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Impact of Educational Placement on Goal Attainment of K-6 Students with Complex Needs

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Abstract:	<p>Students with complex support needs have intense and frequent support needs for learning and participating across multiple domains. Addressing those needs in a comprehensive manner is the purpose of special education, which is accomplished through instructional and Individualized Education Program (IEP) goals. Yet simply setting goals is insufficient; to facilitate positive student outcomes, there is an inherent expectation that students will meet those goals to achieve their potential. Understanding factors that impact variability in goal attainment is essential to this purpose. This includes the extent to which variability in goal attainment is explained by factors varying within students (e.g., goal domains being targeted) or by factors varying between students (e.g., education placement, overall intensity of student support needs). Using Bayesian multi-level modeling analysis to examine the instructional goals of 53 elementary students with complex support needs, we found that 75% of variability in goal attainment exists within student's goals. However, 25% of variability is explained by factors that vary across students, in this case, educational placement and overall intensity of support needs. We conclude with recommendations for research and practice aimed at enhancing goal attainment for students with complex support needs.</p>

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Complex Needs across Academic and Social-Behavioral-Communication Domains**

Abstract

Students with complex support needs have intense and frequent support needs for learning and participating across multiple domains. Addressing those needs in a comprehensive manner is the purpose of special education, which is accomplished through instructional and Individualized Education Program (IEP) goals. Yet simply setting goals is insufficient; to facilitate positive student outcomes, there is an inherent expectation that students will meet those goals to achieve their potential. Understanding factors that impact variability in goal attainment is essential to this purpose. This includes the extent to which variability in goal attainment is explained by factors varying within students (e.g., goal domains being targeted) or by factors varying between students (e.g., education placement, overall intensity of student support needs). Using Bayesian multi-level modeling analysis to examine the instructional goals of 53 elementary students with complex support needs, we found that 75% of variability in goal attainment exists within student's goals. However, 25% of variability is explained by factors that vary across students, in this case, educational placement and overall intensity of support needs. We conclude with recommendations for research and practice aimed at enhancing goal attainment for students with complex support needs.

Impact of Educational Placement on the Goal Attainment Outcomes of K-6 Students with Complex Needs across Academic and Social-Behavioral-Communication Domains

Goals are essential to establishing expectations for learning (Locke & Latham, 2019). For students with complex support needs, individualized learning goals are essential to establishing instructional targets as students engage in the general education curriculum and classroom. In the United States, individualized learning goals are also a required component of Individualized Education Programs (IEPs) for students with complex support needs. Students with complex support needs are defined as the 1% of students with disabilities who take their state's alternate assessment, have support needs across multiple life domains including school participation and learning, and are primarily served under the educational classifications of intellectual disability, autism, and/or multiple disabilities (Taub et al., 2021). Researchers have found, however, that many educators struggle with creating individualized learning goals for students with complex support needs that are challenging, age-appropriate, and aligned with the general education curriculum (Kleinert et al., 2014; Kurth et al., 2021; Kurth & Mastergeorge, 2010). Additionally, low expectations permeate the educational experiences of students with complex support needs, shaping educator's actions as they identify goals for students with complex support needs. This can lead to goals that are not aligned with expectations of inclusive settings and the general education curriculum (Mansouri et al., 2022). This is exacerbated for students who are educated in segregated settings where only students with complex needs are grouped together for instruction, with separate or segregated settings associated with lower expectations and lower quality instruction (Kurth et al., 2016; Ruppard et al., 2018; Zagona et al., 2022).

A recent analysis of learning goals across six learning domains (reading, writing, math, social, behavioral, and communication) identified by teachers of elementary age-students with

complex support needs during one academic year suggested that, across various educational placements ranging from students being primarily served in general education classrooms to students being primarily served in segregated schools, there were challenges with the quality of goals teachers identified for students (Shogren et al., in press). For example, few goals, irrespective of the inclusivity of educational placement, integrated student-directed learning or student-initiated supports. This is counter to recommendations for goals emphasizing self-determination for students with complex support needs. However, researchers did find that goals aligned with grade-level academic standards and social-behavioral-communication competencies were more common for students who spent the most time (i.e., 80% of the school day or greater) in inclusive general education classrooms, suggesting educational placement impacts goal content (Shogren et al., in press). This confirms other research that has suggested that students receive more instruction aligned with the general education curriculum when they are in the general education classroom (Soukup et al., 2007). It also aligns with research that suggests that students with complex support needs are more likely to have access to essential, personalized supports, such as augmentative or alternative communication (AAC) systems in more inclusive placements (Kleinert et al., 2015), which likely influences learning and goal attainment. However, limited research has examined goal attainment and the factors that influence it.

Existing research has primarily focused on examining the quality of goals that teachers develop to advance learning outcomes for students with complex support needs, which should – in theory – shape the instruction students receive. However, it is also important to understand if students attain the learning goals that are set for them, across learning domains, as well as if there are factors such as student support needs and educational placement that impact goal attainment. This paper seeks to expand on previous work that has analyzed the content of

learning goals for a national sample of students with complex support needs (Shogren et al., in press) and examine how teachers perceive students' attainment of those goals. Specifically, we seek to better understand what predicts variability in goal attainment, including if variability is concentrated within student's goals (e.g., students have different levels of attainment across learning domains) or if other factors that vary across goals and students (e.g., educational placement, support needs) also predict variability. Understanding the impact of educational placement and support needs on goal attainment is important, as effective special education services and supports should ensure that all students have equitable access to instruction that leads to their attainment of challenging goals across multiple learning domains. However, we know that an understanding of each student's support needs is not always used to identify and implement supports that students need to attain their goals generally, or within specific learning domains (Thompson et al., 2022). Further, we know that the quality of instruction and supports can vary across educational placements (Zagona et al., 2022) which also vary based on perceptions of students' overall support needs (Kurth et al., 2019).

Therefore, the purpose of this paper is to examine the factors that explain variability in goal attainment outcomes across six learning domains (reading, math, writing, social, behavioral, and communication) for students with complex support needs who are educated in different education placements that vary in their level of inclusiveness (see Table 1 for a description). Namely, we were interested in exploring if variability in teacher-reported goal attainment outcomes was primarily concentrated within student's goals for reading, math, writing, social, behavioral and communication domains or if it was also explained by other factors that vary across all student's goals (i.e., educational placement and overall intensity of student support needs). Our research questions were:

1. What proportion of variance in goal attainment outcomes is within student's goals (e.g., variability in goal attainment across different learning domains) and what proportion is explained by factors that vary across student's goals (e.g., educational placement, support needs)?
2. To what degree do education placement and overall student support needs predict goal attainment differences across learning domains in children with complex support needs?

Method

The data analyzed in this study are a secondary analysis of data from a larger project focused on examining the academic, social, behavioral, and communication outcomes of a relatively large, national sample of students with complex support needs in the United States (see Kurth & Jackson, 2022 for more information). Data were collected from multiple sources (e.g., students, teachers, families, administrators) and in multiple ways (e.g., observations, reviews of IEPs, surveys of teachers and students, assessments of student academic, social, and behavioral skills, and special education program and school level information).

To be included in the overall study, students had to be identified by school personnel as having complex support needs (i.e., falling in the 1% of students with disabilities who take their state's alternate assessment, having support needs across multiple life domains including school participation and learning, and being primarily served under the educational classifications of intellectual disability, autism, and/or multiple disabilities). The study team also targeted recruitment across four types of educational placements, ranging from the most inclusive (Placement A) to the least inclusive (Placement D; see Table 1). The placements were defined based on (a) the percent of time students spent in the general education classroom (> 80% of the school day, 40-79%, < 40%, or 0 for separate schools for students with disabilities) in alignment

with federal reporting guidelines (U.S. Department of Education, 2022) and (b) if the placement reflected proportional representation of students with complex support needs (i.e., approximately 1% of the class was students with complex support needs). Research team members partnered with school districts across the U.S. to identify students with complex support needs served in the range of education placements. Consent for participation was obtained following approved Institutional Review Board procedures. Before consent, the actual support needs of each student were unknown. As such, we assumed students in each setting to have approximately equal support needs, given all met the same eligibility requirements (i.e., being students with complex support needs).

Sample and Procedures

In the overall sample, a total of 117 students across grades K-6 were recruited, consented, and met inclusion criteria for the overall study and contributed data for one or more outcome measures (see Kurth & Jackson, 2022). Students were from 59 schools across 36 local education agencies in 11 states in the West, Midwest, South, and Northeast United States.

The present secondary analysis focused on one source of data collected as part of the overall project: students with complex support needs learning goals across six domains (i.e., (reading, math, writing, social, behavioral, and communication) identified by teachers in the Fall of 2019 with goal attainment ratings made by teachers in the Spring of 2020. Participating teachers were asked to identify goals for each of the six domains for each student either using an IEP goal or by identifying a classroom learning goal that would be a focus of instruction during the school year. Although all teachers were asked to identify goals for each domain for each student as these are expected learning domains for all K-6 students with established learning standards, not all teachers were able to identify relevant goals in each domain (e.g., a teacher

may have said that a student did not need a behavioral learning goal or did not have a reading goal), leading to a lack of a corresponding GAS rubric, and GAS rating. Further, only 53 students from 27 elementary schools had available goal attainment ratings from the Spring of 2020. The missing data resulted from the onset of the COVID-19 public health emergency in the Spring of 2020 and disruptions in students' educational services resulting in an inability to collect data that spring for a large segment of the sample. However, the remaining student goals and GAS rubrics reflect a large sample of students with complex support needs and their goal attainment over an academic year, including as they moved through COVID and its impacts.

Of the 53 students with Spring GAS data, there were 288 completed GAS rubrics, as not all students had goals or GAS ratings for all six goal domains for the reasons described above. Figure 1 provides the exact sample sizes across placements. Overall for 40% of the student sample teachers reported not being able to identify a learning goal in one or more of the six goal domains. On average each student had 5.434 GAS ratings, ranging from 3 to 6. Table 2 provides an overview of the demographics for the 53 students overall, and across education placements. It also provides the average SNI score overall and across placements. The overall mean SNI score for students was 86.340 (SD = 15.598). As shown in Table 2, despite our sampling procedures, there was a linear trend in support needs across placements, with students in Placement A having the lowest reported needs and in Placement D the highest, although, given the standard deviations in scores, there is significant overlap in support needs across placements. This likely also reflects the use of supports needs in determining education placement, despite the assertion this should not be the determining factor (Kurth et al., 2019; Sauer & Jorgensen, 2016).

Variables and Measures

Goal Attainment Scaling

Data on goal attainment came from ratings made on goal attainment scaling (GAS) rubrics created for each of the (up to) six learning goals identified for the 53 students. GAS rubrics were developed by teachers with support from the research team after training in best practices for using GAS (see Shogren et al., 2021). Specifically, research team members met with teachers during on-site visits and supported teachers in developing the rubrics following established protocols in the Fall and followed up with teachers to obtain ratings in the Spring. GAS rubrics include an individualized five-point, ordinal rating scale individualized to each goal. Specific goal attainment expectation statements aligned with each goal are established, reflecting: (-2) much less than expected, (-1) less than expected, (0) as expected, (1) more than expected, (2) much more than expected. GAS rubric statements developed to reflect the time frame of the study, the academic year.

Educational Placement

Educational placement classifications (Table 1) came from information on each student's IEP and were confirmed during school-based observations as part of the larger study. Students were classified as being served in one of the four educational placements aligned with U.S. federal special education guidance and data reporting (U.S. Department of Education, 2022).

Support Needs

We also examined the explanatory power of student support needs, using data collected on the Support Intensity Scale-Children's version (SIS-C; Thompson et al., 2016). The SIS-C uses a standardized interview process to collect data on students' support needs across seven domains (home living activities, community and neighborhood activities, school participation, school learning, health and safety activities, social activities, and advocacy). Domain scores and an overall support needs index (SNI) score can be calculated. The present analyses used

standardized SNI scores to reflect students' overall support needs. For the analyses, we converted SNI scores to be on a scale from 0 to 1 to promote interpretability in the models. Specifically, we standardized the SNI variable to have a mean of 0, with a value of 1 indicating two standard deviations away from the mean. We opted for 1 to denote two standard deviations instead of one standard deviation for better comparability of coefficients between education placement categories and support needs intensity (Gelman, 2007).

Analysis Plan

All analytic data files, scripts, and output can be accessed on the Open Science Foundation (https://osf.io/fhrm8/?view_only=1e5d3252327242b29c80b0cf9e687c34).

Bayesian Multilevel Modeling

To address our two research questions, our primary analytical strategy was Bayesian multilevel modeling analysis (Gelman & Hill, 2007). Specifically, we employed a two-level modeling approach (goals – Level 1; students – Level 2), using ordered logistic regression (Stroup, 2016), with a cumulative logit link function and a categorical response model suitable for ordinal outcomes. Although we considered including schools as a third unit of analyses, we opted against this due to these 53 children being thinly spread among the 29 schools (the range of students per school was 1 to 4; $M = 1.828$, $SD = 0.805$), with 82.76% of schools having only one or two students. Bayesian estimates of all coefficients were obtained using MCMC simulation, and simulation diagnostics and posterior predictive model checks passed inspection (refer to the scripts on OSF for further details). Although there was variability in the number of GAS ratings within students across the six domains (range 3 to 6 GAS rating per student; $M = 5.434$; $SD = 0.799$), we employed full information Bayesian estimation to include every child in these analyses regardless of if they had missing goals or GAS ratings for a goal.

To address our first question (*What proportion of variance in goal attainment outcomes is within student's goals (e.g., variability in attainment across different learning domains), and what proportion is explained by factors that vary across student's goals (e.g., educational placement, overall support needs)?*), we estimated the so-called empty model, which has no predictors, to derive the intraclass correlation coefficient (ICC) and examine variability within and across students. In this case, the ICC value denotes the proportion of variance in goal attainment outcomes explained by factors that varied between children (educational placement, overall support needs) rather than factors within children (variability across the goal domains for each child). Mathematically, the ICC value ranges from 0 (no variation attributable to differences among children) to 1 (all variation attributable to differences among children). For example, an ICC of .20 indicates that 20% of the variation in goal attainment outcomes is explainable by differences in factors varying between children (e.g., educational placement and overall support needs intensity). This is a critical first step as this analysis clarifies the amount of variation potentially attributable to differences across each, such as education placement.

Assuming we found factors varying between children explain variance in goal attainment outcomes, we addressed our second question (*Does education placement and overall student support needs predict goal attainment differences across learning domains in children with complex support needs?*) by regressing goal attainment outcomes on educational placement categories and student support needs. We used odds ratio as our metric of effect size.

Conventionally, odds ratios of 1.68, 3.47, and 6.71 are the boundaries of small, medium, and large effect sizes, respectively (Chen et al., 2010). We considered four different models: (M_0) Null model, (M_1) Support Need Intensity Effects, (M_2) Education Placement Effects, and (M_3) Support Need Intensity and Education Placement Effects. This analysis allowed us to explore the

degree to which support needs alone, education placement alone, or the combination of support need and education placement best predicted goal attainment. Importantly, in these models we controlled for variability in goal attainment across the six domains within children in every model to be true to the structure of these data. We compared the relative fit of different models using Deviance Information Criterion (DIC; Ando, 2007) analysis. In DIC analysis, a DIC value quantifies the relative misfit of different models; a smaller value indicates better fit. We took the extra step of converting attained DIC values into corresponding model weights (McElreath, 2016), which denotes the probability a model has the most explanatory power in the set.

Results

Figure 1 presents a visualization of goal attainment outcomes across the six goal domains (reading, writing, math, social, behavioral, and communication), stratified by educational placement, with descriptive statistics for reference. This highlights the variability in reported goal attainment across both goals and educational placements.

Research Question 1

To further explore the variation observed in Figure 1, we employed Bayesian multilevel modeling (B-MLM) analysis to decompose the total variation into two components: variation attributable to factors varying within children (i.e., different goal domains) and variation attributable to explanatory factors that vary between children (i.e., education placement and support needs). The B-MLM results suggest an intraclass correlation (ICC) of 0.252 (95% CI: 0.126, 0.389) for goal attainment outcomes. This indicates that of the total variance in goal attainment outcomes, although uncertain, there is a 95% probability that between 12.6% to 38.9% of the total variance can be attributed to explanatory factors varying between children (i.e., education placement and support needs), with 25.2% the most probable estimate.

Conversely, the most probable estimate of the ICC implies that 74.8% (range =25.2% - 100%) of the total variance can be attributed to factors within children (i.e., goal domain).

Research Question 2

Table 3 provides an overview of the results from Bayesian Multilevel Modeling (B-MLM) analyses. These results indicate close to a 70% probability that the most explanatory model in the set of considered models includes educational placement, $P(M_2) + P(M_3) = .690$. While it would be premature to reject the null model as its probability is not zero, $P(M_0) = .117$, these data suggest the probability of educational placement being an important explanatory factor in explaining variance in goal attainment outcomes among children with complex support. Further, given that M_3 (which includes both educational placement and children's overall support needs) is the most probable model, $M_3 = .503$, these results also suggests that children's support needs, as measured by the SIS-C, also explain variability in goal attainment outcomes. Thus, it is important to consider the joint explanatory power of support needs and education placements, as we did in exploring the model coefficients.

When inspecting the coefficients for M_3 in Table 3 to understand predicted data patterns in goal attainment outcomes across education placements, we see that educational placement partially explains goal attainment outcomes across children. M_3 indicates that, holding support needs constant, children in separate schools (Placement D) and in the most inclusive settings (Placement A) tend to experience higher goal attainment outcomes compared to students in Placements B and C. The odds ratio (OR) for separate schools (Placement D) is 4.372 (which is considered a moderate difference), while the OR for the most inclusive setting (Placement A) is 2.116 (which is considered a small difference). It is important to note that these are preliminary estimates of group differences in goal attainment across education placement, and they need to

be refined and replicated in larger samples. Additionally, when looking at the predicted differences based on support needs in M_3 , the odds ratio (OR) for support needs intensity is 0.478, indicating that, holding education placement constant, for every increase of two standard deviations in support need intensity, the model predicts a 52.2% reduction in the chances of a positive goal attainment outcomes (considered a difference of moderate size). Overall, our most explanatory model, M_3 , indicates a high probability that the true group difference is in the positive direction for Placement A (90%) and D (99%) and in a negative direction for support needs intensity (99%).

Discussion

The goal of this study was to examine the factors that explain variability in the goal attainment outcomes of students with complex support needs as rated by their teachers over the course of an academic year. Findings suggest that approximately 75% of the variability in goal attainment outcomes is explained by differences within students' goals across six learning domains: reading, writing, math, social, behavioral, and communication goals. While not unexpected, these findings point to needed areas of future research. Obtaining a better understanding of why and how individual students attain their goals, or not, within and across learning domains, is important to improve special education outcomes as well as special education services, including instruction and personalized support. We hypothesize, based on research, that the provision of personalized supports aligned with each goal and learning domain could play an important role in goal attainment (e.g., Thompson et al., 2022); thus, additional research is needed to determine how to develop personalized supports for each child with complex needs that are aligned with support needs across learning domains to minimize variability in attainment across the various goals that students and their teachers are targeting

through special education services and supports. The importance is supported by the finding that despite all teachers being asked to identify learning goals for each of the six domains for each student, for close to 40% of the student sample, teachers stated that a student did not have a learning goal in one or more domain (see Figure 2 for exact numbers across goal domains). This is problematic as each of these six learning goal domains is recognized as important in K-6 education, with associated learning standards relevant for all students, including students with complex support needs (Shogren et al., in press). As such, this highlights the need for ongoing teacher training, supports, and accountability for ensuring all students across educational placements recognize the importance of and set goals for student's learning across these domains (Brock et al., 2020; Jimenez et al., 2021; Ruppert et al., 2023).

However, it is important to note that almost a quarter of the variability in goal attainment was not concentrated within students' goals across learning domains, but instead across students' goal attainment outcomes when considering their overall attainment across learning domains. We specifically examined the influence of educational placement and overall student support needs alone and in combination. With regard to overall support needs intensity, we found that more intense support needs predicts lower overall goal attainment. One interpretation of these findings, supported by other research (Gee et al., 2020; Kurth et al., 2016; Kurth et al., 2021; Zagona et al., 2022), suggests that not only are teachers and schools not individualizing supports to each learning domain, but they also may not be adequately aligning supports with student's overall support needs, and instead are providing lower quality supports and services, resulting in negative impacts on student goal attainment. This may also be influenced by low expectations held for students with complex support needs overall, and the increasingly low expectations as support needs increase (Cameron & Cook, 2013; Roberts et al., 2018).

We also found that educational placement predicted variability in goal attainment across students. Specifically, being served in Placement A and D, the most and least inclusive settings (see Table 1), predicted higher goal attainment at the student level. This is partially consistent with research that goals are of higher quality and reflect higher expectations in more inclusive settings (Kurth & Mastergeorge, 2010; Shogren et al., in press), and this study suggests, in turn, this high quality of goals may translate to higher goal attainment. However, the finding that Placement D also predicted higher goal attainment was counter to expectations. However, it could reflect what researchers have suggested about the most segregated settings (Shogren et al., in press); that is, that these contexts may lead to low quality goals, and that because of the low quality and low expectations, these goals may be easier for students to attain. It could also be that in such settings, teachers are devoting more time to supports, but this is not necessarily aligned with each student and their personalized learning needs (Thompson et al., 2022). Teachers report not feeling prepared or able to provide supports in inclusive settings because of a lack of (a) training on inclusive practices and (b) administrative support for inclusion, which may shape these findings (Coleman et al., 2023).

It is important to note that the best fitting model included both support needs and education placement, suggesting that each of these factors contributes explanatory power understanding goal attainment outcomes. The specific pattern of findings suggests education placement is a critical factor irrespective of support need as there were different goal attainment outcomes across Placements A and D and Placement C and D even after controlling for student intensity of support needs which varied across settings (see Table 2). Thus, education placement above and beyond support needs explains differences in goal attainment. This highlights the criticality of ensuring that placement is not determined by support needs and that research on the

impact of inclusive settings on goal quality and learning outcomes is used to inform education placements to drive student outcomes (Agran et al., 2020; Mansouri et al., 2022; Shogren et al., in press). More research is needed to better understand these complex relationships, and better identify practices to advance inclusive education, effective teacher training on inclusive supports, and the development of methods to support goal setting and attainment across learning domains for students with complex support needs. Overall, these findings tentatively suggest that decisions about placement, which are impacted by student support needs (Anderson & Brock, 2020; Lansey et al., 2023), explain differences goal attainment outcomes and must be further considered in efforts to advance outcomes for students with complex support needs.

Limitations and Future Direction

The study design does not establish causation, and ongoing research is needed to further explore malleable factors that can impact goal attainment outcomes of students with complex support needs over time. Given the study design, our focus was on identifying the model with the highest explanatory power based on Bayesian fit statistics rather than relying on underpowered tests of statistical significance, given our sample sizes. The limited sample size, compounded by imbalanced numbers of goals across children, means that the precise effect sizes observed in this study must be further examined with larger samples to generate more precise and replicable estimates and to further disentangle the complex relationships between student characteristics, educational placement, and learning outcomes. Further, the sample was relatively racially and ethnically homogeneous, and more targeted sampling in this low incidence population is necessary to reflect the experiences of marginalized children with complex support needs. However, even with these caveats, our findings were consistent across models and analyses and suggest that the pattern of relationships are probable and deserving of future attention in

research, policy, and practice. It is important to also note that this data collection occurred, in part, during the COVID-19 public health emergency, and that did impact the sample size, particularly for the GAS outcome data, and likely impacted supports and services. Even with this, this sample reflects one of the largest national samples, of which we are aware, of the goal and goal attainment of students with complex needs served across distinct educational placements. As such, this data can provide meaningful information to inform ongoing supports and services, as well as provide a baseline as we continue to move past the COVID-19 pandemic and assess and intervention to address learning loss that happened during this time.

Ongoing research is also needed to examine other factors that impact goal setting and attainment within children as well as other factors that impact children's educational experiences across goal and curricular domains. For example, we only examined educational placement and support needs across children by aggregating goal attainment across goals. However, other child level factors should be examined in future research, including IEP quality, child race and ethnicity, and specific support needs (e.g., need for augmentative and alternative communication, technological supports) as well as teacher and school level factors (e.g., teacher training, teacher expectations, school support for inclusive education). As noted, the majority of the variability in goal attainment outcomes was concentrated in goals in the six learning domains for each child, and ongoing research should examine factors that impact teacher decision-making about learning goals, effective training practices for teachers to focus on all relevant learning domains for students with complex needs, and inclusive supports to advance goal attainment. Further, differences in goal attainment across academic and social-behavioral-communication domains, particularly given past research that has suggested variability in the quality of goals across these domains for a given child, particularly for academic learning (Shogren et al., in press), should be

explored and approaches to advance effective practices in schools developed and researched.

Implications for Research and Practice

The two primary results of this study offer specific implications for research and practice. The first finding suggests there is variability in goal attainment for individual students with complex support needs across learning domains, namely reading, math, writing, social, behavioral, and communication. Supporting teachers to facilitate goal attainment is critical to enhancing student outcomes, and this should occur across academic and social-behavioral-communication domains. As previously noted, the development of personalized supports is likely important in facilitating student goal attainment. Teachers need training and support to think comprehensively across the six learning domains, linking the learning of students with complex support needs to key K-6 learning standards. However, research on how to support teachers of students with complex support needs to develop these personalized supports, particularly in inclusive settings and targeting academic goals, is limited. Extant research suggests teachers incorporate an understanding of learning progression (Jimenez et al., 2021) to assess student learning and develop supports, along with the use of data-based decision-making practices (Ruhter & Karvonen, 2024) to ensure timely interventions as students work towards their goals. Use of interactive feedback to teachers as they develop goals has also been found effective during teacher preparation programs (Karal et al., 2022). Additional research is needed on effective ways to advance these practices and to evaluate their impact on student goal attainment across learning domains.

Further, extant research suggests there is a lack of personalized supports in congregate settings, like segregated classrooms, where students have been observed to receive essentially the same instruction and supports regardless of their grade level or learning goals (Kurth et al.,

2016). Therefore, it is possible teachers provide similar supports to students with complex support needs, especially when those students are taught together in segregated settings, leading to variability in goal attainment across learning domains as instruction and goals are not aligned with supports each student needs to engage in reading, writing, math, and personalized goals.

Other factors, including intensity of instruction and use of progress monitoring strategies to make timely and data-based instructional and supports decisions can also impact goal attainment; however, few studies have investigated the degree to which teachers of students with complex support needs make data-based decisions and know how to increase the intensity of instruction based on progress monitoring data (Ruhter & Karvonen, 2024). However, such supports could enable the identification of goal domains where attainment was less than expected and where students may need more personalized supports and intensified instruction to build reading, writing, math, social, communication, or behavioral skills. To highlight the importance of this area of work, one study found most teachers of students with complex support needs reported difficulty identifying effective intervention strategies and collecting and interpreting data (Brock et al., 2020) suggesting teacher training is needed in these areas to improve student outcomes. The limited body of research in this area, supplemented by our findings, demonstrates the need for additional teacher preparation in developing supports and evaluating their effectiveness, in conjunction with instructional strategies, using data-based decision-making skills to improve student outcomes across critical learning domains.

Our second overall finding was that placement decisions, which are explained by student support needs, also predict variability in goal attainment at the student level. Specifically, the model which includes both support need and education placement as predictors outperforms models that only includes them as isolated predictors. Our findings suggest the general low

quality of supports planning and lack of personalization of supports for each student could explain goal attainment within learning domains (leading to variability in outcomes within learning goals) as well as across students by suppressing or enhancing attainment across all learning domains. This explanation means that research is also needed to enable teachers to develop supports that align with student needs generally and specific to each learning domain. Extant research has suggested many IEP teams fail to address student needs when developing goals (e.g., Hott et al., 2021) and in selecting supports, which may explain our findings of higher goal attainment in Placement D if goals were of poorer quality and therefore easier to obtain (independent of student support needs). The failure to address unique student needs in a comprehensive manner suggests teams select supports based on what is available or commonly used in the setting; some teachers might even believe the segregated classroom itself is a support (e.g., Coleman et al., 2023). This may explain why being in the most inclusive and the most segregated placement impacted goal attainment across learning goals the most in this study. In the most inclusive setting, there may be greater understanding and emphasis on providing personalized supports that align with student needs (Gee et al., 2020; Kurth et al., 2021; Ruppert et al., 2018). Considering differences in goal attainment across placements in our study, research is needed that investigates the extent to which teachers set ambitious goals for their students and whether or not this varies by educational placement, given the rigor of goals could impact goal attainment as has been suggested in other research (Kurth et al., 2021; Shogren et al., in press).

Although systemic changes to advance access to these settings for students with complex needs are needed, inclusive placements, like Placement A for students with complex support needs, remain rare in the U.S. (U.S. Department of Education, 2022) and across the world (Buchner & Thompson, 2021). This is critically important as, in fully segregated settings, like

Placement D in our study, there is less differentiation of content and low expectations for learning, perhaps leading to greater global goal attainment (Agran et al., 2020). Further, the negative findings for goal attainment in Placement B and C further confirm the difficulties with “part-time” placements and how not receiving instruction in the general curriculum in general education classrooms with general education peers is highly problematic (Gee et al., 2020; Mansouri et al., 2022; Ruppert et al., 2018; Soukup et al., 2007). Our findings are consistent with the documented problems of segregated settings, including lack of instruction (e.g., Kurth et al., 2016), lack of membership (e.g., Schnorr, 1990), and missed learning and social opportunities (e.g., Feldman et al., 2016) that results from “part-time” placements.

Overall, these findings suggest that teacher training in skills like universal design for learning to create more equitable and inclusive learning environments is also needed, as is greater personalization of supports in inclusive contexts that are tailored to multiple learning domains, including reading, writing, math, social, communication, and behavior as all of these domains are critical for all students, but particularly students with complex support needs. Essentially, supports must be personalized to each student to address their overall support needs, as well as their specific supports for instruction in each of these learning domains.

Conclusion

The purpose of this paper was to analyze teacher-reported goal attainment of students with complex support needs, and examine the extent to which variability in goal attainment is concentrated within student’s learning goals across domains, or if attainment is also explained by other factors that vary across students (i.e., educational placement and overall intensity of student support needs). We found that most variability in goal attainment is predicted by differences in student attainment across learning domains. However, approximately 25% of the variability is

explained by factors that vary across students, including educational placement and overall intensity of support needs. To improve student goal attainment, research and teacher preparation focused on providing high-quality, personalized supports in the general education setting rooted in high expectations are needed.

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Table 1*Education Placements, Percent of Day in General Education, and Representativeness*

Placement	Percent of Day Students Spend in General Education	Proportional Representation of Students with and without Complex Support Needs
Placement A	80% or more	Yes
Placement B	40-79%	No
Placement C	Less than 40%	No
Placement D	0 (separate school)	No

Table 2
Sample Demographics

	Overall		Educational Placement											
			A 80% to 100%			B 40% to 79%			C 0% to 39%			D Separate School		
	N	(%)	N	(%)	N	(%)	N	(%)	N	(%)	N	(%)		
Gender Identity														
Female	21	39.62	9	56.25	4	26.67	6	60.00	2	16.67				
Male	32	60.38	7	43.75	11	73.33	4	40.00	10	83.33				
Race/Ethnicity														
Black / African American	6	11.32	2	12.50	1	6.67	1	10.00	2	16.67				
Asian American	2	3.77	0	0	2	13.33	0	0	0	0				
White / European American	40	75.47	14	87.50	10	66.67	7	70.00	9	75.00				
Multiracial	1	1.89	0	0	1	6.67	0	0	0	0				
Native American	2	3.77	0	0	1	6.67	0	0	1	8.33				
Not Reported	2	3.77	0	0	0	0	2	20.00	0	0				
Total Sample	53	100.0	16	100.00	15	100.00	10	100.00	12	100.00				

	Overall			A 80% to 100%			B 40% to 79%			C 0% to 39%			D Separate School		
	N	M	SD	N	M	SD	N	M	SD	N	M	SD	N	M	SD
	Age	53	8.830	2.064	16	8.375	2.277	15	8.867	1.846	10	8.200	1.989	12	9.917
SIS-C SNI Score	53	86.340	15.598	16	83.938	17.665	15	84.867	16.017	10	85.200	15.505	12	92.333	12.235

Table 3

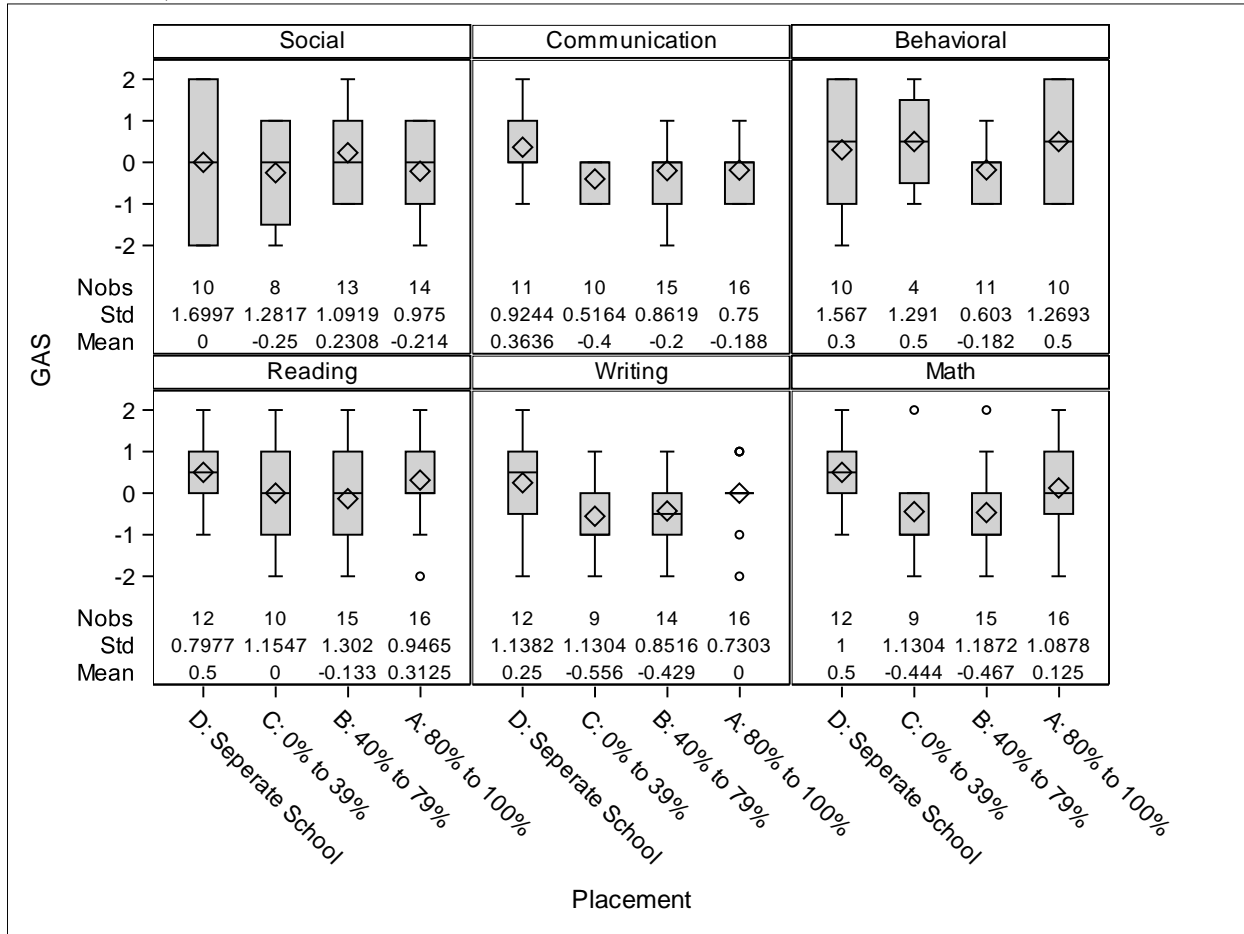
Results of BMA Analysis for Two-level Logistic Regression of Goal Attainment Outcomes on Goal Domain, Support Needs Intensity, and Education Placement.

<i>Parameter</i>	M_0		M_1		M_2		M_3	
	<i>Null</i>		<i>Support Needs Only</i>		<i>Placement Only</i>		<i>Support & Placement</i>	
	<i>Est.</i>	<i>S.E.</i>	<i>Est.</i>	<i>S.E.</i>	<i>Est.</i>	<i>S.E.</i>	<i>Est.</i>	<i>S.E.</i>
<i>Fixed Effects</i>								
<i>Intercept for Goal Attainment Across Goal Domains</i>								
(-2) Much less than expected	-2.835	0.353	-2.862	0.356	-2.342	0.438	-2.379	0.447
(-1) Less than expected	-0.853	0.285	-0.857	0.296	-0.347	0.393	-0.374	0.392
(0) Expected	1.023	0.286	1.030	0.298	1.557	0.389	1.541	0.387
(1) More than expected	2.813	0.341	2.828	0.347	3.347	0.394	3.350	0.401
(2) Much more than expected (Reference Group)								
<i>Education Placement</i>								
Placement D: Separate School					1.254	0.501	1.351	0.507
Placement C: 0% to 39% (Reference Group)								
Placement B: 40% to 79%					0.128	0.479	0.081	0.479
Placement A: 80% to 100%					0.740	0.464	0.640	0.474
<i>Supports Need Intensity*</i>			-0.618	0.361			-0.800	0.355
<i>Variance Components</i>								
Goal Domain Variance	0.247	0.323	0.275	0.363	0.223	0.253	0.232	0.267
Children-Level Variance	1.075	0.372	1.043	0.367	0.963	0.358	0.895	0.358
<i>Model Fit</i>								
Dbar (posterior mean of deviance)	772.938		771.920		772.407		771.009	
Dmean (deviance evaluated at posterior mean)	732.515		731.477		732.397		731.577	
pD (effective number of parameters)	40.423		40.444		40.010		39.432	
DIC (smaller is better)	813.361		812.364		812.417		810.441	
Model Weight	0.117		0.192		0.187		0.503	

***Note.** Support Needs Intensity was scaled to have a mean of zero, with a value of 1 corresponding to two standard deviations away from the mean. This standardization scheme improves the comparability of coefficients of metric and binary variables. The rows under “fixed effects” show the estimated effect (with standard error) for model parameters on the logodds scale. The rows under “Random Effects” show variance of random effects for goal domains and children, which means that the effects of domain were always controlled for in these exploratory analyses to be true to the structure of the data. In the rows under “Model Fit”, DIC denotes the Deviation Information Criterion Value and Model Weight the corresponding model probability. The model probability denotes the probability this model has the most explanatory power in the set given data.

Figure 1

Box plots of the distribution of goal attainment outcomes across students by goal domain crossed with education placement, with accompanying descriptive statistics (mean, standard deviation, and cell size).



Note. Std denote standard deviation; Mean denotes average; and Nobs denotes cell size. The box plots shows some variation in goal attainment outcomes among sampled children with complex support needs. The aim of two-level ordered logistic regression is to decompose the source of this total variation into factors coming from goal domain (level-1) and factors coming from child (level-2).