

Introduction

Research has shown that people have different beliefs about intelligence with some believing that intelligence is malleable (growth mindset) and others believing that intelligence is a fixed trait (fixed mindset; Dweck, 1999). Studies have shown that having a growth mindset promotes learning, while a fixed mindset hinders learning (Dweck, 1999). As a result, research has aimed to identify factors that promote a growth mindset in children. For example, research has found that students' mindset beliefs are influenced by the messages that they receive from their parents and teachers. (Mueller & Dweck, 1998; Rattan, Good, & Dweck, 2012). Even though adult socialization agents have been studied, little research has examined the role of peers in children's growth mindset beliefs. This is surprising given that studies have found that peers influence children's academic related attitudes and behaviors (Brechtwald & Prinstein, 2011).

Social network theory suggests that selection and influence are core components of friendships (Kandel, 1978; Moreland & Levine, 1992). More specifically, examining selection and influence is important in understanding how peers choose similar friends and become more similar to one another over time. Therefore, the purpose of the present study was to examine the role of peers in children's growth and fixed mindset beliefs.

Participants

- ❖ 62 third grade students were recruited from an elementary school in a large metropolitan area in the Southwestern US (49% female).

Procedure

- ❖ Students were recruited as part of a larger longitudinal study examining STEM-related achievement beliefs. Surveys were collected in Spring 2019 before and after participating in a STEM-focused growth mindset or control intervention. All students in this study participated in the control intervention.

Measures

- ❖ Growth Mindset Beliefs
 - ❖ 3 self-report items, 4-point scale, $\alpha = .66$
 - ❖ E.g. People can change how smart they are. Do you agree?
- ❖ Fixed Mindset Beliefs
 - ❖ 3 self-report items, 4-point scale, $\alpha = .71$
 - ❖ People can learn new things, but they can't change how smart they are. Do you agree?
- ❖ Friendship Nominations
 - ❖ Students were asked to nominate up to 10 friends from the same grade at their school

Research Question and Analyses

- ❖ Are children's mindset beliefs related to the number of friendship nominations they make and receive?
- ❖ Do children select friends who have similar mindset beliefs?
- ❖ Do children's friendships influence changes in growth or fixed mindset beliefs over time?
- ❖ These questions were examined by conducting longitudinal social network analyses in RSIENA. Specifically, we examined selection and influence, controlling for network structure, ego, and alter effects.

Results: Network Structure Effects

Table 1
Network Structure Parameter Estimates

Parameter	Estimate	Standard error	p-value
Network structure controls			
Outdegree (density)	-1.84	0.84	$p < .05$
Reciprocity	1.15	0.15	$p < .001$
Transitive triplets	0.30	0.03	$p < .001$
3-cycles	-0.17	0.07	$p < .01$

- ❖ Outdegree and reciprocity effects indicate children were selective in their nominations and preferred reciprocating relationships.
- ❖ A positive transitive triplets effect and a negative three-cycles effect indicate a strong hierarchical tendency in the network (Snijders, van de Bunt, & Steglich, 2010).
- ❖ The Jaccard index from time one to time two in the network was 0.41, which represents a stable network (Snijders, van de Bunt, & Steglich, 2010).

Results: Growth/Fixed Mindset Control Effects

Table 2
Growth and Fixed Mindset Control Effect Parameter Estimates

Parameter	Estimate	Standard error	p-value	Odds-ratio
Growth mindset controls				
Selection ego effect	0.44	0.22	$p < .05$	1.55
Selection alter effect	0.42	0.21	$p < .05$	1.52
Influence indegree effect	0.14	1.57	$p > .05$	1.15
Influence outdegree effect	-0.09	0.24	$p > .05$	0.91
Fixed mindset controls				
Selection ego effect	-0.04	0.06	$p > .05$	0.96
Selection alter effect	-0.02	0.05	$p > .05$	0.98
Influence indegree effect	-0.06	0.25	$p > .05$	0.94
Influence outdegree effect	0.02	0.24	$p > .05$	1.02

- ❖ Ego and alter effects in the model examining friendship selection by growth mindset indicate that students with high growth mindset were one and a half times more likely to give and receive friendship nominations.
- ❖ Controls for the fixed mindset similarity model were not significant indicating that children gave and received friendship nominations regardless of their level of fixed mindset.
- ❖ Controls for growth and fixed mindset influence models were not significant indicating that mindset beliefs were not associated with children's popularity level.

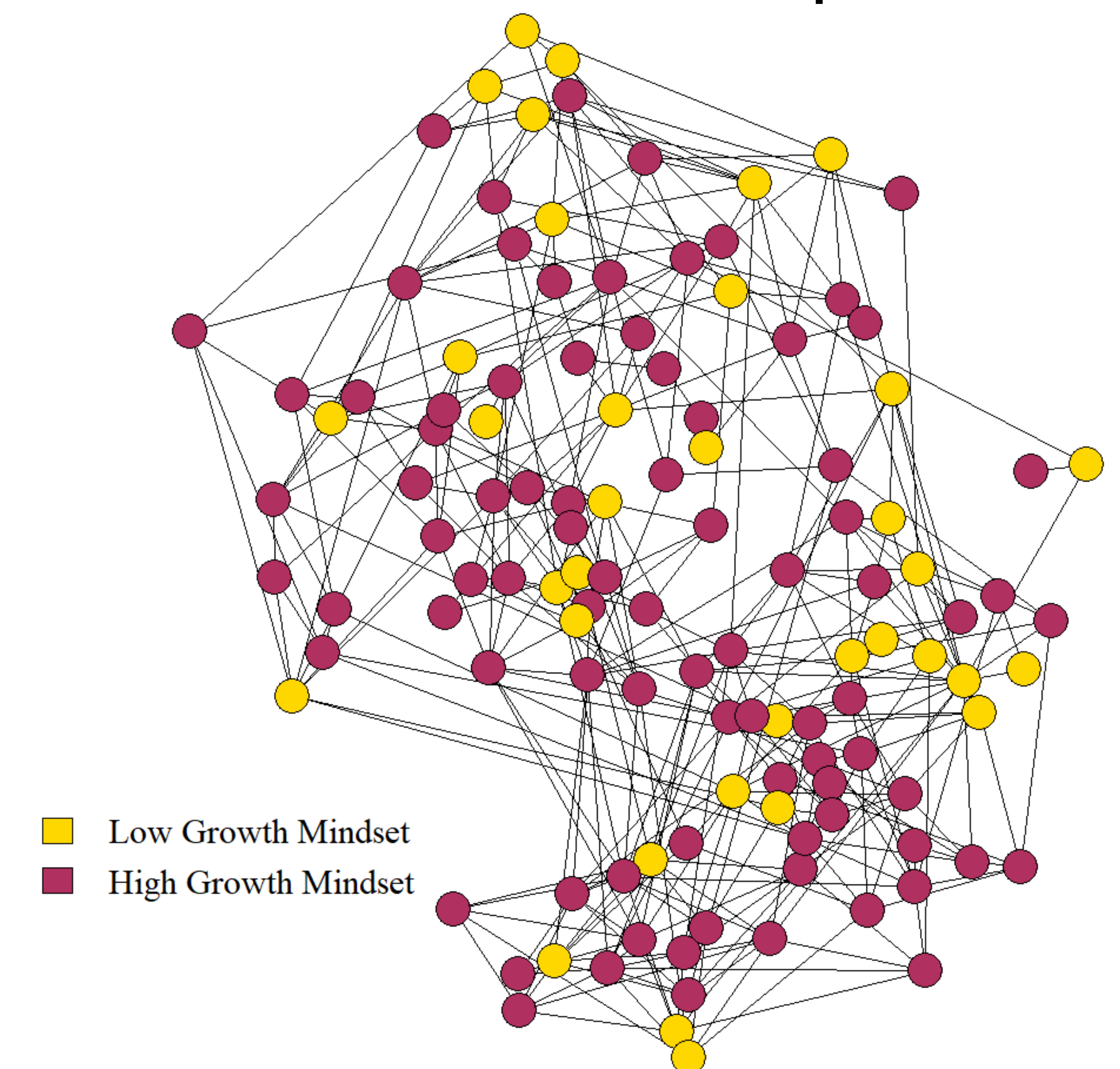
Results: Selection and Influence Effects

Table 3
Selection and Influence Effects Parameter Estimates

Parameter	Estimate	Standard error	p-value	Odds-ratio
Selection main effects				
Growth	-0.86	0.37	$p < .05$	0.42
Fixed	0.03	0.19	$p > .05$	1.03
Influence main effects				
Growth	-0.10	3.34	$p > .05$	0.90
Fixed	-3.29	8.39	$p > .05$	0.04

- ❖ The negative selection effect for the growth mindset model indicates students were about one and half times more likely to select friends with different levels of growth mindset beliefs than friends with similar levels of growth mindset beliefs.
- ❖ The selection effect was not significant for the fixed mindset model indicating that children did not select friends based on their level of fixed mindset beliefs.
- ❖ The influence effects were not significant for both the growth and fixed mindset models indicating that children were not influencing their peers to develop growth or fixed mindset beliefs.

Results: Social Network Map at Time 2



- ❖ Social network map of friendships by level of growth mindset beliefs. This network map shows the diversity in friendships with relation to growth mindset beliefs, such that students were more likely to select friends that had different levels of growth mindset beliefs from themselves than friends with similar levels of growth mindset beliefs.

Conclusions

Findings revealed that children who endorsed higher growth mindset beliefs, gave and received more friendship nominations. In addition, analyses showed that children selected friends who have different levels of growth mindset beliefs to themselves. These results suggest that having a growth mindset may play an important role in children's ability to form friendships as children with more growth mindset beliefs had more friendships overall. It also shows that children are not limiting themselves to only peers with the same level of mindset beliefs, allowing children to form diverse mindset friendship groups. Overall, these findings suggest that growth mindset beliefs may not only promote children's academic achievement in school but may also promote children's friendship formation skills. This highlights the importance of interventions aimed at teaching and promoting growth mindset beliefs to children because it can not only impact children's ability to succeed in school, but also their ability to make friends.

Although this study did not find evidence that children's peers influence their growth mindset beliefs, we only examined friendships over the course of one month. It is possible that one month was not enough time for peers to influence their friend's growth mindset beliefs. Future research should aim to examine peer influence effects using social network analyses over a longer time period to see if friends influence each other's level of growth mindset beliefs.

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