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RECEIVED 17 September 2024
ACCEPTED 23 September 2024
PUBLISHED 17 October 2024

CITATION
Herzog M, Balt M, Volpe R and Casale G
(2024) Editorial: Interventions for students
with combined learning and behavioral
difficulties. *Front. Educ.* 9:1497818.
doi: 10.3389/feduc.2024.1497818

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Editorial: Interventions for students with combined learning and behavioral difficulties

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KEYWORDS

intervention, special education, learning difficulties, behavior problems, remediation

Editorial on the Research Topic

Interventions for students with combined learning and behavioral difficulties

1 Introduction

Many children and adolescents exhibit combined learning (academic skills deficits) and behavioral difficulties (e.g., externalizing and/or internalizing behavior problems; Nowicki, 2003; Visser et al., 2020). The relationships between learning and behavior problems, their influencing factors, and mechanisms are complex: First, it is important to consider which forms of learning difficulties (e.g., problems in reading and/or mathematics) and behavioral difficulties (e.g., internalizing and/or externalizing problems) co-occur; second, it cannot be causally determined in general whether academic problems predict behavioral problems or vice versa; third, developmental pathways in which multiple risks lead to undesirable academic and/or behavioral outcomes can be moderated by learning and behavioral problems (Vanzella-Yang et al., 2024). In any case, the high comorbidity rates of learning and behavioral difficulties underscore the need for effective interventions to support affected students (Morgan and Sideridis, 2013). This necessitates research into the complex mechanisms at work, the development of corresponding interventions, and the evaluation of their effectiveness (Morgan and Sideridis, 2013).

Recent studies have provided evidence that students showing combined specific learning difficulties and behavior problems share a cumulation of developmental risks (Atkinson et al., 2015; Evans et al., 2013; Ragnarsdottir et al., 2017). Following *cumulative risk models* (Evans et al., 2013; Kraemer et al., 2005), the quantity of risk factors is more relevant than the quality of the risk factors. For instance, Ragnarsdottir et al. (2017) investigated the effect of contextual and individual risk factors such as household income, emotional wellbeing of students, or maltreatment by parents on academic achievement in a longitudinal study. With increasing number of risk factors, academic achievement declined substantially. Atkinson et al. (2015) reported that an increasing number of risk factors for emotional and behavioral development in childhood was associated with an increasing number of corresponding negative outcomes such as deviant behavior or school failure in early adulthood. In the context of cumulative risk models, combined learning and behavior difficulties are of particular interest, as both learning difficulties and behavior problems are the special educational needs with the highest prevalence (Nic Aindriú et al., 2020;

Croll and Moses, 2003; KMK, 2024). Thus, combined learning and behavior difficulties affect a considerable number of students. For instance, Visser et al. (2020) report that half of the students with learning difficulties also show behavior difficulties. Given the prevalence rates reported in nation-wide panel studies such as PISA (OECD, 2023), about 10% of the students are likely to show combined learning and behavior difficulties.

Combined learning and behavior difficulties can be understood as a heterotypical comorbidity (Pennington, 2006), which means that the phenomenology of the difficulties is substantially different, although they might stem from similar preconditions. There are several ways, in which combined learning and behavior difficulties can occur. Summarizing several extant models (e.g., Börnert-Ringleb et al., 2023; Neale and Kendler, 1995; Pennington, 2006), at least four different causal models for combined learning and behavior difficulties can be distinguished. We will illustrate the models with an example of mathematical difficulties (MD) and test anxiety as following.

First, learning difficulties can cause behavior difficulties (Figure 1A). Naturally, learning difficulties precede behavior difficulties in this case, but do not necessarily outlast them. While learning difficulties cause behavior difficulties in this scenario, there are different risk factors that increase the probability of the occurrence of one or both types of difficulties. These factors can be found on different levels such as individual (e.g., specific skills deficits in mathematics), social (lack of positive relations to peers), or institutional level (e.g., understaffed schools that struggle to provide support) and are often correlated. In the context of the given example, a child might develop MD that are initially isolated. Subsequently, the lack of math competence leads to repeated failure in exams, so that the child develops test anxiety. Additional factors such as low academic self-concept might increase the probability for occurrence of a combined difficulty.

Second, behavior difficulties might cause or contribute to learning difficulties, probably supported by other factors (Figure 1B). In the example, test anxiety might lead to avoidance behavior in math classes, because a child perceives a mathematical task (that might support learning) as potential threat to fail. Due to missing learning opportunities, the child might develop MD. Again, additional factors could support the occurrence of both difficulties individually as well as in combination.

Third, learning and behavior difficulties can occur separately and more or less at the same time (Figure 1C). However, the persistence of both difficulties might differ in this case. The origin for both learning and behavior difficulty in this scenario is mostly found in shared risk factors. For example, a low level of parental education might lead to anxiety in test situations, probably because the individual is convinced to be not meeting the standards of the school in general. Consequently, exams are perceived as potential event of failure. Parallel, a low academic self-concept due to a low parental education level can undermine the learning motivation, for instance in mathematics, leading to reduced mathematics competencies. In this scenario, there is no direct link between learning and behavior difficulties, as their occurrence is based on a shared factor. Also, low mathematics competencies are not necessary for test anxiety, because exams already are perceived as “unpassable”; and vice versa, there is little

motivation to learn mathematics, independent from the results of exams. Especially in the context of separated teaching for students with special educational needs, when children are schooled with different developmental goals regarding learning and behavior, the coincidental occurrence of learning and behavior difficulties seems to be likely.

In inclusive contexts however, the fourth model of reciprocal learning and behavior difficulties that are separately caused due to common factors (Figure 1D) is likely. In this scenario, a low academic self-concept as individual risk factor might cause both MD and test anxiety as described above. Upon onset, MD can increase test anxiety or vice versa. As a consequence, the relationship between learning and behavior difficulties becomes reciprocal.

2 Interventions addressing combined learning and behavior difficulties

The specific treatment of combined learning and behavior difficulties is of great interest. Over the last several decades, the number of intervention studies in mathematics has markedly increased (Reynvoet et al., 2021). Especially since 2010, an exponential increase can be observed. In contrast to that, Peltier et al. (2022) report no substantial increase in intervention studies focusing on students with combined mathematics and behavior difficulties. Regarding reading interventions, Scammacca et al. (2016) report a substantial increase in studies for all students since the middle of the 20th century, too. However, systematic reviews and meta-analyses of interventions for students with combined reading and behavior difficulties often include only few studies. For instance, Roberts et al. (2015) included 15 studies on students with combined reading and behavior difficulties, Coleman and Vaughn (2000) found 14 (of that only eight were accessible), and Burke et al. (2015) found 11 studies eligible based on their keywords and data bases since the seventies. In comparison, Scammacca et al. (2016) found 30 studies on reading interventions in general from 2010 to 2014.

In conclusion, interventions for students with combined learning and behavior difficulties are a highly relevant issue in current research, given the prevalence rates. Extant studies have shown that interventions that address both learning difficulties and behavior problems can improve both student academic outcomes as well as their behavior (e.g., Benner et al., 2013; Volpe et al., 2012). However, there is a considerable research gap between general interventions for learning or behavior problems and interventions for combined learning and behavior difficulties. A key aspect of the gap between general intervention studies and those specializing in students with combined learning and behavior difficulties seems to be that most studies focus either on a specific learning (e.g., mathematics) or behavior difficulty (e.g., attention-deficit/hyperactivity disorder; ADHD).

The lack of intervention studies on combined learning and behavior difficulties is also reflected in the number of studies included in this Research Topic. However, in total five studies could be included in the current Research Topic. The included studies cover one systematic review, one theoretical framework, and three

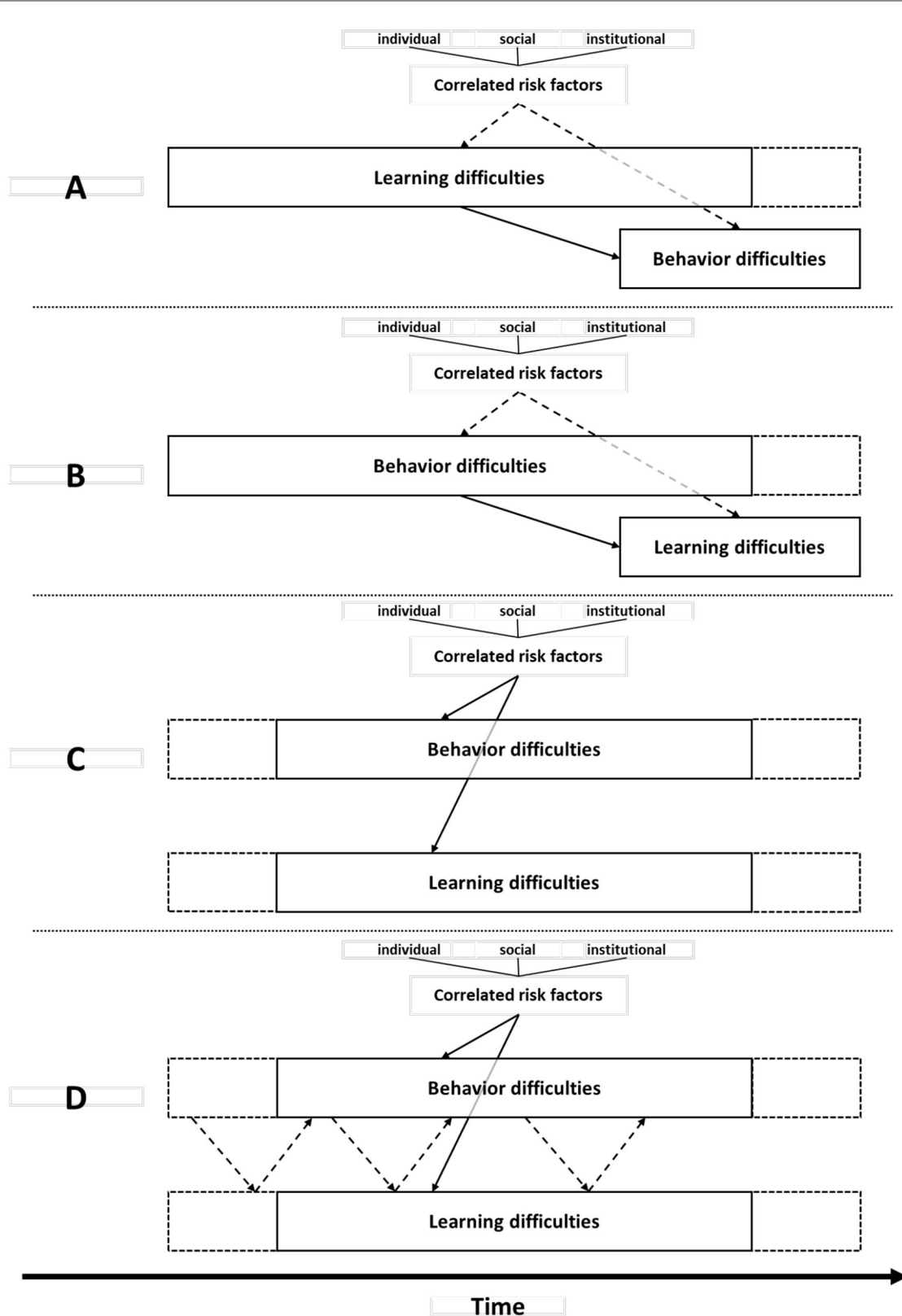


FIGURE 1 Potential causal models for the emergence of combined learning and behavior difficulties, based on extant models [adapted from Börnert-Ringleb et al. (2023)]. Bold lines indicate direct causal relations, dashed lines indicate risk factors. (A–D) refer to the different potential scenarios.

intervention studies. In the following, we will provide an overview over the studies in this Research Topic.

[Gabriel and Börnert-Ringleb](#) addressed the shortcomings of extant research and provided, to our knowledge, the broadest systematic review of interventions for combined learning and behavior difficulties. As the systematic review does not focus on a specific learning or behavioral difficulty, it can give valuable insights of current directions and foci in this field. Following [Gabriel and Börnert-Ringleb](#), recent research on combined learning and behavioral difficulties focusses on the specific difficulty, assuming a direct causal relation between the learning and the behavior difficulty (Figures 1A–C). Moreover, the individual characteristics of children play a dominant role in the interventions included in the systematic review. [Gabriel and Börnert-Ringleb](#) therefore emphasized the need for interventions that also address common risk factors (Figure 1). Moreover, contextual and systemic factors are supposed to be considered more in interventions, too.

[Nunes et al.](#) reported results from an empirical study that vividly depicts possible interactions and cross-effects of interventions regarding learning and behavior difficulties (Figure 1D). While employing a multi-step intervention for self-regulation, differential effects were found for writing performance and writing motivation. The intervention included features often used in self-regulation interventions for students with behavior difficulties such as regulation strategies or meditation. However, main effects of the intervention were found for writing performance (corresponding to the field of learning difficulties), but not for motivation (corresponding to behavior difficulties). The study therefore shows that cross-domain interactions are not only relevant in terms of causal models, but also affect intervention effects.

The greater the number of different risk factors involved, the more likely one discipline will be insufficient to address all the factors appropriately. [Mealings et al.](#) proposed an interdisciplinary framework (*Learn to Listen for Life – L³*) that combines knowledge from health, speech and hearing sciences as well as education. Aim of the proposed framework is to support students to focus on relevant auditive information in classroom. Students with very different prepositions are prone to missing verbal given information (e.g., instructions for a task): Inattentive students might focus on what a classmate is telling them instead; hearing impaired students might not hear what is said in a too noisy classroom; and language impaired students might miss important parts that help them to understand the instruction or explanation. [Mealings et al.](#) illustrated the versatile applications of their framework in their article.

The necessity for more interdisciplinary research in the field of interventions for students with combined learning and behavior difficulties can be seen in the specific perspective of research and researchers. In this Research Topic, two studies employed single-case research designs to address attention skills—a well-researched behavior difficulty that has substantial impact on learning ([DuPaul and Volpe, 2009](#); [Nogues and Dorneles, 2023](#); [Willcutt et al., 2000](#)). Whereas, [Melzer and Herwix](#) reported the effects of an intervention for students' attention in students with learning difficulties, [Herzog and Casale](#) investigated the differential effectiveness of a mathematics intervention in students with varying ADHD profiles.

[Melzer and Herwix](#) investigated the potential of self-regulatory learning to foster attention and planning skills in students with learning difficulties. In two single-case studies, on-task behavior increased and off-task behavior decreased significantly during the intervention. The results show that self-regulated learning can also be used in students with learning difficulties.

[Herzog and Casale](#) could provide further insights into the effectiveness of a mathematics intervention in students with combined MD and ADHD. Both difficulties show strong comorbidities (e.g., [Visser et al., 2020](#)). Assuming a causal link from ADHD to MD (Figures 1B, D), different core symptoms of ADHD were differentiated. While hyperactivity did not affect the effectiveness of the mathematics intervention, attention deficits were associated with lower effectiveness of the intervention. These findings further corroborate extant research (e.g., [Tosto et al., 2015](#); [Orbach et al., 2020](#)) and can inform the design of specific interventions for students with combined MD and ADHD ([Schulze et al., 2020](#)).

3 Conclusions

Summarizing the outcomes of the research published in this Research Topic, interventions for students with combined learning and behavior difficulties need to take the versatile and heterogenous interactions and dependencies of learning and behavior difficulties into account. Simple add-ons to extant interventions for learning or behavior addressing the respective other field are unlikely to bring substantial benefits. The limited number of studies eligible for this Research Topic underlines the need for more research on students with combined learning and behavior difficulties as well as interventions for them.

In general, the research on combined learning and behavioral difficulties holds significant potential to address broader societal challenges by providing insights into the complex interplay between educational and behavioral outcomes. Understanding these dynamics not only informs the development of targeted interventions but also highlights the critical need for interdisciplinary approaches that address the multifaceted risk factors involved. By bridging gaps in current research, particularly in the areas of comorbid conditions and their treatment, scholars can contribute to creating more inclusive and effective educational systems. These efforts are crucial for reducing the long-term societal costs associated with academic failure and behavioral issues, ultimately fostering more equitable opportunities for all students. The growing recognition of the importance of this research underscores its potential to drive meaningful change, not just in education, but in broader public health and social policies aimed at supporting vulnerable populations.

Author contributions

MH: Writing – original draft, Writing – review & editing. MB: Writing – review & editing. RV: Writing – review & editing. GC: Writing – review & editing.

Funding

The author(s) declare that no financial support was received for the research, authorship, and/or publication of this article.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships

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