The Association Between Teaching Students with Disabilities and Teacher Turnover

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Background

Teacher turnover, when a teacher moves schools or leaves teaching, has detrimental effects on schools and students (Ronfeldt, Loeb, & Wyckoff, 2013). Turnover contributes to inequities in the distribution of effective teachers across schools (Clotfelter, Ladd, & Vigdor, 2006; Feng & Sass, 2017), and creates a financial burden for schools and districts who must fill vacant positions (Milanowski & Odden, 2007). Turnover negatively affects student academic outcomes by disrupting instructional cohesion (Ronfeldt et al., 2013) and poses challenges to the implementation of educational programs (McLeskey & Billingsley, 2008). The failure of teachers to return to their schools has immediate consequences for students and schools.

In the United States, the majority of students with disabilities (SWDs) are primarily educated in general education classrooms by general education teachers (Dewey et al., 2017; Gilmour & Henry, 2018a; McLeskey et al., 2012). General education teachers are expected to provide instruction to SWDs, but these teachers may be unprepared to meet these students' needs (Jenkins & Ornelles, 2009; Segall & Campbell, 2012). Examining if teaching SWDs is associated with teacher turnover and the extent to which special education certification attenuates this association is critical for improving the outcomes of these students.

Purpose

The purpose of this study was (1) to examine if teaching SWDs was associated with turnover (2) to evaluate how this association varied by disability, and (3) to identify if special education certification moderated these associations. Teachers have higher probabilities of turnover when they work in schools that serve more disadvantaged students (Boyd, Lankford, Loeb, Rockoff, & Wyckoff, 2008; Hanushek, Kain, & Rivkin, 2004) or teach students who exhibit problem behavior (Feng, 2009). We hypothesized that the percentage of SWDs, particularly disabilities related to behavior, in teachers' classes would be positively associated with turnover, but moderated by special education certification.

Methods

Data Source and Sample

We used administrative data from North Carolina (NC) that linked students to teachers and teachers to schools. We included data from the 2009/10, 2010/11, and 2012/13 school years. This study included all full-time classroom teachers in regular public schools who taught kindergarten through twelfth grade in NC and taught at least one SWD. The final sample included 116,827 teachers with 217,285 teacher-by-year records. Tables 1–3 present sample demographics at the teacher, classroom, and school levels.

Variables

We examined total end-of-year turnover as the dependent variable because moving and leaving have the same organizational results, the loss of a teacher from a school. The primary predictor variables were the the average percentage of SWDs in teachers' classes in a given year or the average percentage of students with specific disabilities in teachers' classes in a given year. We calculated these variables by merging course roster data with student characteristics. These variables were grand mean centered.

We examined special education certification as a moderator. We considered a teacher as special education certified if they only had a certification in special education. We considered a teacher as dual-certified if they were certified in special education and a general education content area.

Prior research suggests that SWDs may be grouped together (Gilmour & Henry, 2018a) or assigned teachers with different characteristics based on their disability (Gilmour & Henry,

2018b). We included classroom characteristics, teacher characteristics, and school characteristics in the models to address some potential omitted variable bias if these characteristics were correlated with both turnover and student assignment to teachers. The control variables are listed in Tables 1–3. We grand mean centered the control variables.

Data Analysis

We built multilevel logistic models, with teacher and school random effects, adding teacher, classrooms, and school level variables in groups to identify how the association between teaching SWDs and turnover changed. We added a school fixed effect in the final model to address unobserved, time invariant differences between schools. First we built the models using the percentage of SWDs in teachers' classes as the predictor of interest, then we built the models using the percentage of students with specific disabilities in teachers' classes as the predictor of interest. We added interactions between special education certification and dual-certification and the percentage of SWDs in teachers' classes or the percentage of students with specific disabilities in teachers' classes. We probed these interactions by re-centering the percentage of SWDs and refitting models changing the comparison group to test the differences between certification categories.

Results and Conclusions

We found that the percentage of SWDs in teachers' classes was associated with an increase in the odds of turnover after controlling for teacher, classroom, and school characteristics (Table 4). A class in which 25% of the students had disabilities was associated with a conditional probability of turnover of 0.04. This association was completely moderated by special education certification and partially moderated by dual-certification (Table 5). Most disability categories were related to teacher turnover (Table 6), with the strongest associations being between the percentage of students with BD or autism and teacher turnover. A class in which 25% of the students had BD was associated with a conditional probability of turnover of 0.05. Some of these associations were moderated by special education certification (Table 7). Across all models, teacher, classroom, and school characteristics weakened the associations between teaching SWD or students with specific disabilities and teacher turnover. The coefficients from the school fixed effects models suggested that unmeasured differences between schools influenced the association between teaching SWDs and turnover.

The inclusion of SWDs in general education classrooms appears to substantively influence teacher career decisions. However, special education certification, indicating training or commitment to SWDs, changes this association in meaningful ways. Teaching students with behavior problems appears challenging for all teachers despite a large number of existing classroom management practices and school-wide programs that results in fewer behavior problems (Simonsen, Fairbanks, Briesch, Myers, & Sugai, 2008). The results here may not generalize to other states, are not causal, and more research is needed to examine the mechanisms underlying these results.

References

Boyd, D., Lankford, H., Loeb, S., Rockoff, J., & Wyckoff, J. (2008). The narrowing gap in New York City teacher qualifications and its implications for student achievement in high-poverty schools. *Journal of Policy Analysis and Management*, *27*, 793–818. doi:10.1002/pam.20377

Clotfelter, C. T., Ladd, H. F., & Vigdor, J. L. (2006). Teacher-student matching and the assessment of teacher effectiveness. *Journal of Human Resources, 41*, 778–820. doi:10.3368/jhr.XLI.4.778

Dewey, J., Sindelar, P. T., Bettini, E., Boe, E. E., Rosenberg, M. S., & Leko, C. (2017). Explaining the decline in special education teacher employment from 2005 to 2012. *Exceptional Children*, *83*, 315–329. doi:10.1177/0014402916684620

Feng, L. (2009). Opportunity wages, classroom characteristics, and teacher mobility. *Southern Economic Journal*, *75*(4), 1165–1190.

Feng, L., & Sass, T. R. (2013). What makes special-education teachers special? Teacher training and achievement of students with disabilities. *Economics of Education Review*, *36*, 122–134. doi:10.1016/j.econedurev.2013.06.006

Gilmour, A. F., & Henry, G. T. (2018a). Who are the classmates of students with disabilities in elementary mathematics classrooms? *Remedial and Special Education*. Advance online publication. doi:10.1177/0741932518789493

Gilmour, A. F., & Henry, G. T. (2018b). A comparison of the teacher quality of late elementary and middle school students with disabilities to the teacher quality of their peers without disabilities in math. *The Elementary School Journal, 118,* 426-451. doi:10.1086/696140

Hanushek, E. A., Kain, J. F., & Rivkin, S. G. (2004). Why public schools lose teachers. *The Journal of Human Resources*, *39*, 326–354. doi:10.2307/3559017

Jenkins, A., & Ornelles, C. (2009). Determining professional development needs of general educators in teaching students with disabilities in Hawai'i. *Professional Development in Education, 35*, 635–654. doi:10.1080/13674580802568930

McLeskey, J., & Billingsley, B. S. (2008). How does the quality and stability of the teaching force influence the research-to-practice gap? A perspective on the teacher shortage in special education. *Remedial and Special Education, 29*, 293–305. doi:10.1177/0741932507312010

McLeskey, J., Landers, E., Williamson, P., & Hoppey, D. (2012). Are we moving toward educating students with disabilities in less restrictive settings? *The Journal of Special*

Milanowski, A., & Odden, A. R. (2007). *A new approach to the cost of teacher turnover* (Working Paper No. 13). Seattle, WA: Center on Reinventing Public Education. Retrieved from https://www.crpe.org/sites/default/files/wp_sfrp13_milanowskiodden_aug08_0.pdf

Ronfeldt, M., Loeb, S., & Wyckoff, J. (2013). How teacher turnover harms student achievement. *American Educational Research Journal, 50*, 4–36. doi:10.3102/0002831212463813

Segall, M. J., & Campbell, J. M. (2012). Factors relating to education professionals' classroom practices for the inclusion of students with autism spectrum disorders. *Research in Autism Spectrum Disorders*, *6*(3), 1156–1167. doi:10.1016/j.rasd.2012.02.007

Simonsen, B., Fairbanks, S., Briesch, A., Myers, D., & Sugai, G. (2008). Evidence-based practices in classroom management: Considerations for research to practice. *Education & Treatment of Children*, *31*, 351–380. doi:10.1353/etc.0.0007

Table 1
Teacher Characteristics (*n*=116,827)

Variable	Percentage	*SD*	Range
Race/ethnicity			
White	82.13		
Black	13.36		
Hispanic	1.56		
Other minority	1.25		
Native American	1.00		
Asian	0.70		
Certification[a]			
Elementary	58.77		
Other	33.64		
English	15.08		
Social studies	13.18		
Math	11.24		
Science	9.91		
Special education only	6.19		
Dual-certification	4.89		
Test dual-certification	0.94		
Preparation and Entry			
Traditional			
In-state	49.24		
Out-of-state	29.44		
Alternative			
Other	15.17		
Teach for America	0.77		
Visiting teacher	0.66		
Unclassified entry to teaching	4.72		
Other Demographics			
Years of experience[b]	10.99	9.57	0 – 54
Male	20.91		

Note.
[a]The certification categories add up to above 100% because teachers could have certifications in multiple areas.
[b]Years of experience reflects a mean not a percentage.

Table 2
Classroom Characteristics (n = 217,285).

Variable	M	SD	Range
Disability Status			
Students without disabilities	80.02	25.76	0 – 99.88
Students with disabilities	19.98	25.76	0.12 – 100
Learning disabilities	7.26	11.25	0 – 100
Gifted	10.16	13.59	0 – 100
Other health impairment	3.65	7.38	0 – 100
Intellectual disabilities	3.12	10.70	0 – 100
Speech/language impairments	3.05	6.54	0 – 100
Other disability	2.04	8.06	0 – 100
Autism	1.77	8.31	0 – 100
EBD	0.86	4.40	0 – 100
Race/Ethnicity			
White	51.60	28.09	0 – 100
Black	27.10	23.96	0 – 100
Hispanic	12.73	14.17	0 – 100
Other race	5.28	8.70	0 – 100
Asian	2.23	4.90	0 – 100
Other Demographics			
Male	52.43	14.44	0 – 100
Free/reduced lunch	55.15	24.92	0 – 100
English language learner	7.58	12.93	0 – 100
Class size[a]	17.56	7.01	1 – 439
Absences per pupil[b]	8.31	3.72	0 – 132

Note. Teachers may have multiple years of classroom data and all years are included in the descriptive statistics.

[a]Class size reflects mean class size not a percentage. The large classes are primarily due to marching band and other electives.

[b]Absences per pupil reflects the mean absences per pupil not a percentage.

Table 3
School Characteristics (n = 2,305)

Variable	Percentage/*M*	*SD*	Range
School level			
Elementary school	56.18		
High school	21.30		
Middle school	18.79		
Elementary and middle	4.99		
Other grade configuration	0.39		
Area designation			
Rural	55.79		
City	26.68		
Town	14.36		
Suburb	13.63		
State growth goals			
Met	45.03		
Exceeded	44.29		
Did not meet	21.43		
Race/ethnicity			
White	52.75	27.18	0.24 – 100
Black	26.91	23.32	0 – 97.50
Hispanic	12.84	11.11	0 – 74.42
Other	5.37	7.22	0 – 95.73
Asian	2.13	3.43	0 – 47.19
Demographics and expenditures			
Free/reduced lunch	59.27	23.79	0 – 100
Title 1	53.89		
Total per pupil expenditure in hundreds	89.92	34.55	13.86 – 1443.40
Acts of violence per 1000 students	6.15	7.71	0 – 93.35

Note. Some school locations, grade level, and growth designations changed over time. These schools are coded between 0-1 depending on the proportion of years with the specific designation. These percentages are rounding schools coded as .5 to 1. This is also why the percentages do not add to 100.

Table 4

Association Between the Average Percentage of Students with Disabilities in Teachers' Classes and the Odds of Turnover (RQ1)

	Model 1		Model 2		Model 3		Model 4		Model 5[a]	
	Coeff.	*SE*	Coeff.	*SE*	Coeff.	*SE*	Coeff.	*SE*	Coeff.	*SE*
% SWDs	0.005***	0.000	0.004***	0.001	0.003***	0.001	0.003***	0.001	0.003***	0.001
SPED	-	-	0.153***	0.053	0.143**	0.053	0.142**	0.053	0.094*	0.041
Dual	-	-	0.108*	0.047	0.093*	0.046	0.098*	0.047	0.064	0.035
Intercept	-3.009***	0.045	-3.176***	.050	-3.099***	0.048	-3.185***	0.070	-	-
Teacher var.			X		X		X		X	
Class var.					X		X		X	
School var.							X			
School FE									X	
Variances										
Teacher	3.719	0.159	2.128	0.132	2.00	0.128	2.031	0.129	-	-
School	0.609	0.032	0.402	0.022	0.287	0.017	0.273	0.016	-	-
Fit statistics										
LL (*df*)	-89557.2 (6)		-87808.5 (29)		-87525.4 (40)		-87468.4 (57)		-	
AIC	179126.3		175675.1		175130.8		175050.8		-	
BIC	179188.1		175973.5		175542.3		175637.3		-	
Sample size										
Observations	217,285		217,285		217,285		217,285		216,869	
Teachers	116,827		116,827		116,827		116,827		105,178	
Schools	2,305		2,305		2,305		2,305		2,274	

Note. SWDs= Students with disabilities. LL = Log likelihood. Var. = variables. FE = Fixed effects. Coefficients are on a logit scale.
[a]All models include a year fixed effect. Intercepts are school specific in Model 5 so are not included in the table. Fit information is excluded for Model 5 because the sample is not the same as the sample used in prior models.
 p < .05. **p* < .01. ****p* <.001.

Table 5

Interactions Between the Average Percentage of Students with Disabilities in Teachers'
Classes and Certification Area Varying Reference Group (RQ3)

	General Ed.		SPED		Dual	
	Coeff.	*SE*	Coeff.	*SE*	Coeff.	*SE*
% SWDs	0.005***	0.000	-0.001	0.002	0.003**	0.001
SPED*SWD	-0.006***	0.002	-	-	-0.004*	0.002
Dual*SWD	-0.002***	0.001	0.004*	0.002	-	-
Gen.*SWD	-	-	0.006***	0.002	0.002	0.001
Gen.	-	-	-0.410***	0.0107	-0.93	0.055
SPED	0.410***	0.107	-	-	0.319**	0.119
Dual	0.092	0.055	-0.318**	0.119	-	-
Intercept	-3.166***	0.070	-2.756***	.050	-3.088***	0.089
Variances						
Teacher	2.015	0.129	2.011	0.129	2.058	0.146
School	0.272	0.016	0.272	0.016	0.274	0.017
Fit statistics						
LL (*df*)	-87457.97 (60)		-87458.0 (60)		-87458.34 (60)	
AIC	175035.9		175036.0		175036.7	
BIC	175653.3		175653.3		175654.0	
Sample size						
Observations	217,285		217,285		217,285	
Teachers	116,827		116,827		116,827	
Schools	2,305		2,305		2,305	

Note. SWDs = Students with disabilities. LL = Log likelihood. Var. = variables.
Coefficients are on a logit scale. All models include a year fixed effect.
*p < .05. **p < .01. ***p <.001.

Table 6

Association Between the Average Percentage of Students with Specific Disabilities in Teachers' Classes and the Odds of Turnover (RQ2)

	Model 1		Model 2		Model 3		Model 4		Model 5[a]	
	Coeff.	*SE*	Coeff.	*SE*	Coeff.	*SE*	Coeff.	*SE*	Coeff.	*SE*
% LD	0.005***	0.001	0.004***	0.001	0.002*	0.001	0.002*	0.001	0.002*	0.001
% SLI	-0.004*	0.002	-0.002	0.001	-0.001	0.002	0.001	0.002	0.001	0.001
% ID	0.005***	0.001	0.004***	0.001	0.002*	0.001	0.002*	0.001	0.002*	0.001
% EBD	0.016***	0.002	0.014***	0.002	0.010***	0.002	0.011***	0.002	0.008***	0.001
% AU	0.004***	0.001	0.003**	0.001	0.003**	0.001	0.004**	0.001	0.003***	0.001
SPED	-	-	0.091	0.055	0.109*	0.055	0.117*	0.056	0.075	0.042
Dual	-	-	0.067	0.048	0.070	0.047	0.081	0.048	0.052	0.036
Intercept	-2.999***	0.044	-3.156***	0.050	-3.091***	.048	-3.235***	0.077	-	-
Teacher var.			X		X		X		X	
Class var.					X		X		X	
School var.							X			
School FE									X	
Variances										
Teacher	3.707	0.158	2.120	0.132	1.998	0.128	2.189	0.162		
School	0.595	0.031	0.399	0.022	0.287	0.017	0.280	0.017		
Fit statistics										
LL (*df*)	-89518.2 (12)		-87781.4 (35)		-87510.95 (46)		-87450(63)			
AIC	179060.4		175632.8		175113.9		175026.2			
BIC	179183.9		175992.9		175587.2		175674.4			
Sample size										
Observations	217,285		217,285		217,285		217,285		216,869	
Teachers	116,827		116,827		116,827		116,827		105,178	
Schools	2,305		2,305		2,305		2,305		2,274	

Note. LD = Learning disabilities. SI = Speech/language impairments. ID = Intellectual disabilities. EBD = Emotional/behavior disorders. AU = Autism. LL = Log likelihood. Var. = variables. FE = Fixed effects. Coefficients are on a logit scale. All models include a year fixed effect, the percentage of students with other disabilities (visual impairment, hearing impairment, traumatic brain injury, etc.), and the percentage of students with other health impairments in the class.
[a]Intercepts are school specific in Model 5 so are not included in the table. Fit information is excluded for Model 5 because the sample is not the same as the sample used in prior models.
p < .05. **p* < .01. ***p* <.001.

Table 7

Interactions Between the Average Percentage of Students with Specific Disabilities in Teachers' Classes and Certification Area Varying Reference Group (RQ3)

	General Ed.		SPED		Dual	
	Coeff.	*SE*	Coeff.	*SE*	Coeff.	*SE*
% LD	0.007***	0.001	-0.004*	0.002	0.002	0.002
% SLI	0.007	0.002	0.000	0.006	-0.006	0.007
% ID	0.002	0.002	-0.002	0.002	0.003	0.002
% EBD	0.012**	0.004	0.005	0.003	0.015***	0.003
% AU	0.009**	0.003	-0.001	0.002	0.005*	0.002
SPED*% LD	-0.010***	0.002	-	-	-0.006*	0.002
SPED*% SLI	-0.000	0.006	-	-	0.007	0.009
SPED*% ID	-0.004	0.002	-	-	-0.004	0.002
SPED*% EBD	-0.008	0.005	-	-	-0.011**	0.004
SPED*% AU	-0.010**	0.003	-	-	-0.006*	0.002
Gen.*% LD	-	-	0.010***	0.002	0.005*	0.002
Gen. *% SLI	-	-	0.000	0.006	0.007	0.007
Gen. *% ID	-	-	0.003	0.003	-0.001	0.003
Gen. *% EBD	-	-	0.008	0.005	-0.003	0.005
Gen. *% AU	-	-	0.010**	0.003	0.004	0.003
Dual *% LD	-0.005*	0.002	0.006*	0.002	-	-
Dual *% SLI	-0.007	0.008	-0.007	0.009	-	-
Dual *% ID	0.001	0.003	0.004	0.002	-	-
Dual *% EBD	0.003	0.005	0.011**	0.004	-	-
Dual *% AU	-0.004	0.004	0.006*	0.003	-	-
Test*% LD	-0.011**	0.004	-0.001	0.004	-0.007	0.004
Test*% SLI	0.029	0.024	0.029	0.024	0.036	0.024
Test*% ID	-0.004	0.004	-0.000	0.004	-0.004	0.004
Test*% EBD	-0.006	0.008	0.002	0.008	-0.009	0.008
Test*% AU	-0.013*	0.006	-0.004	0.006	-0.009	0.006
Gen.	-	-	-0.352***	0.089	-0.096	0.053
SPED	0.357***	0.090	-	-	0.257**	0.098
Dual	0.098	0.054	-0.257**	0.098	-	-
Test	0.235	0.135	-0.118	0.156	0.138	0.142
Intercept	-3.294***	0.076	-2.805***	0.109	-3.062***	.086
Teacher var.	X		X		X	

Class var.	X		X		X	
School var.	X		X		X	
Variances						
Teacher	2.152	0.157	2.006	0.129	2.005	0.129
School	0.279	0.017	0.272	0.016	0.272	0.016
Fit statistics						
LL (*df*)	-87424.9 (81)		-87427.6 (81)		-87427.6 (81)	
AIC	175011.9		175017.1		175017.2	
BIC	175845.3		175850.5		175850.6	
Sample size						
Observations	217,285		217,285		217,285	
Teachers	116,827		116,827		116,827	
Schools	2,305		2,305		2,305	

Note. LD = Learning disabilities. SLI = Speech/language impairments. ID = Intellectual disabilities. EBD = Emotional/behavior disorders. AU = Autism. OH = Other health impairment. LL = Log likelihood. Var. = variables. FE = Fixed effects. Coefficients are on a logit scale. All models include a year fixed effect, the percentage of students with other disabilities (visual impairment, hearing impairment, traumatic brain injury, etc.), and the percentage of students with other health impairments in the class.
*p < .05. **p < .01. ***p <.001.