Impact of Beginning Career Science Teachers' Social Networks and Self-Efficacy on Retention

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Teacher Preparation and Retention

- Science and mathematics teachers are known to be the most likely to leave their schools or the profession than teachers from other fields, resulting in teacher shortages in these areas

- Teacher preparation programs have been created to address this concern, using varying strategies to prepare teachers for work in public schools and address long-term retention

- The Noyce Program
  - Provides various supports, such as induction programs, networking opportunities, and mentoring for early career teachers to help beginning career teachers manage the challenges of the profession

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What Impacts Teacher Retention?

- Some studies have indicated that teachers' social support networks affect retention
  - Teaching effectiveness and retention are affected by the strength and nature of teachers' collaborative networks, both inside and outside of school settings
  - Teachers with a strong support network are more likely to teach effectively and remain in high-need schools

- Teacher self-efficacy is also shown to impact retention
  - According to social cognitive theory, because current beliefs are thought to powerfully predict future behavior, teacher self-efficacy may be a better predictor of retention than teachers' current levels of effectiveness

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Social Network Analysis

- A method used to detect and interpret patterns of social ties among network actors, such as teachers
  - Unique in that the interest is not necessarily in the individual, but instead, on the relationships between individuals
- Two advantages of using an Ego- or Personal-Network approach in this study:
  1. No predefined assumptions regarding network bounds
  2. Flexibility for teacher respondents to define their individual support networks

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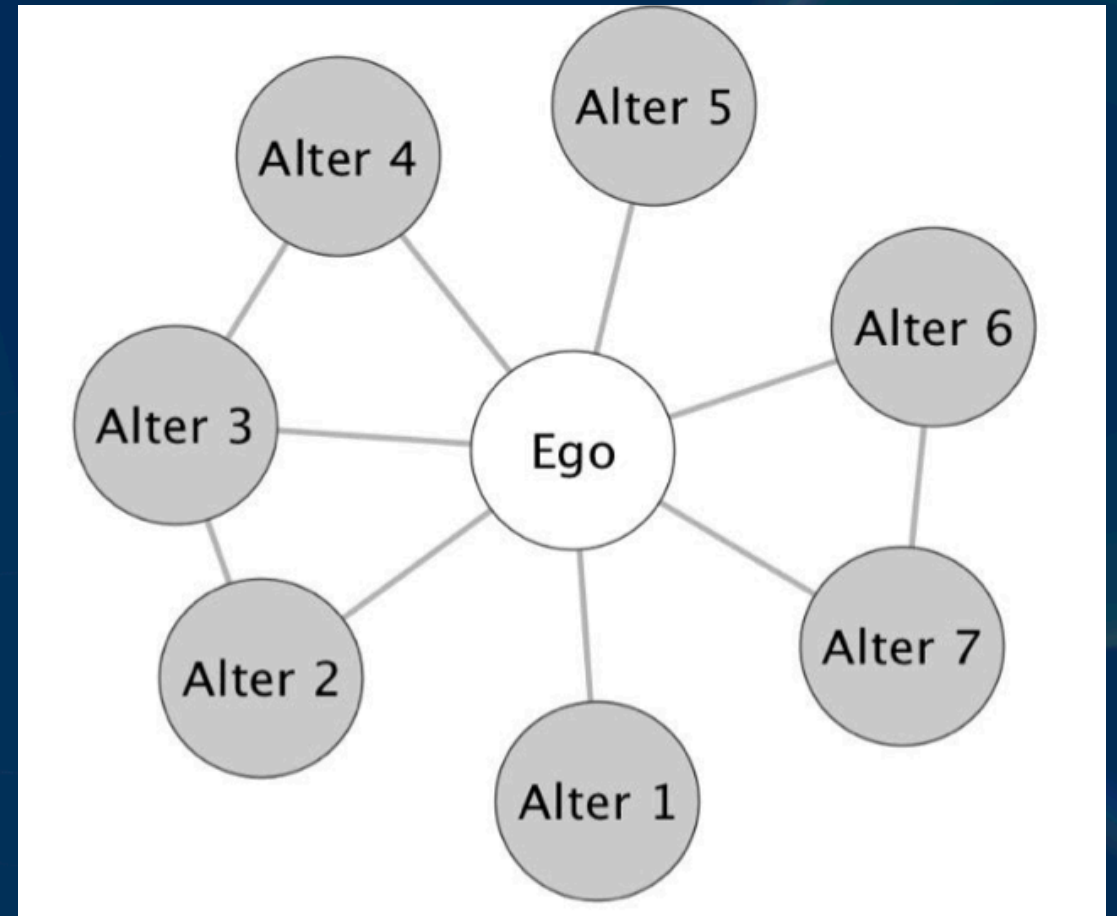
Research Questions

1. How do science teachers' personal networks and self-efficacy affect their retention?

2. What are the relationships among beginning career science teachers' self-efficacy, personal network structure, school climate factors, and retention?

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Study Design

- Teacher Personal Network Survey (TPNS)
  - Survey is designed to elicit information regarding teachers' person networks, self-efficacy, likelihood of retention
  - Additional survey items are included regarding respondent demographics, school climate, etc.

- Dependent Variable: Likelihood of retention

Q: How likely is it that you will continue to be employed as a **K-12 teacher** in the future?

	Very unlikely	Unlikely	Neutral	Likely	Very likely
1 year from now (2018-2019)	○	○	○	○	○
3 years from now (2020-2021)	○	○	○	○	○
5 years from now (2022-2023)	○	○	○	○	○
10 years from now (2027-2028)	○	○	○	○	○

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Analysis Sample

- Overall study sample size = 160, represents 50 Noyce programs across 30 states

- In this paper, only 50 of the study participants are Noyce Scholars who are science teachers with 1 year or less of teaching experience (i.e., novice teachers)

		n	%
Gender	Female	41	82%
	Male	9	18%
Ethnicity	White (Non-Hispanic)	38	76%
	Black/African American	3	6%
	Latino/Latina	3	6%
	Other Ethnicity	6	12%
Age	20-25	34	68%
	26-30	10	20%
	31+	6	12%

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Analysis Method

- Network data analyzed using E-Net
  - Numerous network measures calculated, including those related to network size, structure, and composition

- Network measures examined in relation to other variables
  - Descriptive statistics
  - OLS Regression

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Results

- Moderate correlations between retention variables and network variables exist, but only for the more general, "Retention as a Teacher".
  - Statistics regarding network composition (i.e., heterogeneity) and structure (i.e., effective size) are moderately correlated with retention, especially at 3 years and 5 years

- Heterogeneity:
  - Respondents who have a greater diversity of alters (i.e., how they know their alter) are more likely to remain teachers

- Effective Size:
  - Respondents who receive more unique sources of support (i.e., non-redundant ties) are more likely to remain teachers

	Degree	Density	Effective Size	Heterogeneity
Retention - 1 Year	0.18	-0.16	0.2	0.11
Retention - 3 Years	0.35	-0.09	0.34	0.23
Retention - 5 Years	0.37	-0.2	0.36	0.32
Retention - 10 Years	0.23	-0.1	0.21	0.06
High Need - 1 Year	-0.15	-0.17	-0.08	0.02
High Need - 3 Years	-0.11	-0.1	-0.07	0.11
High Need - 5 Years	0.1	-0.13	0.1	0.18
High Need - 10 Years	0.13	-0.17	0.12	0.16

Results

Regression analysis predicting likelihood of retention as a teacher in 5 years

|	Model 1		Model 2	
	Estimate	SE	Estimate	SE
Intercept	1.58	1.32	1.34	1.00
Heterogeneity	1.96*	.73	1.83***	.67
Self-Efficacy (Classroom Management)	.32*	.14	.31*	.14
School Safety	-.68	.37	--	--
Peer and Adult Relationships	.16	.25	--	--
Staff Connectedness	.31	.24	--	--
Adjusted R^2	.30		.20	
n = 50				

* $p < .05$ ** $p < .01$.   *** $p < .001$

Network Heterogeneity and Retention

This is an example of three science teachers' ego networks

As network heterogeneity increased, the likelihood of a teacher remaining in the classroom in 5 years also increased.

In contrast, a teacher who is less likely to be retained has less network heterogeneity; in other words, their network consists of the same "type" of people.

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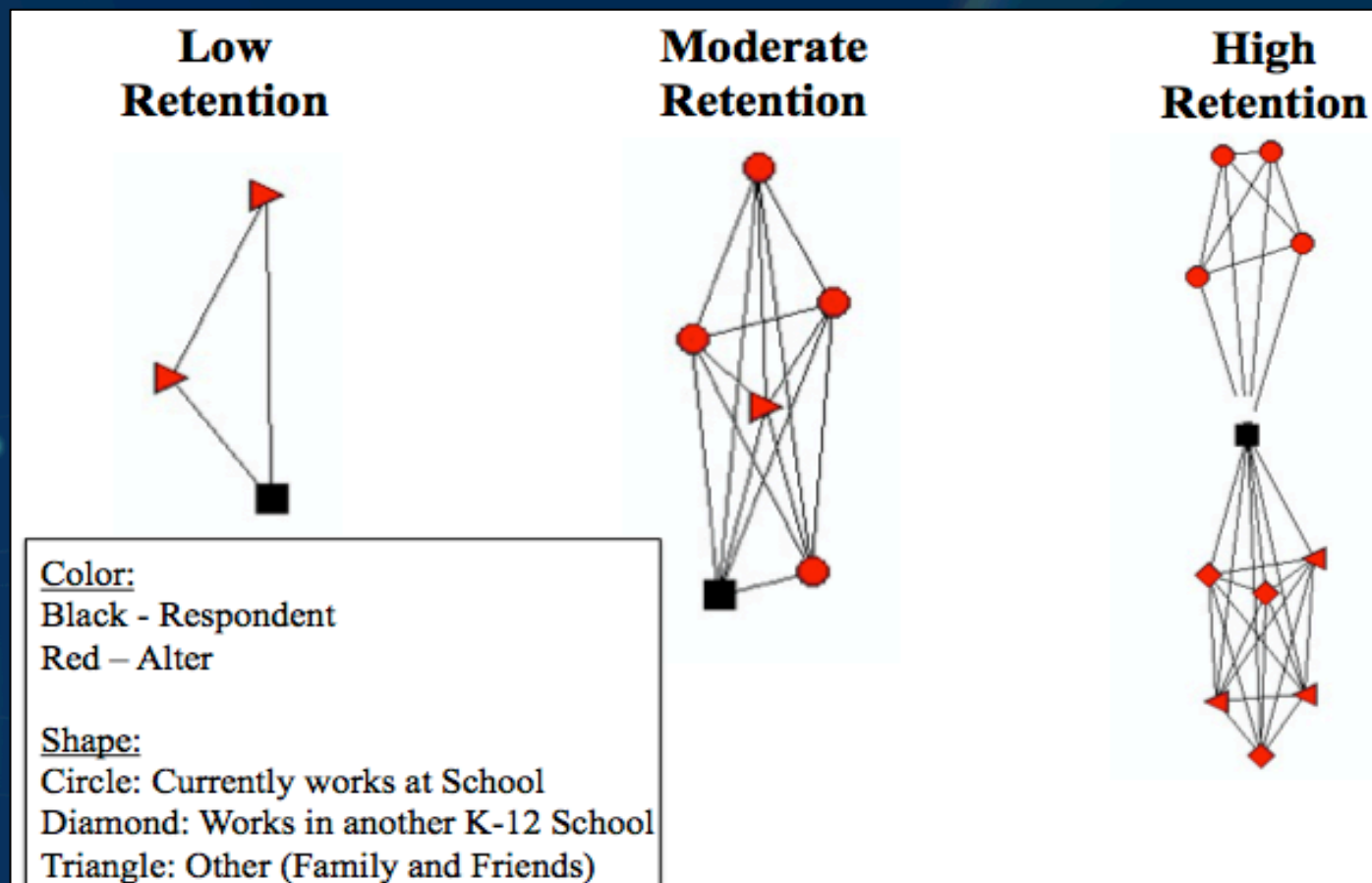
Summary of Findings

- For novice science teachers, it appears that there is a relationship between network measures, self-efficacy, and retention

- Descriptively, network composition and structure have a generally positive relationship with teacher retention in general, but a weaker relationship with retention specifically in a high needs school
  - Generally speaking, the more unique sources of information a novice science teacher has access to from their network and the more varied the types of people in their support network, the more likely they are to remain a teacher

- Both the diversity of a novice science teacher's network and their self-efficacy in classroom management are significantly related to their likelihood of remaining a teacher 5 years from the time of study

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