revealed unique characteristics of slow learners, who are also known as individuals with borderline intellectual functioning, whose intelligence quotient is usually between 75 and 90 (Shaw, 2010). These individuals often have a low level of concentration, poor memory, difficulty in abstract and conceptual thinking, and limited expressive language skills (Korikana, 2020). Their difficulties also include reading, writing, and academic performance, which are mostly due to the lack of executive functions and working memory (Peltopuro, 2014). In cases where these learners are put in general education schools, and if they fail to meet the expectations of an ordinary classroom, they may opt to discontinue their education. The persistent struggle to achieve academic objectives at the beginning of the schooling period often leads to academic hindrances and failure (Hassan & Mahmud, 2018). This cycle of academic frustration and disappointment is repeated every time, despite the students' earnest efforts to achieve their goals. As a result, slow learners end up pushing aside their academic ambitions after years of cumulative struggles and disappointments. In a classroom setup, these students have been perceived to be demotivated, and they are wrongly termed as being lazy. These attributions also increase the obstacles they experience when seeking the right support and interventions.

Moreover, the literature highlights the occurrence of socio-emotional

and behavioral challenges in slow learners, generally explained by their intellectual limitations (Korikana, 2020; Shaw, 2008). Slow learners usually engage in activities that are below grade level and thus find it difficult to adjust in mainstream classrooms. These problems are aggravated by a lack of fundamental skills, such as poor self-concept and communication skills, insufficient coping mechanisms, and a misperceived social role. As a result, these learners are more vulnerable to a range of psychosocial issues (Daga & Jain, 2022; Malik et al., 2012), which often lead to social isolation and decreased self-esteem (Gigi et al., 2014). The interdependence of these aspects clarifies the complex link between cognitive limitations and socio-emotional well-being in the context of slow learners. Acknowledging such multi-dimensional challenges, it is vital to develop effective interventions and support mechanisms that are highly personalized to address their various needs.

The literature reveals that while addressing the needs of children with borderline intellectual functioning or those who can be classified as slow learners, theories of Piaget (1970), Erikson (1950), and Vygotsky (1978) are especially valuable (Miller, 2022). The basic processes of how children create meaning and internalize their images of the surrounding world have been explained in the framework developed by Piaget, but the viewpoint of Vygotsky (1978) predicts the crucial place of sociocultural interactions in the process of cognitive development. In contrast, the theory of Erikson (1950) focuses on how social and emotional determinants affect the developmental patterns. Based on these theoretical frameworks, researchers have developed various models that aim to understand slow learners and risk factors that are associated with them. The most widely used model is Shaw's model, which explains the association between slow learners and mental illnesses. Shaw (2000) defines the borderline intellectual functioning of slow learners in relation to their developmental tasks. Besides, the model explains how the lack of ability to accomplish the tasks can lead to mental health hazards for slow learners.

The prevalence rate of slow learners across the globe is between 7 and 13 percent (Hassiotis et al., 2017; Karande et al., 2019). Nevertheless, the prevalence rate of slow learners in Pakistan is undetermined. However, the enrollment ratio of slow learners is the third-largest percentage of enrolled students (11%) among different disabilities in the government special-

education institutions of Punjab. Currently, thirty-six institutions in Punjab provide educational facilities to slow learners. Though the lack of standardized diagnostic criteria prevents proper identification and categorization of suspected cases. The eligibility criteria for admission to a slow learners' institution generally rely on past academic achievements or grade failure, which is often deceptive. This approach overlooks contextual factors, such as socio-economic disadvantage, less exposure to the environment, parental attitudes about the importance of education, and intermittent poor-quality education, which may falsely increase the ratio of students who have been incorrectly labeled as slow learners (Chaudhry, 2019). Similarly, Afzal et al. (2021) indicated that the scarcity of efficient screening tools is an important deterrent to assess the prevalence rate of slow learners in Pakistan.

To identify slow learners, a number of intelligence and development assessment tests have been used by practitioners and researchers. Among them are Raven Colored Progressive Matrices (Raven et al., 1977), Slosson Intelligence Test (Slosson, 1963), Battelle Developmental Inventory-2 (Newborg, 2005), Clinical Evaluation of Language Fundamentals-Fifth Edition (Wiig et al., 2013), the Developmental Indicators of Assessment of Learning-Fourth Edition (Mardell & Goldenberg, 2010), and the Academic Evaluation Scale for Slow Learners (Karishnakumar et al., 2011). However, these tools were not meant to specifically screen out slow learners or to be used in varying cultural contexts, especially in Eastern culture. In Pakistan, Mahmood (2017) developed a detailed screening proforma to be used with slow learners in institutions across Punjab. However, this proforma did not have any known psychometric properties, and it was too lengthy, which posed difficulties for the educators and psychologists who had to administer it.

Given these shortcomings, it is essential to recognize the unique learning needs of slow learners and to develop an integrated approach to identifying and enhancing their functional capacities. Similar conclusions have been made by researchers who have recognized the possible drawbacks of using the assessment tools designed in different cultural and language contexts, because such a method can overlook the intricate interaction between the cultural experiences and the psychological expression (Batool, 2016; Clark & Watson, 2016). The use of assessment techniques based on different cultural backgrounds might also lead to

unreliable findings and raise the question of the trustworthiness of the research (Kelley-Quon et al., 2019). As a result, to ensure the practicality of any assessment tool, researchers should prove the construct validity of a tool in the indigenous cultural context of the target population (Karamat et al., 2022).

In view of the above issues, the authors felt a need to develop a suitable screening instrument tailored to Pakistani culture to identify slow learners. The aim of the present study is to develop a robust multidimensional screening tool that is culturally adapted and inclusive. In understanding the construct of slow learners in an indigenous manner, it is anticipated that it will be an effective and authentic tool.

Objectives

The following are the objectives of the study:

- To develop an indigenous tool to screen out the slow learners.
- To establish construct validity and other psychometric properties of a newly developed screening tool for the identification of slow learners.

Method

The current research comprised of three studies. In study 1, screening tool for the identification of slow learners was developed, and factor structure was explored. In study 2, the factor structure of screening tool was examined and validated through confirmatory factor analysis. In study three criterion related validity was examined through contrasted group approach.

Study I: Development of Screening Tool for Identification of Slow Learners

Study I was carried out in three phases. In phase I, an item pool was generated, whereas in phase II, expert validation and a pilot study were conducted. In phase III, establishment of construct validity of screening tool for identification of slow learners was done.

Phase I: Item Pool Generation

To generate an item pool, a mixed method approach was used including a literature review, focus group discussions, and semi-structured interviews with parents. First, extensive literature was reviewed to identify

the characteristics of slow learners by consulting qualitative and quantitative research articles available on different research engines. Next, the interview protocol was prepared by a team of researchers to conduct focus group discussions and semi-structured interviews keeping in view the general characteristics of slow learners identified through the literature review. In the second step, two focus groups were conducted. The first focus group was conducted with psychologists (N = 20), while the second focus group was conducted with educators (N = 15) working in government institutes for slow learners in Punjab. For group discussions, psychologists and educators who had at least three years of working experience with slow learners and were currently posted in slow learners' institutes throughout Punjab were invited to participate. All participants actively participated and shared their valuable experiences and observations regarding the characteristics of slow learners.

In the third step, semi-structured in-depth interviews were conducted with parents of slow learners. For this purpose, the heads of the two slow learners' institutes in Lahore and Faisalabad were approached. They were briefed about the purpose of the study and requested to arrange interviews with parents of slow learners. A total of 13 interviews were conducted with parents (5 fathers & 8 mothers). Those parents were recommended by class teachers based on their students having characteristics of slow learners. The teachers recommendations were used to ensure that parents of children with learning disabilities did not participate. All the interviews were conducted individually with written consent. Moreover, informed consent was also taken from all group discussion participants to take audio recordings, and they were also ensured about the confidentiality of the data gathered and their right to withdrawal from the study anytime. Later, interviews and focus group discussions were transcribed and major themes were derived using thematic analysis (Braun & Clarke, 2006). The major themes were labeled as comprehension issues, short attention span, poor problem-solving, poor memory, lack of motivation, difficulty in generalizing learned concepts, poor social interaction, stubbornness, low self-esteem, frustration, sluggishness, etc. After thoroughly analyzing the above-stated themes, 84 items were generated. A 4-point response format was set for all developed items with response categories 0 = *never*, 1 = *sometimes*, 2 = *often*, and 3 = *always*.

Phase II: Expert Validation

After preparing the list of 84 statements of the item pool for the Slow Learner's Screening Tool in its initial format, it was presented to eight experts. This expert panel was comprised of clinical psychologists, school psychologists, and professionals having M.Phil. and Ph.D. degrees in relevant fields. After a thorough review of the statements by experts, certain items were removed and refined because they contained unclear concepts, overlaps, or inappropriate wording. Additionally, some similar statements were combined. As a result of this process, 73 items were finalized for a screening tool designed for slow learners.

In the next step, the content of items was finalized by presenting them to another panel of experts (i.e., two clinical psychologists, two psychologists working at slow learners' institutes, and two Ph.D. research experts who had experience with the research problem). Lawshes (1975) criteria were used to validate the content of the screening tool. They were asked to review and rate the appropriateness of each statement using a three-point scale including essential, useful but not essential, or not necessary. The content validity of the screening tool was assessed through the item and scale content validity index (I-CVI & S-CVI). To calculate the item content validity index (I-CVI), the number of experts rating each item was divided by the total number of experts. The scale content validity was obtained by averaging item content validity indexes. The screening tool has an overall good content validity ratio of .89 for S-CVI and .8 to .1 for I-CVIs respectively (Polite & Beck, 2006). It indicated a good item relevancy to the content of the screening tool for slow learners suggested by Lawshe table (Ayre & Scally, 2014).

Pilot study. The initial form of screening tool was administered to a sample of slow learner children (N=50) consisting of 48% boys and 52% girls with an age range of 6-15 years (M = 10.12, SD = 2.14). They were conveniently selected from five institutes of slow learners located in different cities of Punjab including Lahore, Nankana Sahib, Sahiwal, Okara, and Pakpatan. For each participant**,** a rating on the screening tool was done by their concerned class teacher. Teachers were informed about the purpose of the pilot study and were requested to rate those students whom they considered to have characteristics like slow learners. At this step, assumptions of normality were assessed through skewness and kurtosis. The skewness value was -.32 and Kurtosis value was -.27 which

were in acceptable rang (The acceptable skewness value is 3 and kurtosis value >10, Kline, 2015), and the preliminary Cronbach alpha reliability was .96, which is excellent.

Phase III: Establishing Construct Validity through Factor Analysis

To establish the construct validity of the scale, exploratory factor analysis technique using principal component analysis and Varimax rotation was applied.

Sample. The province of Punjab is the most populous region and is geographically diverse. Additionally, slow learners' institutes are situated in every district of Punjab. Therefore, to obtain a representative sample, the cluster sampling technique was employed. Using this technique, a sample of 356 participants was surveyed. The age range of the participants was 6 to 15 years (M = 10.70, SD = 2.24) and were enrolled in grades one to five. To reach the target population, first, the province of Punjab was divided into three regions: central Punjab, south Punjab, and north Punjab. In the next step, two divisions from central Punjab (Lahore & Gujranwala) and south Punjab (Multan & Bahawalpur) and one division from north Punjab (Rawalpindi) were randomly selected. From given institutes, participants conveniently selected from each grade for data collection. Participants having any visible physical or intellectual disability were excluded from the sample. Further, participants enrolled in intellectual disability class at special education centers before being admitted in slow learners' institutes were also excluded. The demographic characteristics of the sample are given in Table 1.

Table 1

Demographic Characteristics of Sample (N =356)

Variables	*f (%)*	*M(SD)*
Students' Age (6-15 Years)		10.70(2.24)
Students' Gender		
Boys	175(49.2)	
Girls	181(50.8)	
Grade		
One	84(23.6)	
Two	70(19.7)	
Three	66(18.5)	

Variables	*f (%)*	*M(SD)*
Four	64(18.0)	
Five	72(20.0)	
Family System		
Nuclear	223(66.0)	
Joint	121(34.0)	
Monthly Family Income		27786(14308.84)

Instruments. To collect the data, a biographical information sheet and an initial form of a screening tool for slow learners developed during phase I was used. This screening tool was comprised of 73 items with a four-point Likert-type response scale (0 = *never*, 1 = *sometimes*, 2 = *often*, and 3 = *always*).

Procedure. First, permission was sought from the concerned authority at the Department of Special Education, Punjab to conduct a study. Then randomly selected slow learners' institutes working under the jurisdiction of the special education department were contacted officially for data collection. All concerned heads of the institutes were sent a study protocol along with a cover letter explaining the topic and purpose under investigation. Later, zoom meetings were conducted with concerned class teachers to brief them about the purpose of study and procedure to fill the checklist. Class teachers rated a screening tool for at least five students from their respective class. In each institute, only those teachers took part in this exercise who had at least three years of teaching experience with slow learners. Before collecting data, class teachers took written consent from parents, and they were assured of confidentiality and anonymity. Any difficulty encountered by the class teachers during data collection was entertained through a telephone conversation by the principal author. A total of 450 questionnaires were received by selected institutes, out of which 356 forms were found complete and usable for data analysis. Thus, the response rate was 79%.

Results

Exploratory factor analysis was run to determine the factor structure of the screening tool. A principal component analysis technique with Varimax rotation was used. The value of Kaiser-Meyer-Olkin (KMO) indicated sample adequacy through its value which was .94 (Kaiser, 1970). Bartlett's test of sphericity was also significant ($\chi^2 = 171.39$, $p < .001$) indicating

adequate size of correlation to run a factor analysis. The initial factor solution converged into 13 factors with eigenvalues greater than 1.0 using Kaiser criteria. Nevertheless, four factors were retained based on eigenvalues greater than 1.0, and theoretical relevance. Moreover, Monte-Carlo parallel analysis was also run to confirm chosen factors based on the eigenvalues (>1) greater than the values from parallel analysis (Wismeijer, 2012). The final solution indicated four factors comprising 37 items with factor loading ≥ .40 exclusively on one factor. The accumulated variance for chosen factors was 49.34% and inter-item correlation ranged from .38 to .61 (see Table 2). The factors identified through factor analysis are mentioned in table below.

Table 2

Factor Loadings for Exploratory Factor Analysis of Screening Tool for Identification of Slow Learners (N = 356)

Factors and Item Number	Factor Loading				
	1	2	3	4	r_{it}
Factor 1: Cognitive Skills Domain					
2	.77				.54
1	.75				.55
3	.71				.55
4	.71				.55
5	.70				.61
6	.58				.53
9	.57				.53
7	.55				.54
11	.53				.50
14	.46				.55
10	.42				.53
Factor 2: Academic Performance Domain					
26		.65			.51
27		.64			.50
30		.64			.53
31		.62			.53
25		.62			.53
29		.52			.48
34		.43			.54
Factor 3: Social Skills Domain					
47			.85		.47

Factors and Item Number	Factor Loading				
	1	2	3	4	r_{it}
48			.84		.49
45			.78		.53
44			.75		.47
51			.71		.52
46			.70		.48
50			.70		.62
55			.59		.57
54			.54		.60
Factor 4: Emotional & Behavior Problems					
64				.87	.43
65				.85	.40
67				.79	.40
61				.76	.49
63				.76	.39
62				.74	.48
59				.74	.50
60				.74	.54
66				.70	.44
71				.46	.53
Eigenvalues	22.80	6.60	4.64	1.98	
% of variance	31.24	9.04	6.35	2.71	

Factor 1: Cognitive Skills Domain (CSD). It consists of ten items that measure the extent to which slow learners lack their cognitive capacities. It entails difficulty in understanding concepts, difficulty in doing complex tasks, failing to use one learned skill to solve another problem, and difficulty following two or more instructions at a time.

Factor 2: Academic Performance Domain (APD). It consists of seven items that describe the difficulties faced by slow learners in the academic domain. The items in this domain entail difficulty in pronouncing words correctly, and difficulty combining two or more words to form a sentence compared to average students.

Factor 3: Social Skills Domain (SSD). It consists of 9 items and is related to the social skills of slow learners. It describes how they socially interact with others, the nature of friendships, and the self-confidence they have.

Factor 4: Emotional and Behavioral Problems (EBP). It consists of ten items that are relevant to emotional and behavioral problems exhibited by them such as having more complaining behavior than normal children, teasing other fellows for no reason, and wasting time in other activities (like frequently going to the washroom and drinking water) to avoid studying during school time.

To determine the internal consistency of the retained factors of the Screening Tool for Identification of Slow Learners, the reliability analysis was run. Table 3 shows the Cronbach's alpha coefficients and descriptive statistics of the screening tool and its sub-domains. Cronbach's alpha reliability of all four domains ranges from α = .87 to α .92 that are excellent and supported the construct validity of the tool.

Table 3

Descriptive Statistics of Screening Tool for Identification of Slow Learners (N = 356)

Tool and Sub-domains	*k*	*M(SD)*	Range		α
			Potential	Actual	
Cognitive Skills Domain	11	35.62(5.79)	0-33	7-33	.92
Academic Performance Domain	7	22.50(3.82)	0-21	4-21	.87
Social Skills Domain	9	24.46(6.43)	0-27	0-27	.91
Emotional & Behavioral Problems	10	23.58(7.32)	0-30	0-30	.92
Full Score	37	106.17(16.76)	0-111	14-111	.93

Table 4

Inter-correlation among Screening Tool and its Sub-Domains (N = 356)

Variables	1	2	3	4	5
1. Total Screening Tool	-	.78**	.73**	.73**	.65**
2. Cognitive Skills Domain		-	.70**	.50**	.19*
3. Academic Performance Domain			-	.36*	.28*
4. Social Skills Domain				-	.22*
5. Emotional & Behavioral Problems					-

Note. *$p < .05$ **$p < .01$.

Further, to support the internal consistency of the screening tool, Pearson Product Moment correlation among sub-scales was computed. Results in Table 4 indicate significant and positive correlations among all sub-scales of the screening tool. The relatively small but significant magnitude of correlation for sub-scales compared to full-scale score indicates that sub-scales represent distinct aspects of a screening tool for slow learners.

Study II: Confirmatory Factor Analysis

In study II, the measurement model of the screening tool was confirmed using AMOS version 21.0 to ensure the factor structure and dimensionality of the screening tool which was explored in the EFA during study I.

Sample. For confirmatory factor analysis, Haier et al. (2010) criteria for sample size were followed which is 10 cases per parameter. The sample of the study comprised of 403 students (206 boys & 197 girls). The participants were slow learners from different government institutes for slow learners located in various regions of Punjab. The age of the participants ranged from 6 to 15 years (M =10.21 & SD = 2.43). The sample was recruited from government institutes for slow learners located in five divisions of Punjab (Sargodha = 83, Sahiwal = 96, Dera Ghazi Khan = 76, Rawalpindi = 64, and Faisalabad = 84). Only those participants were selected for data collection who had no visible physical and intellectual disability and were attaining education in slow learner institutes for at least one academic year.

Measures. A 37-item screening tool was used in study II which was retained after exploratory factor analysis in study I. The items were rated on a four-point Likert-type scale (0 = *never*, 1 = *sometimes*, 2 = *often*, & 3 = *always*).

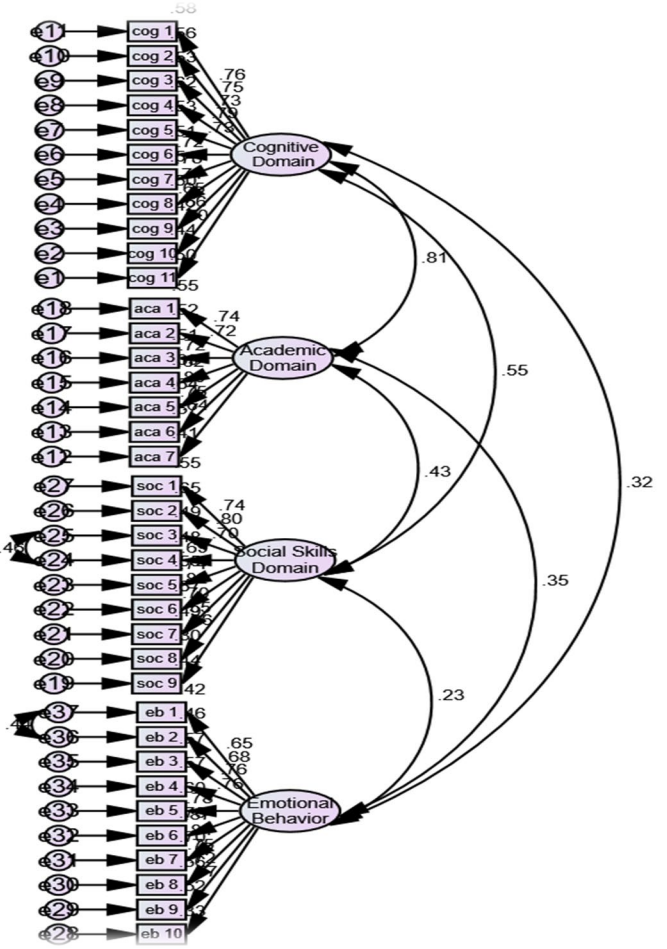
Procedure. The data were collected from the slow learners' institutes of said divisions of Punjab. The heads of the institutes were contacted through telephone calls and were explained about the nature and purpose of the study. Then zoom meetings were conducted with class teachers on designated days and times. Teachers were briefed about the study protocols and time duration to collect the data. First, class teachers took informed consent from the parents of selected students then they rated the screening tool for their students. Each teacher filled in at least four forms

from their class. All contacted parents gave permission to their children to take part in this study.

Results

Figure 1

The Model Presents the Factor Structure of Slow Learners' Screening Tool with Four Domains (Cognitive Domain, Academic Domain, Social Skills Domain, & Emotional Behavioral Domain)



To assess the measurement model, the model was developed based on 37 items distributed into four dimensions which results from exploratory factor analysis. Results of CFA showed a good fit. None of the items were

deleted from the final model due to low factor loadings (see Table 5). The proposed model displayed model fit indices [χ^2 (df = 621) = 1443.13, p =.000, $\chi 2$ / df = 2.32, CFI = .91, GFI = .83, RMSEA = .057, SRMR = .066]. According to Kelloway (1998), when the p-value for $\chi 2$ is significant at .05 and above, the model is an exact fit as it is significant at p < .000. The higher indices values (between 0 & 1) except RMSEA and SRMR indicate a better fit (Chow et el. 2001) The value of RMSEA and SRMR in the current study also indicated a fair fit to data. The values for CFI and GFI were also in acceptable ranges. These values showed an acceptable fit for the four-factor model.

Cronbach's alpha reliability was calculated for this sample. The results showed the overall screening tool (α = .94) and its sub-domains, including the cognitive skills domain (α = .92), academic performance domain (α = .87), social skills domain (α = .90), and emotional and behavioral domain (α = .92) are excellent reliabilities.

Table 5

Factor Loadings of Screening Tool from Confirmatory Factor Analysis (N = 403)

Factors and Item No.	λ	Factors and Item No.	λ
Cognitive Skills Domain		Social Skills Domain	
2	.76	47	.69
1	.75	48	.74
3	.73	45	.81
4	.79	44	.74
5	.73	51	.70
6	.72	46	.70
9	.73	50	.82
7	.71	55	.66
11	.65	54	.55
14	.66	Emotional & Behavioral Problems	
10	.71	64	.87
Academic Performance Domain		65	.84
26	.72	67	.72
27	.72	61	.76
30	.79	63	.78
31	.75	62	.76

Factors and Item No.	λ	Factors and Item No.	λ
25	.74	59	.65
29	.62	60	.68
34	.64	66	.75
		71	.58

Study III: Criterion related Validity of Screening Tool for Identification of Slow Learner

To assess the criterion-related construct validity of a newly developed screening tool for the identification of slow learners, a contrasted group method approach was employed. For this purpose, a group of slow learner students (N = 203) were randomly taken from different government institutes for slow learners in Punjab. The sample was comprised of both girls (n = 103) and boys (n = 100) and they were enrolled in classes one to five at the time of study.

A comparison sample was comprised of 203 normal students studying in general education schools in the city Lahore and Faisalabad. These students were matched with slow learner students regarding their gender and classes. A chi-square was run to compare the students from slow learner institutes and general education schools on said variables. The result of the chi-square in Table 6 indicated that gender wise distribution and class wise distribution in both types of school was same (χ^2 (df = 4) = .00).

Table 6

Distribution of Participants According to Gender and Classes in General Education and Slow Learners Institutes (N =406)

Variables	School Type				χ^2
	General Education		Slow Learners		
	n	%	n	%	
Gender					
Boys	100	49.26	100	49.26	.00
Girls	103	50.74	103	50.73	
Classes					
One	47	23.15	47	23.15	
Two	38	18.72	38	18.72	.00
Three	40	19.70	40	19.70	

Variables	School Type				χ^2
	General Education		Slow Learners		
	n	%	*n*	%	
Four	34	16.75	34	16.75	
Five	44	21.67	44	21.67	

To further compare the students from the two groups, a t-test was run to assess the differences between their age, percentages of marks obtained in the last exam, and different domains of screening tool.

Table 7

Comparison of Slow Learner Children and Normal Children on Demographics and Study Variables

Variables	Slow Learner Students (*n* = 203)	Normal Students (*n* = 203)	*t*(404)	*p*	Cohen's *d*
	M(SD)	*M(SD)*			
Children' age	11.42(2.44)	9.47(1.72)	9.33	<.001	0.01
Marks' Percentage	47.89(12.12)	83.45(16.55)	-24.69	<.001	2.45
Cognitive Skills Domain	25.72(5.33)	5.62(5.72)	36.65	<.001	3.64
Academic Performance Domain	16.06(3.57)	3.88(3.48)	34.82	<.001	3.46
Social Skills Domain	17.62(5.77)	3.37(3.56)	29.94	<.001	2.97
Emotional & Behavioral Problems	15.04(7.28)	3.90(3.68)	19.46	<.001	1.93
Full Score	74.44(15.22)	16.77(13.08)	40.95	<.001	4.06

First, an assumption of equality of variances for the t-test was checked with Levene's test. Significant difference in the variances was found in the groups except for cognitive skills domain and academic performance domain. Thus, t-value assuming inequality of the variances was used for these variables.

According to the findings presented in Table 7, there were significant differences between two groups of children. The slow learner children

were found to be older than the normal children. Additionally, there was a significant difference in the percentage of marks received by both groups in their last academic exams. The group of slow learner children scored significantly lower marks compared to the normal children. Besides, the results showed that the slow learner group scored significantly higher than the normal children group in four domains of the screening tool, as well as in its full score. Thus, it is concluded that a screening tool for the identification of slow learners is a valid tool to screen out the slow learner students.

Discussion

Three independent studies were designed to develop and validate a screening tool for slow learners. To construct a linguistically and culturally relevant tool, items were empirically generated with the help of focus group discussions, literature reviews, and interviews. The construct validity was established through exploratory factor analysis with the Varimax rotation method. It resulted in 37 items distributed into four dimensions namely cognitive skills domain, academic performance domain, social skills domain, and emotional-behavioral domain. Cronbach alpha reliability of four domains indicated that the screening tool is internally consistent. The significant items total correlations and Pearson product-moment correlation among domains also proved that the newly constructed tool is psychometrically sound. In study II, the factor structure retrieved from EFA was confirmed through CFA on an independent sample of slow learners. Results from CFA confirmed a similar four-factor structure as in EFA.

The four domains of newly developed screening tool indicate that slow learners in our culture not only lag in their cognitive skills, but encounter difficulties in other domains like the academic domain, social skills domain, and emotional-behavioral domain. Previously, most researchers have focused on the cognitive characteristics of slow learners and have proposed educational work frames to enhance their cognitive abilities (Azzahra & Herman, 2022; Juleha et al., 2021; Malik et al., 2012). However, the findings of the current screening tool highlight the significance of truly representing the diverse nuance of once culture. It involves a comprehensive approach to evaluate slow learners, taking into account various dimensions of their learning profiles, whether they fall under mild, moderate, or severe levels of slow learners. The subscales of

the current screening tool, namely “Social Skill Domain” and "Emotional and Behavioral Problems", were not assessed in previous studies, such as the Academic Evaluation Scale of Slow Learners by Karishnakumar et al. (2011), or even in studies conducted in Western cultural settings. The challenges that the social skills domain includes are illustrated in statements such as “Avoiding interacting with people and being unwilling to talk to them” and “Feeling inferior to others. On the other hand, emotional and behavioral issues are illustrated by statements such as “Participating in unnecessary activities such as going to the bathroom or drinking water frequently to avoid studying in school hours” and “Not taking care of personal belongings”.

The first dimension of the screening tool, “Cognitive Skills Domain,” is associated with problems in performing complex tasks, following multiple instructions simultaneously, and generalizing learned skills to solve new problems. The second dimension explains the issues associated with the academic performance in the classroom, such as phonological mistakes and the integration of several words to form proper sentence structure, compared to a typically developed child. These subscales find support in the cognitive-developmental theory of Piaget (1970), which argues that children are born equipped with primary mental structures called schemas that help them to integrate the elementary pieces of knowledge into progressively more complex constructs at subsequent stages of development. Slow learners often face difficulties in integrating the already learned skills with new skills, a process which often leads to learning problems in the classroom (Yilmaz, 2011). However, empirical research revealed that cognitive-therapy interventions can improve the memory abilities of elementary-school students who are deemed slow. It has offered a promising approach toward supporting their educational developments (Adawiyah & Daulay, 2022; Alawiyah & Supriatna, 2022).

The last two dimensions of the screening tool focus on social skills and emotional and behavioral issues experienced by slow learners. Developmental psychologists recognize the significant relationship between intellectual functioning and the acquisition of developmental skills. It is widely accepted that there is a strong interplay between environmental factors and a person’s typical functioning, which ultimately determines their success in social interactions. Erikson (1950) emphasized the importance of cultural and social aspects of life and described how

social experiences impact individuals throughout their lifespan. He proposed that life consists of a series of lessons and challenges that contribute to personal growth across various stages. Additionally, Vygotsky (1978) argued that when learning aids are provided in a way that connects to a childs cultural context, the effects on their developm ental skills become significantly more pronounced. The results of the current study align with the findings of Trisnani (2023) and Davies et al. (2021), who identified a connection between learning disabilities, low self-esteem, and difficulties in peer relationships among slow learners. Additionally, Escobar (2021) supported these findings, noting that slow learners often face challenges such as rejection, bullying, and social exclusion in their school environments. Addressing these issues can foster a more inclusive and supportive educational atmosphere, helping all students thrive socially and academically. They need comprehensive intervention services to excel in all spheres of life whether it is cognitive, academic, social, or emotional-behavioral. This nuanced screening process ensures that educational strategies are tailored effectively to meet their unique needs.

The last two dimensions of the screening tool focus on the social skills and emotional-behavioral issues, which are typical of slow learners. Developmental psychologists agree that there is a significant association between cognitive functioning and developmental skills acquisition. It is broadly accepted that there is a strong interplay between the environmental determinants and normative functioning of an individual, which eventually determines success in a social interaction. Erikson (1950) emphasized the importance of the cultural and social aspects of life and explained how the sociocultural experiences influence people throughout their lifespan. According to him, life is a series of lessons and challenges that enable an individual to grow in different phases. Besides, Vygotsky (1978) suggested that the impact of learning aids on the process of developing the skills is significantly increased by aligning it with the cultural context of a child. The current results correlate with those in the study by Trisnani (2023) and Davies et al. (2021), who also found a correlation between learning disabilities, low self-esteem, and peer relationship problems among slow learners. These findings are also supported by Escobar (2021), who observed that slow learners often face the problem of rejection, bullying, and social exclusion at school. Reducing these issues can cultivate a more inclusive and supportive learning environment and help students flourish both socially and

academically. Moreover, such students will need holistic intervention services to thrive in all areas of life, such as cognitive, academic, social, and emotional-behavioral spheres. Such subtle screening processes ensure that education approaches are precisely designed to address the unique needs of slow learners.

Limitations and Suggestions

During the data collection process, it was not possible to assess the Intelligence Quotient (IQ) of the study sample because standardized indigenous IQ tests were not available in slow learner institutes. To overcome this limitation, the marks obtained by slow learner children in their most recent academic exams were obtained and compared to a contrasted group of normal children. However, it is recommended that in future studies, an assessment of the IQs of slow learners should be conducted to address this limitation. Further, this study aimed to develop a screening tool for identifying slow learners in government institutes for slow learners across Punjab. However, it is suggested that future studies should focus on expanding the screening to slow learners in general education schools at the primary and middle levels. Also, the data for this study was only collected from the province of Punjab, which may limit its generalizability across Pakistan. To overcome this problem, it would be useful to apply the newly developed screening tool in different parts of Pakistan to determine whether the characteristics of slow learners are similar in the whole country.

Implications

The current study includes both theoretical and practical implications. Theoretically, it adds to the special education and school psychology fields by providing detailed knowledge on the characteristics that are related to slow learners. On a practical side, it has significant implications for the promotion of special needs advocacy in the Pakistani cultural setting. This study can guide special educationists, school psychologists, counselors, and policymakers in the identification of the exact educational challenges experienced by slow learners in this environment.

Conclusion

The development of the current screening tool has set a major milestone in the Department of Special Education, Punjab, to screen out students with sub-average cognitive abilities. This tool is expected to play

a significant role in shaping the profile of slow learners. It has shown good reliability and validity, suggesting that it may be effective in deriving the distinguishing features of the slow learners. This information can be used to come up with improved educational approaches and hence maximize the best learning experience of this population.

Author Contribution

Nosheen Ramzan: conceptualization, data curation, investigation, formal analysis, methodology, writing – original draft. **Tariq Mahmood Malik:** conceptualization, data curation, investigation, methodology. **Khaula Munawar Minhas:** conceptualization, data curation. **Iram Fatima:** data curation, formal analysis, writing – review & editing.

Conflict of Interest

The authors of the manuscript have no financial or non-financial conflict of interest in the subject matter or materials discussed in this manuscript.

Data Availability Statement

The data associated with this study will be provided by the corresponding author upon request.

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