

USING CLUSTER ANALYSIS TO EXPLORE DIFFERENCES IN THE READER SELF-PERCEPTIONS OF ADOLESCENT STRUGGLING READERS

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Adolescent struggling readers (ASRs) with and without disabilities are often reported uniformly in the literature as disengaged from reading and lacking the motivation required to read. The present study tested, at the beginning of the academic year, reader self-perception of sixth grade ASRs ($n = 71$) enrolled in remedial reading courses using the Reader Self-Perception Scale (RSPS). Application of a hierarchical cluster analysis using the 4 RSPS domains yielded 3 statistically significantly distinct clusters of ASRs based on variance across each domain of the RSPS.

There is little question that learning to read proficiently is a complex process beyond simply an acquisition of skills. In fact, research over the past 2 decades has shifted from a sole focus on the cognitive factors associated with reading proficiency to a more comprehensive examination of reading that includes affective constructs such as motivation, attitude, and self-perception. Though related, these constructs are distinct from one another, and each significantly influences reading behaviors, and by extension, academic outcomes (Melnick, Henk, & Marinak, 2009). One challenge in

addressing the areas of motivation, attitude, and self-perception in particular has been the lack of consensus in defining and differentiating them from each other. In both research and practice, this inconsistency in terminology has convoluted the findings and led to a blurring across both application and measurement (Unrau & Quirk, 2014).

Thus, blanket generalizations about the motivation and engagement of adolescent struggling readers (ASRs) with and without disabilities are frequently made without sufficient empirical backing or contextual distinc-

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tion. At times, ASRs are uniformly depicted as having poor self-efficacy, being disengaged from learning, and lacking the necessary motivation to read (Guthrie & Davis, 2003). Other studies of this population have questioned the capacity of adolescent struggling readers to accurately calibrate their ability to read (Klassen, 2002). However, it is unclear whether this is really the case for all adolescents who struggle in reading.

Given that ASRs are largely heterogeneous in terms of demographics, school-based experience, disability status, and cognitive ability (Calhoun & Petscher, 2013), it seems likely that there would also be marked variation among ASRs in affective constructs. Although multiple affective constructs potentially impact reading in ASRs, the affective construct of interest in this study is *reader self-perception*. According to Bong and Skaalvik (2003), the ways in which individuals construe themselves result in varying self-perceptions and likewise different courses of action and behavior in the classroom. For purposes of the present study, we distinguish reader self-perception profiles of ASRs as a way to investigate the “different courses of action” appropriate to students to improve reading outcomes.

THEORETICAL FOUNDATION

The underlying factors that shape students’ motivation for reading include students’ goals, dispositions, and beliefs about themselves (Conradi, Jang, & McKenna, 2013). These factors are hierarchical and comprise an evolving area of inquiry in educational research. Self-perception—to some, synonymous with self-concept—is the foundational construct that relates to how individuals see themselves within a particular context; goals and dispositions are then established upon this foundation (Rahmani, 2011). Self-perception may refer to individual’s view of himself or herself as a student, or more specifically focused on his or her self-perceptions related to a particular skill

(e.g., reading). Though self-perception is a “work in progress” (Conradi et al., 2013, p. 155) rather than a fixed point of inquiry, research is beginning to investigate how students see themselves generally and in specific academic areas such as reading. To a large extent, history of reinforcement and past academic achievement largely influence one’s academic self-perception (Bong & Skaalvik, 2003). Conversely, self-perception may influence academic achievement and the ways in which students attempt a given task (Montague & van Garderen, 2003).

Reader Self-Perception

The multifaceted construct of reader self-perception incorporates students’ beliefs about their ability to read, the processes they choose in learning to read, and whether they have positive experiences with reading (Baştug & Celick, 2015; Henk & Melnick, 1995). For the purposes of this study, reader self-perception is broadly defined as the way students see themselves as readers (Henk, Marinak, & Melnick, 2013). Aligned to this view, reader self-perception can best be understood by examining its underlying domains (Henk & Melnick, 1995). Based on Bandura’s (1977) model of self-efficacy, the four domains of reader self-perception are (a) observational comparison (how students see themselves in relation to their peers), (b) social feedback (the way students interpret messages received from their peers and teachers), (c) progress (their view of their growth and learning), and (d) physiological state (how reading makes them feel). Together with reading behavior (Chapman & Tunmer, 2003; Melnick et al., 2009), these four self-perception domains serve as the core of the theoretical model underlying the present study (see Figure 1).

Notably, the present study’s theoretical model also posits that reader self-perception is an important element in understanding the academic progress and outcomes of students who struggle in reading, including the sometimes discrepant relationship between how ASRs

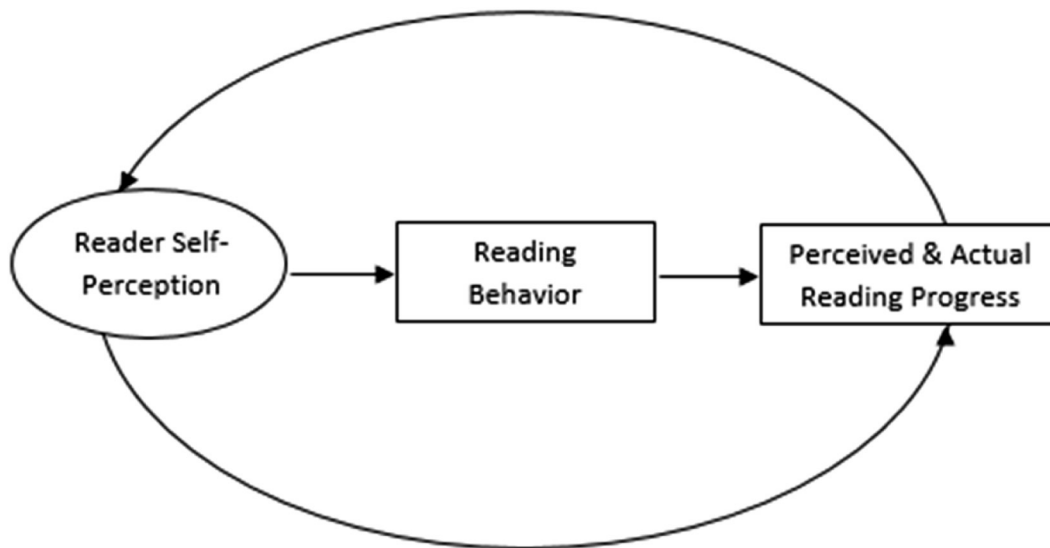


FIGURE 1

Theoretical Model Showing Relationship Between Self-Perception and Academic Progress in Reading

perceive their reading ability and their actual performance growth and outcomes. In addition to the reciprocal relationship between both perceived and actual academic progress and reader self-perception, previous research suggests that students' reader self-perception influences their reading behaviors (Chapman & Tunmer, 2003; Henk & Melnick, 1992). For example, self-perception may influence whether a student seeks out or avoids reading tasks (Henk & Melnick, 1992). Likewise, self-perception may impact the level of persistence and effort applied to comprehending difficult text (Henk & Melnick, 1995). Consequently, in our theoretical model we hypothesize that reader self-perception indirectly affects academic performance in reading and is therefore a major factor in understanding chronic underperformance in reading among adolescents.

METHOD

Participants

The participants for the present study were sixth-grade students ($n = 71$) enrolled in inten-

sive reading courses in three middle schools within a very large urban school district in the southeastern United States. Pursuant to state and district guidelines, intensive reading courses are aimed to remediate identified deficiencies in reading for ASRs who have previously failed to reach proficiency on the state standardized assessment. The sample included students with specific learning disabilities, other health impairments, and speech and language impairments as well as general education students. Table 1 provides additional demographic information. The study's sample was largely Hispanic, reflecting a demographic characteristic consistent with the school district. A moderate percentage of the sample was currently enrolled in or exited from the district's English for Speakers of Other Languages (ESOL) program. It is important to note that students enrolled in ESOL programs were only excluded from eligibility in the present study if they had not yet met proficiency in English according to district ESOL guidelines.

Because ASRs for this study were a subset of a larger intervention study, they adhered to

TABLE 1
Demographic Information for Student Participants

	<i>N</i>	<i>M Age</i>	<i>Gender</i>		<i>Ethnicity Percentages</i>			<i>Disability</i>	
			<i>Male</i>	<i>Female</i>	<i>White</i>	<i>Hispanic</i>	<i>Black</i>	<i>IEP</i>	<i>No IEP</i>
School 1	33	12.03	61%	39%	3%	91%	6%	70%	30%
School 2	14	12.28	43%	57%	—	93%	7%	29%	71%
School 3	24	11.90	50%	50%	—	100%	—	29%	71%
Total	71	12.03	54%	46%	1%	95%	4%	48%	52%

an academic-based inclusionary criteria. ASRs were deemed eligible based on a distinguishable pattern of underachievement on state assessments and enrollment in a sixth-grade intensive reading course at their public middle school. Students were also administered two additional assessments used for screening by the study team. Students were included if they scored under a predetermined threshold on the letter word identification (LWI) and word attack (WA) subtests of the Woodcock-Johnson Tests of Achievement, Third Edition (WJIII; Woodcock, McGrew, & Mather, 2001).

Sample means for the age-based *W* scores for LWI ($M = 491.91$, $SD = 17.19$) and WA ($M = 486.07$, $SD = 13.74$) highlight students' underperformance in reading given that the reference *W* score—the median scores of same-age peers in the norming sample—on the two subtests are, respectively, 515 and 512 (Jaffe, 2009). A *W* difference score (the difference between the sample mean and the reference *W*) on LWI of approximately -23 shows these students generally have limited proficiency in word reading and are likely to find grade-level word reading tasks very difficult (Jaffe, 2009). Similarly, a *W* difference score of nearly -26 on WA demonstrates limited proficiency in phonic decoding such that these students would likely the find grade-level decoding tasks very difficult (Jaffe, 2009). The rationale for the inclusionary criteria was to ensure that participants had significant and

sustained deficits in word level reading and decoding.

Measures

Reader Self-Perception Scale (RSPS). Henk and Melnick (1995) developed the RSPS to better understand the construct of reader self-perception. Based on an exploratory factor analysis conducted by the instrument's authors, the RSPS consists of 33 total items, beginning with one general and 32 subsequent items representing four domains on which reader self-perception is measured (observational comparison, social feedback, progress, and physiological states). The RSPS uses a 5-point Likert-type scale with a variation in number of items per factor. Notably, this results in differences in maximum possible scores which is an important consideration in analysis. Alpha reliabilities were calculated by the instrument authors to analyze the internal consistency for scores on each of the four factors, which were found to be highly reliable (32 items; α ranging from .81–.84). Table 2 provides sample items for the four factors of the RSPS as well as further reliability and descriptive statistics.

Woodcock Johnson III Tests of Achievement. In addition to the two screening assessments (LWI and WA), the passage comprehension (PC) and spelling (SP) subtests of the WJIII Tests of Achievement (Woodcock et al., 2001) were individually administered to students to assess reading achievement at the

TABLE 2
Sample Items and Reliability Calculations for the RSPS Subscale Scores

<i>Factor</i>	<i>Sample Items</i>	<i>Items (n)</i>	<i>α</i>
I. Observational comparison	<ul style="list-style-type: none"> • I read faster than other kids. • I seem to know more words than other kids when I read. 	9	.84
II. Progress	<ul style="list-style-type: none"> • Reading is easier for me than it used to be. • When I read, I don't have to try as hard as I used to. 	6	.82
III. Social feedback	<ul style="list-style-type: none"> • My teacher thinks I am a good reader. • My classmates think I read pretty well. 	9	.81
IV. Psychological states	<ul style="list-style-type: none"> • I feel calm when I read. • Reading makes me feel good. 	8	.84

beginning of the sixth grade. The WJIII is a widely used battery of assessments (Schrack, McGrew, & Woodcock, 2001). Each assessment takes about 5 to 7 minutes to complete and was administered per the standardized administration protocol consistent. To determine students' proficiency in identifying real words in isolation, students were administered the LWI subtest. The WA subtest of the WJIII requires students to read aloud nonsense words that are phonically correct in order to measure students' ability to decode. These two subtests were also utilized as screening assessments. The PC subtest assesses reading comprehension by asking students to insert a missing key word that makes contextual sense in the text provided. The fourth subtest, SP, is administered orally and has students spell orally presented words. Reliability of scores on these four subtests is strong at .94, .87, .88, and .90, respectively (Schrack et al., 2001).

Procedures

In accordance with university institutional review board and district research guidelines, parent consent and student assent were obtained prior to the start of data collection and analysis. Participants were administered the RSPS within the first month of the school year using paper and pencil. Members of the study team administered the assessment to students in small groups. Following administration of sample items to clarify procedures for stu-

dents, survey items were read to students orally and students recorded their responses using the 5-point Likert-type scale. Student responses to each item were then coded, and total scores for each of the four domains of the RSPS were tabulated electronically. All item responses and domain scores were input into a SPSS database by a study team member. Accuracy of data input was assessed for 20% of the data, and agreement was found to be 99.8%.

Analysis and Findings

Cluster analysis is an exploratory statistical technique that maximizes the differences between groups and similarities within groups (Hair, Black, Babin, Anderson, & Tatham, 2010). Groups, or clusters, are formed around predetermined variables selected by the researcher. Because the main research question aimed to differentiate between groups of ASRs based on their reader self-perception, cluster analysis provided the optimal means to accomplish this task. As detailed in this section, the investigation began first with multiple methods of cluster analysis to identify clusters followed by testing of between- and within-group differences.

Identification of Student Clusters. Specifically, to answer the first research question, summative scores on each of the four domains of the RSPS (social feedback, progress, observational comparison, and physiological states) were used as the grouping variables. However,

because the measurement scales of the four domains differed, scores were standardized to z scores during the clustering process. Due to the fact that there was no a priori theory as to the number of clusters that existed within the sample, hierarchical clustering using Ward's method to maximize significance between clusters was utilized first to determine clusters of students based on standardized domain scores on the RSPS. Both three-cluster and four-cluster solutions were initially explored based on analysis of the resulting dendrogram.

Using the three-cluster solution, K-Means clustering was employed to confirm cluster membership. Cohen's κ was calculated to determine the level of agreement in cluster assignment between the K-Means and Hierarchical methods. There was moderate and statistically significant agreement between the clustering of the two techniques ($\kappa = .536, p < .001$) according to Altman's (1999) benchmarks. The three cluster solution emerged as the best fit given the limited sample size and the statistically significant differences between groups on each of the four clustering variables. Two-way analysis of variance (ANOVA) indicated that the three clusters were significantly different on progress ($F(2,69) = 38.954, p < .001$), observational comparison ($F(2,69) =$

$20.451, p < .001$), social feedback ($F(2,69) = 39.868, p < .001$), and physiological states ($F(2,69) = 29.075, p < .001$). Results from pairwise comparison in post hoc analysis adjusted using the Tukey method indicated that Profile 1 and Profile 3, Profile 1 and Profile 2, and Profile 2 and Profile 3 were significantly different in each of the four analyses, $p < .05$. Table 3 presents the three clusters (herein referred to as student profiles) with a brief description of each.

Figure 2 shows the mean scores for each profile on the four domains assessed in the RSPS in addition to the sixth grade norm data provided for comparative analysis by the instrument's developers (i.e., Henk & Melnick, 1995). Notably, the norm data provided by the developers were not exclusively drawn from a sample of ASRs, though these data provide an important comparative indicator when examining reader self-perception in the study sample. The ordinal nature of reader self-perception among the study sample is evident in that mean scores across all four domains show the progression from extremely low scores in Profile 3 to the average scores associated with Profile 1. In other words, there were no domains in which the mean score for Profile 1 was not the highest and, conversely, the mean

TABLE 3
Descriptive Characteristics of the Three Clusters of ASRs

<i>Profile</i>	<i>n (%)</i>	<i>Description</i>
Average reader self-perception	19 (27%)	Despite the norm data being gathered from students of a wide range of abilities, Profile 1 data across all four factors closely mirrored the norm. Scores in each factor were within or slightly below the "average" scoring category (Henk & Melnick, 1995).
Generally low reader self-perception	44 (62%)	Mean scores for these students across all factors were in the "low" scoring category according to Henk and Melnick's (1995) guidelines and were likely the most accurate indication of academic performance. The majority of students fell into this profile.
Very low reader self-perception	8 (20%)	Most alarmingly, the smallest cluster rated themselves extremely low in each of the four factors. Scores in all four factors were significantly lower than Profile 2 despite scores in that group also being rated in the low range.

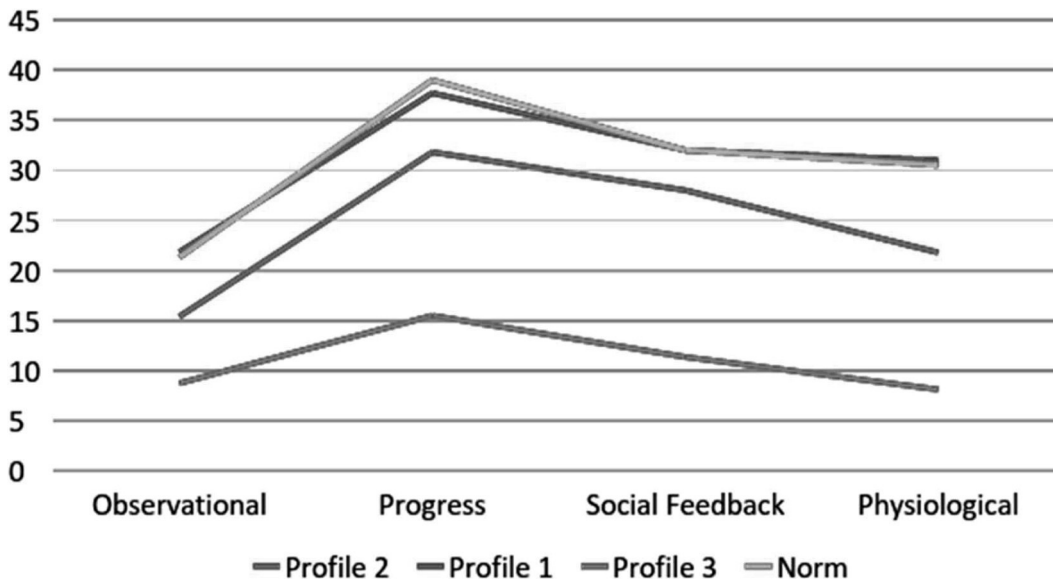


FIGURE 2
Reader Self-Perception Mean Scores by Profile

score for Profile 3 was not the lowest. As noted previously, these differences were statistically significant on all four domains.

Profile Comparisons. The second research question asked the extent to which profile groups differed in terms of academic outcomes and demographic variables. Interestingly, although statistically significant differences were found for each domain of reader self-perception, the profiles did not differ significantly on mean academic outcomes. The mean differences between profiles on the four standardized academic measures (WJIII: LWI, WA, PC, and SP) were each tested using two-way ANOVA. Age-based W scores for each of the four subtests were used as they are preferable for statistical analyses and comparison among groups (Jaffe, 2009). Results indicated that there were no statistically significant differences between profiles on LWI ($F(2,69) = .331, p = .720$), WA ($F(2,69) = .401, p = .672$), PC ($F(2,69) = 1.377, p = .263$), or SP ($F(2,69) = .588, p = .560$). In terms of student demographic variables, no association was found between profile membership and gender

($X^2(2) = 3.171, p = 0.205$), disability status ($X^2(2) = .134, p = 0.935$), or age ($F(2,69) = .987, p = .381$).

DISCUSSION

The results from the present descriptive study provide further insight into the heterogeneous nature of the ASR population with regards to reader self. The three distinct cluster profiles showed that ASRs exhibit differing patterns of reader self-perception across all four domains of the RSPS *irrespective of their actual academic outcomes*. This is noteworthy given that the academic outcomes for these ASRs are relatively homogeneous based on the inclusion criteria for placement into the intensive reading programs and results from the baseline academic assessments administered. The fact that three distinct cluster profiles were found within such an academically similar group of ASRs shows the heterogeneity of reader self-perception among these students with and without disabilities, and may highlight oppor-

tunities for differentiated support given these differences. At the least, this finding warrants further exploration as to why these ASRs, with relatively similar reading abilities, have different perceptions of their reading ability.

Profiles

Interestingly, a majority of the study's sample ($n = 44$) clustered into Profile 2, characterized by a generally low rating across each of the four domains of the RSPS. However, despite low ratings, students in Profile 2 viewed their reader self-perception significantly higher than their peers in Profile 3 and significantly lower than Profile 1. It is encouraging that students in Profile 2 appear to have a more accurate view of their reading abilities than students in Profiles 1 and 3. This is the largest profile and contradicts studies that show students with disabilities have an incorrect perception of their academic abilities and tend to see themselves as academically competent (Meltzer, Katzir-Cohen, Miller, & Roditi, 2001; Meltzer, Miller, Katzir-Cohen, & Roditi, 2000; Meltzer, Roditi, Houser, & Perlman, 1998). The demographic makeup of ASRs in this profile varied. In other words, profile membership was not significantly associated with a particular school, gender, age, or disability status. Similarly, the demographic makeup of Profile 2 did not differ significantly from that of Profiles 1 or 3.

Remarkably, ASRs in Profile 1 rated themselves similar to the normative data of typically achieving students (Henk & Melnick, 1995). This is an important insight that corroborates previous research suggesting that there are large discrepancies between the way some struggling readers perceive their reading ability and their actual performance, an idea some refer to as an inflated self-concept (Kloomok & Cosden, 1994). ASRs both with and without disabilities were clustered in Profile 1, highlighting the fact that inflated self-concept is not specific to students with disabilities. This finding corroborates previous research (i.e., Klassen, 2002) on the extent to which students

are able to judge their own ability and/or efficacy. Findings showed the most frequent miscalibration among students with disabilities is in the form of overestimation. Related to this notion, Pajares (1996) questioned, "How much confidence is too much confidence, when can confidence be characterized as excessive and maladaptive in an academic enterprise, and what factors help create inaccurate self-perceptions?" (p. 565). These important questions highlight the complexity of self-perception; that is, whereas higher self-perception is associated with persistence, effort, and engagement, *more* is not necessarily *better* because accuracy of perception is also a relevant factor. Therefore, teachers should be cautioned from relying solely on self-reports of student progress and needs. Some ASRs may be unable to effectively advocate for themselves in terms of needing further assistance and support given their inability to accurately judge that need.

Profile 3 was the smallest group ($n = 8$) and demonstrated alarmingly low reader self-perception. Sound consideration must be given by both researchers and practitioners to the underlying causes of the negative self-perceptions exhibited by these students. Just as overestimating abilities can be damaging, underestimating abilities can feed negative feelings that contribute to decreased motivation in not only reading, but all other academic areas (Baker & Wigfield, 1999). The persistence of ongoing difficulties in reading are often reflected in self-perceptions that are intimately linked to reading experiences (Chapman & Tunmer, 2003). Students with low reader self-perception may need additional support in the affective domain in order to enhance their academic performance. Although their performance on academic outcomes may not differ significantly from their peers, the socioemotional support required for these ASRs may differ from ASRs in other profiles. Teachers should provide these students with strategies that enhance their opportunities to succeed and to feel successful (Chapman & Tunmer, 2003).

The results of the present study underscore the idea that even if ASRs are similar academically

ically, they can be markedly different in their reader self-perception. It is important not to look at middle schools students through a homogeneous lens, but instead from a flexible lens that recognizes the complexities of adolescence and reading difficulties. Most of the ASRs in this sample have struggled with reading for 3 to 5 years without making appreciable gains. The three profiles demonstrated by these ASRs sheds light on the differences that exist within reader self-perceptions despite the commonness of limited achievement.

Limitations

There are two limitations in this study that must be acknowledged when considering these findings in light of the broader population of ASRs and the inherent complexity in assessing reader self-perception. First, the study sample was relatively small and restricted to 6th graders in just three schools within one district. Second, though self-report is the most common method of measuring academic self-perception (Bong & Skaalvik, 2003), there are inherent limitations in self-report measures, particularly with student participants. The inclusion of semistructured interviews in addition to the self-report measure would have substantiated and further strengthened the findings. Therefore, whereas the present study provides an important contribution to reader self-perception research, its findings should be interpreted cautiously in light of these limitations.

Future Directions

It is important to further investigate the differences in reader self-perception displayed by older ASRs with additional quantitative and qualitative research endeavors. Future research might explore the extent to which RSPS data are related directly to the reading achievement outcomes of ASRs. Additional work might also investigate the extent to which the reader self-perception of ASRs changes over time by

administering the RSPS longitudinally. Understanding the factors that both positively and negatively impact the way ASRs see themselves as readers is another important area for future research. Qualitative data collection and methods of analyses could provide a more nuanced account of these changes and further explain underlying mechanisms that influence reader self-perception among different groups of ASRs.

CONCLUSION

In examining the complexities underlying the process of reading, both cognitive and affective factors need to be considered as both play a significant role in reading behavior and academic outcomes. Across the three profiles identified in the present study, it is clear that many ASRs are internalizing their negative perceptions of their reading progress, the ways in which others view their reading, their own comparisons to peers, and their feelings toward reading. Whereas one cluster of ASRs showed evidence of an inflated self-concept, another demonstrated extremely low reader self-perception. This suggests that ASRs should be characterized as heterogeneous in terms of their reader self-perception. Ultimately, understanding the differing ways in which these ASRs construe themselves as readers has important implications for the nature of support provided to them in the classroom.

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