

Exploring health literacy in university students with specific learning disorders: An observational pilot study

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ABSTRACT

Background: Diagnoses of specific learning disorders (SLDs) have increased in recent years, as has the number of certified students entering university. From a public health perspective, the potential impact of dyslexia, dysgraphia, dysorthography, and dyscalculia on health literacy (HL) deserves attention. However, empirical evidence on the relationship between SLDs and HL remains limited.

Methods: We conducted an observational pilot study to assess HL levels among students with documented SLDs at the University of Udine (Italy). Between November 2023 and April 2024, participants completed an online self-administered questionnaire collecting sociodemographic data and the European Health Literacy Survey Questionnaire (HLS-EU-Q47), which was used to measure HL.

Results: The study sample consisted of 38 students (mean age: 24 years; 60.5% female). A single SLD diagnosis was reported by 42.1% of participants, whereas 57.9% had two or more co-occurring SLDs. Dyslexia was the most prevalent disorder (71.1%), followed by dysgraphia (52.6%). Overall, 65.8% of students showed problematic or inadequate HL levels. The presence of multiple SLDs was not significantly associated with HL level. Additionally, no significant differences in HL were observed according to the type of SLD or the use of compensatory or dispensatory measures.

Discussion and Conclusions: These preliminary findings support the hypothesis that SLDs are associated with difficulties in accessing, understanding, appraising, and applying health-related information. Future research is



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needed to further substantiate the findings of this exploratory study as well as to clarify their public health implications, particularly in relation to healthcare access, disease prevention, and health promotion.

Key words: health literacy, specific learning disorders, university students, public health

Background

Specific learning disorders (SLDs) are primary, lifelong conditions reflecting neurocognitive specificities, not secondary to sensory disabilities, neurological diseases, or impaired cognitive abilities. Persisting over time, they can primarily affect an individual's instrumental skills required for academic learning and the ability to function in social and occupational contexts, as well as significantly limit certain everyday activities (1). The International Statistical Classification of Diseases and Related Health Problems, 10th Revision (ICD-10) (2), labels SLDs as "Specific Developmental Disorders of School Skills", while, according to the Italian National Institute of Health Consensus Conference (3), they are disorders that affect a specific area of ability while general intellectual functioning remains intact. SLDs are categorized as dyslexia, dysgraphia, dysorthography, and dyscalculia which can occur individually or in combination, and therefore require tailored learning and teaching strategies. More in detail, dyslexia is characterized by specific difficulties in reading fluency, speed and accuracy; dysgraphia by difficulties in handwriting and graphic production related to impairments in motor coordination and spatial organization; dysorthography by deficits in the automatization of phoneme-grapheme conversion processes; dyscalculia is characterized by specific difficulties in the automatisms related to the processing of quantities and numerical calculations (2). In the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition, Text Revision (DSM-5-TR) (4), SLDs are classified as a single general category called "specific learning disorder" within Neurodevelopmental Disorders but require specifiers to indicate the affected domain (i.e., reading, written expression, or numeracy) as well as an indication of the severity level (i.e., mild,

moderate, or severe). Overall, the impacts of SLDs at multiple levels bring to the fore the crucial role of early detection and timely, targeted interventions and support to meet the changing needs of the affected people throughout development from childhood to adulthood (1). In this regard, in Italy, the adoption of Law 170/2010 entitled "New norms regarding specific learning disorders in the educational context" (5) formally and legally recognized SLDs and established criteria for their diagnosis; it was subsequently followed by regional regulations (6). When an SLD is diagnosed, affected students are entitled to supportive educational measures through specific dispensatory provisions and compensatory measures for individualized and personalized educational approaches. This also includes adapted forms of assessment and evaluation, which apply to both university entrance examinations and university exams (3). Overall, such measures help create conditions that support learning processes in students with SLDs, thus fostering their autonomy and self-efficacy. In Italy, according to a report by the Statistical Office of the Italian Ministry of Education (7), respectively 337,602 and 354,569 students were identified as having an SLD in the 2021-2022 and 2022-2023 school years, representing approximately 5.7% and 6% of the total student population, respectively. The highest percentage of students with SLDs was found in lower and upper secondary schools (6.3%). These data suggest that SLDs are often not diagnosed at primary school but at later educational stages, despite their neurobiological origin. Such a late diagnosis may have negative impacts on students' learning trajectories, as they are forced to rely on teaching methods and tools that are inappropriate for their neurodivergence for much of their school career. Therefore, earlier diagnosis allows earlier and more timely interventions to be implemented to more

effectively support students with SLDs. According to the Italian National Agency for the Evaluation of Universities and Research Institutes (ANVUR) report “Students with Disabilities and SLDs in Italian Universities—A Resource to Enhance” (8) for the academic year 2019-2020, a total of 36,816 students with disabilities or SLDs are enrolled in university courses, representing 2.13% of the total student population in Italian universities. Over a period of nine years, the number of students with SLDs enrolled in state universities increased from 983 in the 2011-2012 academic year to 14,441 in the 2019-2020 academic year, thus showing a significant progressive growth. These data reflect the general increase in SLDs diagnoses over time, likely linked to a series of factors, such as greater information on the topic and a more developed associated sensitivity and awareness among families, schools, and professionals, as well as greater and more specific teacher training in this area and the support of national norms and guidelines, which represent a useful framework for identifying, understanding, and managing SLDs. If the current growth trend continues, within a few years, students with SLDs will become the dominant group compared to those with disabilities. This may require an increase in the resources annually allocated to universities for the operation of student support services as well as a review of the current criteria for allocating these resources and a redesign of available services to meet new demands and needs. The distribution of students with SLDs by type of degree programme shows that the majority are currently enrolled in a three-year degree program (81.6%). At the University of Udine, a province in north-east Italy, the prevalence of students diagnosed with SLDs is between 3.5% and 4.5%. In line with the progressive increase in SLDs diagnoses detected at national level (8), since 2011, the number of students with SLDs has shown a steady upward trend, with 409 certified students in the 2022-2023 academic year and approximately 540 currently enrolled. In compliance with Italian law, the University of Udine offers a free reception and support service for students with such disorders through a dedicated office. Through the “Includi Uniud” service, specific assessment and evaluation arrangements are indeed guaranteed for the entire university education and training pathway, including

admission tests and university exams. From a public health perspective, given the well-documented and specific difficulties experienced by students with SLDs and their impact not only on learning processes but also on the performance of daily activities, the urgency of considering the relationship between SLDs and health literacy (HL) emerges. HL is defined as the knowledge, motivation and skills individuals need to access, understand, evaluate and use health information, express their opinions and make everyday decisions regarding healthcare, disease prevention and health promotion, to maintain or improve their quality of life (9). A good level of HL therefore requires the ability to decode, process and understand health-related information, from reading a medical report to navigating the healthcare system to making informed decisions for personal well-being (10). Some of these skills underpinning HL, particularly the ability to read, process and understand information, which are related to both literacy and numeracy, may be compromised in people with SLDs. HL is itself considered a key determinant of health, and poor HL is associated with fewer healthy choices, poor health status, lower participation in health promotion and disease prevention activities, riskier behaviours, higher incidence of occupational accidents, lower ability to self-manage chronic diseases, poorer adherence to treatment, more hospital admissions, higher morbidity, and higher demand on human and economic resources of the healthcare system for patient care. HL should therefore not be conceived as an individual trait but as a relational construct, reflecting the dynamic interplay between people’s abilities and skills and the complexity of the health systems, services, and information they interact with. This relational approach substantiates the concept of organizational HL and lays the groundwork for the development of multi-level HL promotion interventions (11). In the Italian general population, recent data from the 2019 Health Literacy Survey (12), conducted as part of the Action Network for the Measurement of Health Literacy of Population and Organizations (M-Pohl), show that almost a quarter of respondents (23%) have an inadequate level of HL and 35% have a problematic level of HL, meaning that more than half of the population (58%) has limited HL. Despite the role of HL in determining health on the one hand and the

progressively increasing number of people with SLDs, especially students, on the other, to our knowledge, empirical data on HL among university students with SLDs are very limited or absent. In light of this gap, the present pilot study aimed to provide a preliminary exploration of HL levels among university students with documented SLDs at the University of Udine, Italy.

Methods

Study design

POPULATION

This observational pilot study targeted students enrolled at the University of Udine (Italy) during the 2023-2024 academic year who had a documented diagnosis of one or more SLDs and provided informed consent to participate.

Assessment tools

HL was assessed using the most recent Italian version of the 47-item European Health Literacy Survey Questionnaire (HLS-EU-Q47) (10, 12, 13). The HLS-EU-Q47 is a validated self-administered instrument developed in 2012 to measure perceived HL through 47 items rated on a Likert scale. The questionnaire assesses the perceived difficulty of health-related tasks across multiple domains, including accessing, understanding, appraising, and applying health information within three dimensions: Healthcare, Disease Prevention, and Health Promotion. Items address activities such as interacting with healthcare professionals, navigating the healthcare system, understanding information from media and food packaging, searching for health-related information, decision-making, critical thinking, responsibility, confidence, and navigation skills. In addition to the HLS-EU-Q47, the questionnaire included a section collecting sociodemographic and academic information. The variables collected comprised age, sex, living conditions, degree program attended, academic year, academic discipline, number of diagnosed SLDs, timing of the first SLD diagnosis (with reference to the school level at diagnosis), type

of SLD (i.e., dyslexia, dysgraphia, dysorthography, and dyscalculia), and use of compensatory and dispensatory support measures.

Data collection

Data were collected using an online questionnaire administered via the EU Survey platform. Prior to dissemination, the questionnaire was tested for readability and feasibility using a convenience sample. Data collection took place between November 2023 and April 2024. All students registered at Includi UniUD (the University of Udine's dedicated support service for students with disabilities and SLDs; N=409) who had at least one documented SLD diagnosis and able to complete an Italian online questionnaire were invited to participate by email. Additional recruitment strategies included posters displayed in common university areas and reminder emails sent during the data collection period, without any a priori scheduled number or timing. After reading the study information sheet, participants who voluntarily completed the questionnaire provided consent for the use of their data for research purposes. Participation was entirely voluntary and free of charge. No monetary or non-monetary incentives were offered or considered in participant recruitment. All data were collected and analysed in aggregated form to ensure participant anonymity. The study protocol was approved by the Institutional Review Board of the University of Udine, Italy (approval no. 238/2023).

Data analysis

Descriptive analyses were performed on the entire dataset, followed by subgroup analyses based on variables such as sex, age, type of SLD, and degree program. HL was measured using Likert-scale responses and categorized into four levels—inadequate, problematic, sufficient, and excellent—according to the classification adopted in a previous Italian study conducted in the province of Florence (14). HL scores were also calculated for the three domains of the HLS-EU-Q47: Healthcare, Disease Prevention, and Health Promotion. Associations between categorical variables were assessed using the chi-square test or Fisher's exact test,

as appropriate. A p -value < 0.05 was considered statistically significant. For the purposes of the present study, the inadequate and problematic HL groups were merged into the “inadequate/problematic HL” single category, denoting a limited HL level, while the sufficient and excellent HL groups were collapsed into the single category “sufficient/excellent HL”, referring to an appropriate HL level. This dichotomous classification system, which helps in the identification of vulnerable groups of individuals that may benefit from targeted HL interventions, was used in statistical analysis to assess the association of limited and appropriate HL with the independent sociodemographic and academic characteristics of the participants, in agreement with previous literature (15-17). Given the small number of participants, all analyses were considered as exploratory/hypothesis-generating and statistical analyses were performed using IBM SPSS Statistics, version 29.0. AI was not used to generate original scientific content, conduct analyses, or interpret data.

Results

A total of 38 students with SLDs, corresponding to 9.3% of all students with SLDs enrolled at the University of Udine, participated in the study. The mean age was 24 years, and 60.5% of participants were female. Most students (81.6%) were enrolled in a first-cycle three-year degree programme, with the largest proportion attending the third academic year (34.2%). Most respondents were commuters (73.7%), while 26.3% lived away from home for study purposes. All academic disciplines were represented, although with different proportions. Sixteen students (42.1%) had a single diagnosed SLD, whereas 57.9% had two or more SLD diagnoses. Dyslexia was the most frequently reported condition, affecting 71.1% of the sample, followed by dysgraphia (52.6%). Furthermore, 23.7% of students reported a combined diagnosis of dyslexia and dyscalculia, and 7.9% presented all four types of SLDs (dyslexia, dysgraphia, dysorthography, and dyscalculia). Regarding HL, the overall level was predominantly problematic, with a mean score of 30.7 (SD = 8.2). Given the small sample size, these estimates should be interpreted with caution. No

statistically significant differences were detected across the three HL dimensions: Healthcare (mean = 31.2, SD = 8.4), Disease Prevention (mean = 31.3, SD = 8.6), and Health Promotion (mean = 30.4, SD = 9.7). Overall, 65.8% of participants exhibited an inadequate or problematic HL level, including 23.7% with inadequate HL and 42.1% with problematic HL. Only 34.2% of students demonstrated sufficient or excellent HL (23.7% and 10.5%, respectively). The sociodemographic and academic characteristics of the study participants are presented in Table 1.

Further analyses (Table 2) explored differences in HL levels according to selected sociodemographic and academic characteristics. Although some variations were observed, none of the comparisons reached statistical significance. Specifically, 72.7% (16/22) of students with two or more SLDs had an inadequate or problematic level of HL, compared with 56.2% (9/16) among students with a single SLD. The presence of a combined diagnosis of dyslexia and dyscalculia was not associated with an increased likelihood of inadequate or problematic HL ($p = 0.66$). Sex-related differences were also observed: 84.6% of male students had inadequate or problematic HL, compared with 52.2% of female students, although this difference did not reach statistical significance. No statistically significant associations were found between HL level and school level at first SLD diagnosis, use of compensatory or dispensatory measures, age, living condition, or academic discipline.

Discussion and Conclusions

The present pilot study aimed to provide preliminary exploration of the relationship between HL and SLDs by examining HL levels in a sample of certified university students with SLDs. The findings indicate that most participants exhibited an inadequate or problematic level of HL. The proportion observed in this study (65.8%) is higher than that reported for the general Italian population (58%) with inadequate or problematic HL (12), suggesting that individuals with SLDs may experience greater difficulties in accessing, understanding, appraising, and using health-related information. These difficulties may plausibly be related

Table 1. Characteristics of university students with at least one SLD participating in the study.

Variable	Category	N	Percentage (%)
Age class	≤21	21	55.3
	>21	17	44.7
Sex	Female	23	60.5
	Male	13	34.2
	Non-binary	2	5.3
Living condition	Commuters	28	73.7
	Resident away from home	10	26.3
University course attended*	First-cycle programme	31	81.6
	Single-cycle master's programme	6	15.8
	Second cycle programme	1	2.6
Academic year	First	9	23.7
	Second	11	28.9
	Third	13	34.2
	Fourth	1	2.6
	Fifth	0	0.0
	Sixth	3	7.9
	Seventh (out of schedule)	1	2.6
Academic discipline	STEM	22	57.9
	Non-STEM	16	42.1
Number of SLDs	Single SLD	16	42.1
	Two SLDs	11	28.9
	Three SLDs	8	21.1
	Four SLDs	3	7.9
Type of SLDs	Dyslexia	27	71.1
	Dysgraphia	20	52.6
	Dysorthography	13	34.2
	Dyscalculia	14	36.8
	Dyslexia + dyscalculia	9	23.7
School attended at first SLD diagnoses	Primary school	13	34.2
	Lower secondary school	7	18.4
	Upper secondary school	10	26.3
	University level	8	21.1
Measures requested	Compensatory and dispensatory measures	15	39.5
	Compensatory measures	28	73.7
	Dispensatory measures	17	44.7
	No measures	8	21.1
Level of HL	Inadequate	9	23.7
	Problematic	16	42.1
	Sufficient	9	23.7
	Excellent	4	10.5

*Courses refer to different degree structures implemented over time (i.e., single-cycle five-year programmes or first- and second-cycle programmes covering a total of five years). *Abbreviations:* N = number of observations; % = percentage; STEM = Science, Technology, Engineering, Mathematics

Table 2. Level of HL considering the number of SLDs diagnosed, the school level at first SLD diagnosis, sex, the use of support measures, age, living condition, and academic discipline.

Variable	Category	HL level		p-value
		Excellent and sufficient N (%)	Problematic and inadequate N (%)	
Number of SLDs diagnosed	1 SLD	7 (43.8%)	9 (56.2%)	0.48
	≥2 SLDs	6 (27.3%)	16 (72.7%)	
School attended at first SLD diagnoses	Primary school or lower secondary school	9 (45.0%)	11 (55.0%)	0.26
	Upper secondary school or university	4 (22.2%)	14 (77.8%)	
Sex (N=36)	Female	11 (47.8%)	12 (52.2%)	0.11
	Male	2 (15.4%)	11 (84.6%)	
Use of support measures	Compensatory and/or dispensatory measures use	11 (36.7%)	19 (63.3%)	0.76
	No measure use	2 (25.0%)	6 (75.0%)	
Age	≤21y	9 (69.2%)	4 (30.8%)	0.37
	>21y	12 (48.0%)	13 (52.0%)	
Academic discipline	STEM	7 (31.8%)	15 (68.2%)	0.98
	Non-STEM	6 (37.5%)	10 (62.5%)	

to the core cognitive impairments characterising different SLDs. Specifically, i) deficits in decoding skills, phonological processing, and sequential reading typical of dyslexia, ii) impairments in sequential visual recognition and memorisation associated with dysgraphia, and iii) difficulties in manipulating numerical magnitude and performing written or mental calculations characteristic of dyscalculia (2,4) may substantially interfere with the competencies required for adequate HL. Contrary to expectations, the present exploratory study did not identify a significant association between the number of diagnosed SLDs and HL level. One possible explanation may lie in the under-additivity or “shared risk factor” hypothesis (18), according to which the co-occurrence of multiple SLDs (e.g., dyslexia and dyscalculia) can be attributed to common deficits in domain-general cognitive skills that support information processing across learning domains. Consistent with this interpretation, previous research has shown a genetic overlap between cognitive phenotypes associated with different SLDs, including dyslexia and dyscalculia (19,20). As a result, students with SLDs may experience difficulties across multiple academic areas (21), given that the cognitive skills underpinning distinct learning domains—such as language

processing and working memory—partially overlap. Accordingly, a high rate of co-occurrence or comorbidity of multiple SLDs, involving reading, written expression, and numeracy difficulties, has been widely reported (19,22,23) and this pattern was also observed in the present study, where more than half of participants had more than one diagnosed SLD. With regard to SLD type, it could be hypothesised that dysgraphia and dysorthography—due to their specific impairments—may exert a lesser impact on HL compared with dyslexia and dyscalculia. Skills such as accurate reading and text comprehension, as well as the ability to interpret and apply numerical information, are indeed likely to be particularly relevant for the development of adequate HL. Nevertheless, no significant differences in HL levels emerged according to the type of SLD diagnosed, nor was the combined presence of dyslexia and dyscalculia associated with a significantly more inadequate or problematic HL level. These findings should be interpreted with caution, as preliminary and hypothesis-generating, given the small sample size of the present pilot study (see limitations below). Furthermore, no significant association was found between HL level and the use of compensatory and/or dispensatory measures. This finding may suggest that

the determinants of HL in students with SLDs may lie earlier in the educational trajectory, rather than being substantially influenced by support measures implemented at the university level. Although university-based services may enhance academic performance, self-efficacy, and study resilience—factors known to be associated with academic success (24)—they may not be sufficient, on their own, to meaningfully improve HL among students with SLDs. Finally, most participants in the present study were enrolled in three-year bachelor's degree programmes. This observation raises the possibility that students with SLDs may preferentially choose shorter degree programmes or may discontinue their academic path after completing the first cycle rather than pursuing a master's or specialist degree. However, this remains a speculative hypothesis and should be confirmed through further longitudinal or comparative studies involving long-term follow-up, larger samples and/or multiple universities. Existing literature (25) indicates that university students with SLDs, compared with their typically developing peers, report lower self-efficacy, higher academic anxiety, and greater emotional and relational difficulties. Collectively, these factors—related to the emotional-relational domain—may orient students with SLDs towards shorter academic pathways. The results of the present study should be interpreted as preliminary, given the pilot nature of the study and the limited number of participants. As a first investigation in a largely unexplored area, this study also served to test the feasibility and suitability of the study design, while identifying aspects requiring improvement. The small number of participants suggests the need to develop further engagement strategies to involve a student population with emotional and relational characteristics that likely require targeted attention and specifically designed tools. Despite substantial recruitment efforts and repeated reminders during the 2023-2024 academic year, the response rate in our study was suboptimal. Possible reasons for non-participation include fear or reluctance to disclose diagnoses or difficulties related to HL, particularly among individuals who may have experienced stigma during their academic careers. These methodological reflections may help refine the study procedures, thereby promoting

the quality and accuracy of the larger amount of data that could be collected in the future, even within a multicentre study.

Limitations and future perspectives

This study has several limitations that should be acknowledged. First, potential selection bias related to the study sample should be considered. The participants represent a subgroup of students with SLDs who successfully achieved the expected educational milestones up to university enrolment. It is therefore plausible that these students were able to effectively address their learning difficulties and benefited from support measures implemented during their earlier school careers. Such measures may have partially compensated for difficulties associated with SLDs and contributed to strengthening self-esteem and self-efficacy, thereby mitigating the overall impact of these disorders. In addition to formal support guaranteed by law, participants may also have benefited from additional support provided by families and/or teachers who were particularly attentive, collaborative, or specifically trained in the field of SLDs. These favourable conditions may have positively influenced not only learning outcomes but also emotional and relational development. Over time, these students may have developed higher levels of soft skills (e.g., critical thinking, perseverance, social intelligence) and resilience, which could have supported them in managing academic challenges throughout their educational trajectory. In this sense, students with SLDs who reach university may already be considered relatively “experienced learners”, having had the opportunity to explore, experiment with, and refine alternative learning strategies, tools, and methodologies better suited to their specific needs. As already mentioned, a second limitation concerns the small sample size, which limits the generalisability of the findings and warrants caution in their interpretation. In this regard, the provision of monetary or non-monetary incentives might have enhanced study participation, allowing for a larger sample size. Further research is therefore needed to investigate the relationship between HL and SLDs in larger and more diverse samples, allowing for more

statistically robust analyses. The present study should be regarded as a pilot investigation in a research area that has been largely overlooked, despite its relevance for public health. While some studies have examined HL levels among individuals with intellectual disabilities (26-28), research focusing on university students with SLDs remains scarce and has primarily addressed academic performance, study-related variables, and emotional-motivational or social dimensions (e.g., resilience, anxiety, self-esteem, self-efficacy, soft skills, satisfaction) (24,29-32). Consequently, HL levels among individuals with SLDs remain poorly understood. A further limitation is that the self-report questionnaire administered to study participants measures subjective, perception-based HL and is therefore more susceptible to individual and cultural influences, including social desirability and widespread beliefs about illness and health, than objective, performance-based HL measures. The combined use of different types of HL measures in the same population may allow a more comprehensive understanding of HL in future investigations (33). Regarding future research directions, targeted analyses examining HL in relation to specific types of SLDs are warranted. Given that HL inherently includes literacy-related skills, such as reading and text comprehension, dyslexia may be particularly influential in shaping HL levels. Consistent with this hypothesis, previous literature has demonstrated a strong association between HL and general literacy (32). Similarly, numeracy skills—including the ability to understand and manipulate numerical information—are also integral to HL. From this perspective, dyscalculia may represent another SLD with a particularly significant impact on HL, as numeracy skills are involved in the acquisition of health-relevant knowledge, such as understanding body-related information, diseases, and measurement units (32). From a public health perspective, an important objective would be the development of HL best practices specifically tailored to individuals with SLDs, aimed at reducing risk factors and strengthening protective factors for this neurodivergent population. Such an approach would ensure that HL initiatives adequately address their needs within healthcare, disease prevention, and health promotion contexts (34). Potential

interventions could include the design of multimedia health information materials adapted to SLDs, characterised by reduced textual content, schematic and graphic representations, and the use of colours, images, videos, audio resources, and animations to facilitate information processing and comprehension. In this regard, digital technologies could play a crucial role through the development of tailored tools, such as computer-based programmes or storytelling applications, designed to support individuals with SLDs. Providing accessible and inclusive health information may promote greater engagement of people with SLDs in their own healthcare and in interactions with health services, thereby helping to reduce health inequalities. This view reflects the relational nature of the HL construct, according to which health organizations themselves exercise a responsibility in mitigating and reducing HL-related barriers, thus supporting improvements in service quality and safety (11). In other words, HL can be considered as the result of a synergistic relationship between individuals' ability to access, understand, and apply health information, and the health system's ability to adapt to people's competencies (35). Notably, communication strategies developed for people with SLDs may also benefit the general population, given the reduced attention span commonly observed in the contemporary digital environment characterised by information overload and constant connectivity (36). Therefore, the implementation of inclusive HL practices could generate widespread benefits in terms of information uptake and positive health behaviours. Finally, it may be valuable to develop intervention guidelines and support strategies for parents of children with SLDs, beginning early in the school trajectory. Such interventions should aim to increase parental knowledge of SLDs, enhance coping skills, and provide emotional, practical, organisational, and financial support. Strengthening parental resources may foster sustainable improvements in children's development, learning processes, psychosocial well-being (37,38), and ultimately their HL. In conclusion, a paradigm shift is urgently needed to recognise SLDs as social determinants of health (39). SLDs should not be conceptualized merely as individual deficits but rather as conditions with multi-level

implications, whose effective management entails the involvement of multiple actors. They may contribute to shaping how individuals' access, engage, and interact with the healthcare services and system to achieve optimal health outcomes. Accordingly, structural, organizational, educational, awareness-raising, and policy-level interventions seem crucial to reducing avoidable health inequalities and enhancing the overall quality of life of people with SLDs. Early identification and the implementation of targeted, timely interventions may indeed promote academic and professional achievement, psychological, relational, and economic well-being, social participation, and engagement in society among individuals with SLDs. Importantly, these actions may also enhance HL, with far-reaching implications for healthcare, disease prevention, and health promotion.

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