Rapid Automatized Naming (RAN) involves quickly and accurately naming repeated sets of familiar items. RAN is a significant predictor of later reading skills, even when controlling for other reading skills, such as letter naming fluency (Gray et al., 2020). Additional questions remain as to why and how RAN predicts later reading outcomes.

One possible mechanism by which RAN predicts important reading skills is the so-called “double deficit hypothesis,” which places students into one of four categories based on RAN and phonemic awareness (PA) skills (Cronin, 2011). Students who score highly on both RAN and PA are termed “no-deficit.” Students who score poorly on both RAN and PA are considered “double deficit.” Students who score well on RAN but poorly on PA are considered to have a “phonological deficit,” while students who do poorly on RAN but well on PA are considered “poor with naming speed.” Perhaps predictably, students with a double deficit fare the worst in reading skills development, while students with no deficit are comparatively well-off.

The double deficit hypothesis perhaps conflicts with the model of RAN and orthographic knowledge provided by Martinez et al. (2021). According to this hypothesis, PA mediates the relationship between RAN and later reading outcomes. Wolff (2011) has suggested there is uncertainty regarding whether PA and RAN are distinct skills. The small study by Wolff indicated that PA and RAN both tap phonological processes in common with reading.

The purpose of the present study was to investigate if PA itself explains the relationship between RAN and later reading success, using a mediation model that specifies PA as a mediator. In other words, we sought to evaluate if PA and RAN both tap phonological processes in common with reading.

One possible mechanism by which RAN predicts important reading skills is a mediation model that specifies PA as a mediator. In other words, we sought to evaluate a relationship between RAN and PA, indicating a relationship between the proposed distal and mediator variables. These initial results suggest a plausible mechanism for mediation.

The present study used Acadience Reading PSF as an indicator of PA more plausibly than RAN. Results of the multilevel mediation models are presented in Table 1. Despite previous theories that RAN and phonemic awareness represent largely overlapping (and even redundant) skills, RAN reading Composite Score (RCS), when even when controlling for PSF in the intervening time. To this point, RAN and PSF in kindergarten have a direct relationship to later RCS, independent of each other. This finding is noteworthy when considering that the middle-of-year PSF score used from kindergarten is closer in time to end-of-year RCS than the RAN Total is. In first grade, RAN and PSF were assessed at the same period as beginning of the school year, but RAN actually had a stronger relationship with the RCS than did the PSF score. Additionally, the relationship between RAN and PSF varies in the Acadience Data Management System, indicating a relationship between the two variables.

### DISCUSSION

This study examined the extent to which PA acts as a mediator of the relationship between RAN and later RCS. The results suggest that not only are RAN and PA distinct, but that PA accounts for only a small portion of the relationship between RAN and later reading skills. In kindergarten, PSF was a stronger mediator than in first grade. However, at most, PSF mediated less than a quarter of the relationship between RAN and the RCS. Our results are both consistent with and different from previous research in this area. For example, Papadopoulus et al. (2016) found that PA contributed more to the RAN-reading relationship in the earlier phases of reading compared to late phases. However, their evaluation of earlier phases took place in kindergarten compared to later phases in second grade. The results of our study cast doubt that PA is able to wholly explain the RAN-reading relationship.

#### limitations

1. The Acadience RAN and Acadience Reading K-6 measures were administered under uncontrolled conditions. Information on training of assessors and fidelity of assessment is not available, so these data do represent the way these measures are used in practice.

2. While the research questions revolve around PA as a general skill, the present study used Acadience Reading PSF as an indicator of PA more generally. While PSF is both a strong measure of PA and predictor of reading, it is possible that there are some aspects of PA that were inadequately captured by this study.

3. RAN and PSF were administered during the same benchmark period in first grade, but the PSF score used from kindergarten is closer in time to end-of-year RCS than the RAN Total is. In first grade, RAN and PSF were assessed at the same period as beginning of the school year, but RAN actually had a stronger relationship with the RCS than did the PSF score. Additionally, the relationship between RAN and PSF varies in the Acadience Data Management System, indicating a relationship between the two variables.

#### Future Research

The present study shows that the reason RAN predicts later outcomes cannot be solely attributed to its relationship with PA, so some question remains as to the underlying processes that contribute to the power of RAN. Future research should continue to explore which aspects of RAN overlap with existing reading skills and investigate further why RAN remains such a powerful predictor of reading outcomes. We may also wish to explore the role of orthographic processing in mediating the relationship between RAN and reading, similar to the research conducted by Papadopoulus et al. (2016). For example, future research could examine scores from measures of PA and RAN, such as the Acadience Reading Nonsense Word Fluency Whole Words Read in first grade.