Realistic Expectations: State-level Changes in the Percentage of Proficient Students 2002-2008

Brett P. Foley

Alpine Testing Solutions

Paper presented at the annual conference of the National Council on Measurement in Education, New Orleans, LA

April, 2011

Brett P. Foley
Alpine Testing Solutions
Brett.Foley@alpinetesting.com

Abstract

Although the percentage of proficient students (PPS) on statewide assessments has become the primary metric for making accountability decisions under the No Child Left Behind (NCLB), there is a lack of a comprehensive set of norms to help determine a "typical" state-level change in PPS. The purposes of this study were to summarize yearly state-level changes in PPS across various grades, subgroups, and subject areas for the past several years and to determine if there were relationships between changes in PPS and the value and change in PPS from the previous year. State PPS data collected by the Center on Education Policy (CEP) for the school years ending in 2002-2008 were used for the present study. It was found that: (1) Typical changes in PPS ranged from a 2.0% decline to a 7.2% increase for mathematics and from a 3.0% decline to a 6.0% increase for reading. On average, the PPS for mathematics tended to increase about 2% per year, while the PPS for reading tended to increase about 1% per year. (2) There was some evidence of achievement gaps narrowing. (3) There was only a week relationship between previous year's proficiency change and the current year's proficiency change. And (4) high PPS levels are hard to maintain: declines in PPS rates occurred more frequently when the previous year's PPS rates were high. Limitations of the study are discussed, as are directions for future research.

Introduction

Since 2001, the percentage of proficient students (PPS) on statewide assessments has become the primary metric for making accountability decisions under the No Child Left Behind Act (NCLB; Braden & Tayrose, 2008; Ho, 2008). When a state's PPS increases, it can be cause for celebration and accolades. A decline in PPS can be met with public outcry (e.g., Matus, 2007; Solochek, 2007; and Sparks, 2007). When a state receives test results from its testing contractor that are unexpected (especially when they are lower than expected), legions of psychometricians are brought to bear in an attempt to identify the cause, math error or otherwise, and explain the discrepancy.

These reactions beg the question, how large (or small) of a yearly change in PPS should we expect? A goal of NCLB is for all students to reach proficiency in reading and mathematics by 2014. If a given state would need to show a 10% improvement in PPS each of the next three years to meet this target, is such a rate of improvement achievable? How can we tell if goals for improvement are realistic? Linn (2004) argues,

> At the very least, there needs to be an existence proof. That is, there should be evidence that the goal does not exceed one that has previously been achieved by the highest performing schools. For example, if the top 10% of schools in a state improved an annual average of 3% proficient or above each year in the past 5 years, then 3% might be the annual state goal. That would be a major challenge to the vast majority of schools, but might be a target that is within reach with sufficient effort (p. 3).

Previous studies have analyzed the PPS change data necessary to make these inherently norm-referenced decisions at the school level (e.g., Powers & Waltman, 2009; Toppo, Amos, Gillum, & Upton, 2011). Similarly, PPS (as opposed to PPS change) has been studied at the state level

(e.g., Chudowsky, Chudowsky, & Kober, 2009; Kober,. Chudowsky, & Chudowsky, 2010). Using data gathered by the Center on Education Policy (CEP) and the Human Resources Research Organization (HumRRO; Center on Education Policy, 2009) one can see in Figure 1 that the median state-level PPS across grades and states increased from 2002 to 2008. This aggregate information is useful, but does provide detailed norms to inform policy makers about how PPS changes in their state compare to those of other states. Although some studies have examined state-level PPS change for a few states and grades (e.g., Fuller, Wright, Gesicki, & Kang, 2007), there is a lack of a more comprehensive set of norms. The primary purpose of this study was to summarize yearly state-level PPS change for various grades, subgroups and subject areas for the past several years.

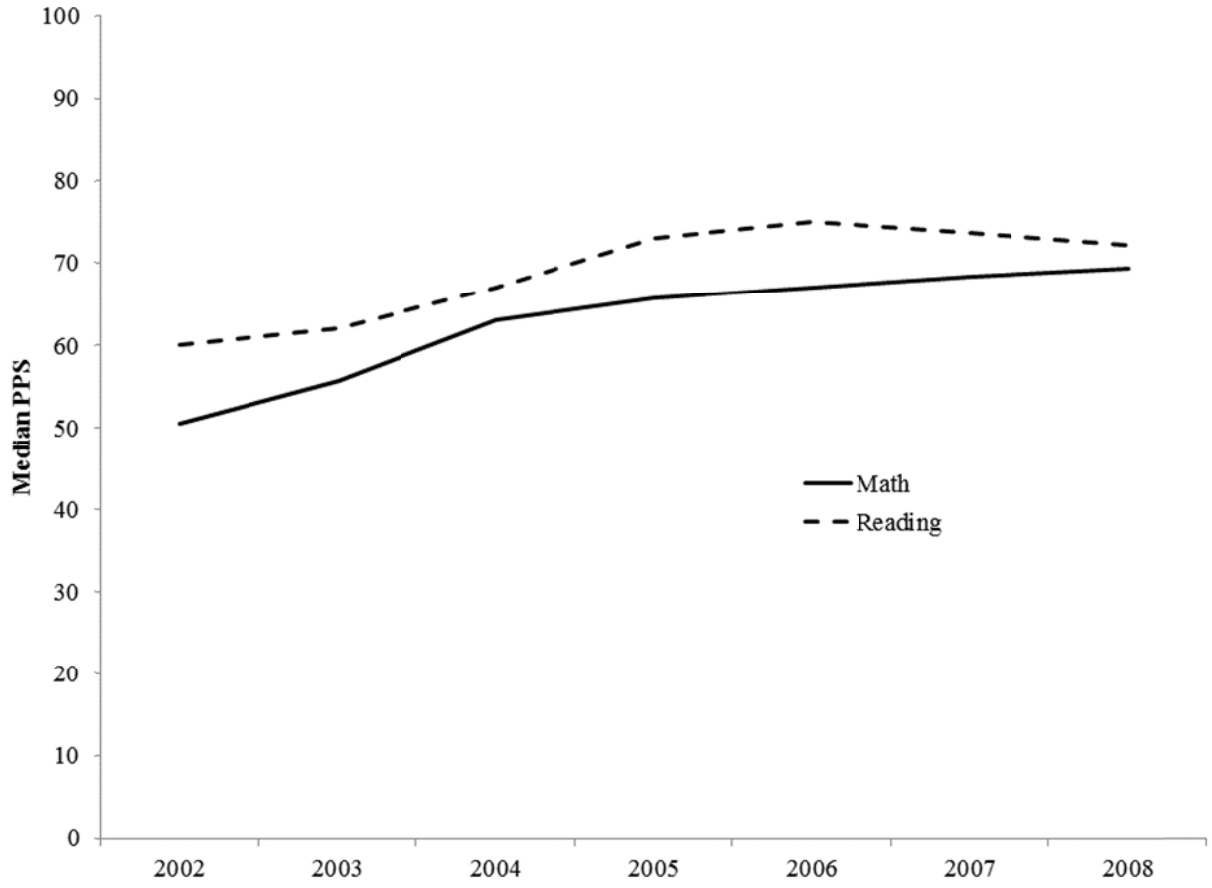


Figure 1. Median PPS across grades and states, all students, 2002-2008.

A secondary purpose of this study was to determine if there were relationships between changes in PPS and the value and change in PPS from the previous year. This will help to provide reasonable expectations of future changes in PPS based on past values of PPS and past rates of PPS change.

The results of this study will be particularly important for K-12 educational administrators and policy makers. Results from this study can help inform interpretations of yearly changes in PPC by creating a set of norms by which state results can be compared. Additionally, results from this study may allow policymakers to set more realistic goals for mandated PPS increases, for the full student population as well as important subgroups, over time.

Methods

Data Source

State PPS information was collected by CEP and HumRRO from states from fall 2008 through April 2009. PPS information was available (in varying degrees of completeness) from 1999 through the 2007-2008 school year for all 50 states. CEP makes these data available on their website (Center on Education Policy, 2009).

State level data files were combined into a "national" file with the following variables: state, subgroup (e.g., males, females, ELLs), subject (i.e., reading, mathematics), grade, and PPS for each school year. Because subgroups are given different names in different states, it was necessary to recode state subgroup classifications into a common national classification. Details of the recoding are included in Appendix A. Results are not disaggregated for race due to inconsistent racial definitions and groupings across states and over time.

For this study, data from grades 3-8 were used, as well data from one high school (HS) assessment per state per subject. Because states vary in how proficiency is assessed in HS, some recoding was necessary. If there was only one grade tested (i.e., grade 9, 10, 11, or 12) this was treated as the HS test. If there was test data available for multiple HS grades, only the data from grade 11 was used. If there was only one high school test listed by content (rather than grade, e.g., algebra or geometry), this was treated as the high school test. If there were data available for multiple courses, only data from algebra were used. Data for the school years ending in 2002-2008 were used for the present study.

The unit of analysis for this study was PPS change for each state/grade/year combination. For example, "In 2007, the PPS for Florida 8th graders increased by 3% in mathematics" describes a single data point. Change in PPS was always calculated based on the change from the year immediately preceding the year in question. A summary of sample sizes for each subgroup of interest is shown in Table 1. The sample size for each subgroup is approximately 1,400, indicating that data were available for approximately four grades per state per year (i.e., 1,400 data points ÷ 50 states ÷ 7 years = 4 data points per state per year). Seven variables identifying the yearly PPS change were calculated from the aforementioned PPS variables. Subgroups of interest in this study included males, females, low socioeconomic status (SES) students, English language learners (ELL), and students receiving special education services (SPED).

Table 1

Sample sizes for groups and subjects across grades and years

	State	Female	Male	ELL	SPED	Low SES
Mathematics	1,399	1,434	1,434	1,394	1,381	1,393
Reading	1,419	1,457	1,457	1,399	1,386	1,397

Analysis

Tables of percentiles were created in order to show the distribution of changes in PPS for various groups. Additionally, graphs were included to show trends in PPS change over time. All results were disaggregated by subject. Medians and Spearman rank order correlations were used to help mitigate undue influence from outliers. Results were calculated for all students ("State"), gender/subgroup (i.e., male, female, ELL, SPED, Low SES), year (i.e., 2002-2008), grade (i.e., 3-8 and HS), and previous year's PPS change.

To determine if there were relationships between changes in PPS and the value and change in PPS from the previous year, the data were analyzed descriptively, using summary statistics and scatter plots. The graphical analyses were used to evaluate the feasibility of linear regression procedures for these data. Next, state level PPS change was regressed hierarchically on the previous year's PPS, the previous year's change in PPS, and the interaction of the two predictors (with predictors added in that order).

One goal of this study is to describe "typical" PPS change. For this study, "typical" is operationally defined as the middle 80% of all PPS change values. In other words "typical" PPS change values are defined as those ranging from the 10^{th} percentile to the 90^{th} percentile. Because of the near-census nature of the analyzed data, statistical tests were not conducted. Consequently, emphasis is placed on the practical significance of differences and relationships.

Results

All Students

Table 2 illustrates the distribution of changes in PPS for reading and mathematics, collapsed over time, grade, and state for mathematics and reading. The sample sizes (N=1,399 for mathematics and N=1,419 for reading) indicate that PPS data were available for approximately four grades per state per year, on average. The values in Table 2 allow us to see values of typical changes in PPS. For example, we can see that most (i.e., the middle 80%) of changes in PPS ranged from a 2.0% decline to a 7.2% increase for mathematics and ranged from a 3.0% decline to a 6.0% increase for reading. The median PPS change for mathematics was an increase of 2.0% compared to 1.0% for reading, indicating that across grades, years, and states mathematics proficiency increased more quickly than reading proficiency, on average. Additionally, we can see that declines in PPS rates were not uncommon, occurring about 23.8% of the time for mathematics 30.0% of the time for reading.

Table 2

Summary of changes in PPS for math and reading across grades, states, and years (2002-2008)

Percentile	Math	Reading
5th	-5.0	-5.3
10th	-2.0	-3.0
20th	-0.8	-1.0
30th	0.1	0.0
40th	1.0	0.5
50th	2.0	1.0
60th	2.7	2.0
70th	3.8	3.0
80th	5.0	4.0
90th	7.2	6.0
95th	10.0	8.7
N	1,399	1,419
How often PPS declined	23.8%	30.0%

In Figure 2 we can see that, on average, PPS rates have been increasing more rapidly in mathematics (i.e., median increases of approximately 2% per year) than in reading (i.e., median increases of approximately 1% per year) for the past several years. Both the median reading and mathematics PPS levels increased at a lower rate in 2008 than in the previous study years. More detailed percentile information, calculated for each year, is shown in Table 3. Table 3 also shows that the amount of available PPS data has increased over time. The sample sizes in 2002 (N=90 for mathematics and N=103 for reading) indicate that PPS data were available for approximately two grades per state, on average. The sample sizes in 2008 (N=310 for mathematics and N=309 for reading) indicate that PPS data were available for more than six grades per state, on average.

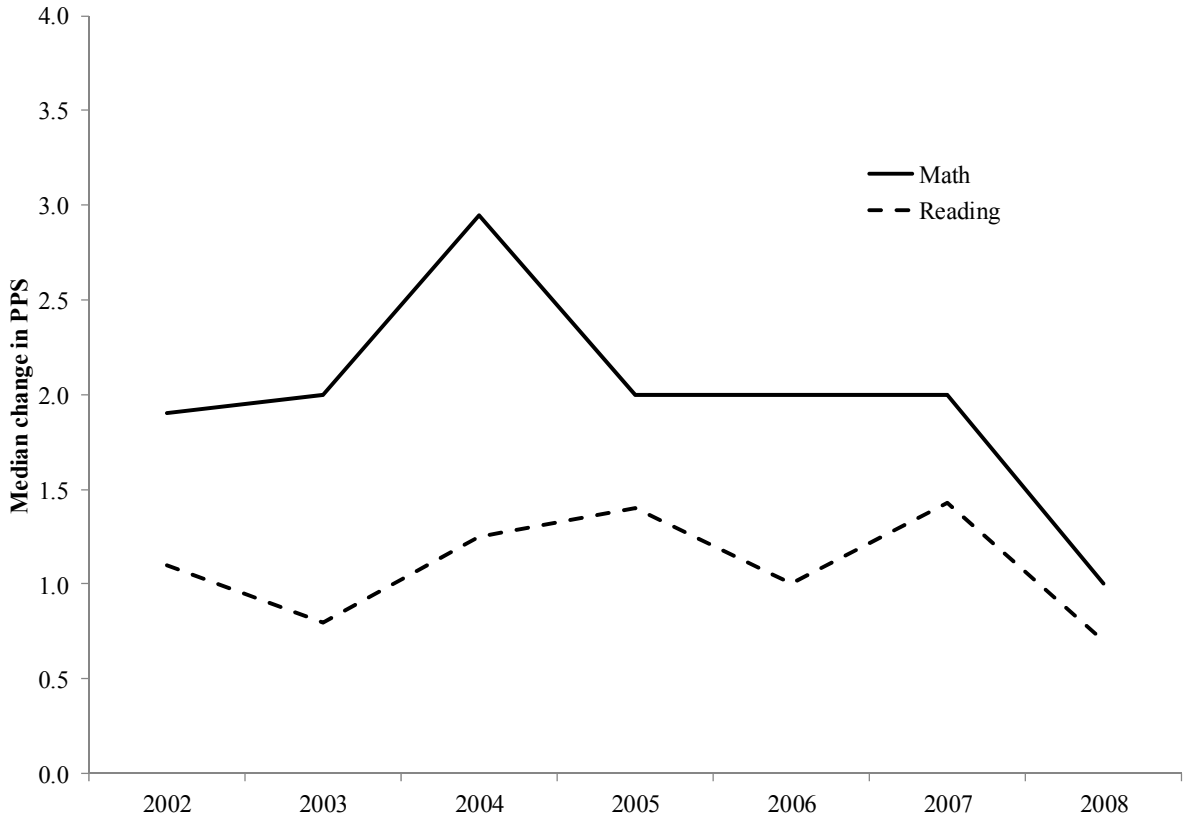


Figure 2. Median change in PPS across grades and states, all students, 2002-2008.

Table 3

Summary of changes in PPS for math and reading across grades and states, all students, 2002-2008

	Math							Reading						
Percentile	2002	2003	2004	2005	2006	2007	2008	2002	2003	2004	2005	2006	2007	2008
5th	-4.0	-6.2	-3.6	-5.0	-10.4	-3.7	-6.5	-3.0	-6.1	-5.0	-5.2	-4.7	-5.1	-9.1
10th	-2.0	-2.6	-1.9	-3.1	-2.2	-1.8	-2.2	-2.3	-4.3	-2.6	-2.0	-2.6	-3.0	-4.3
20th	-0.5	-0.7	0.0	-1.0	-1.0	-0.1	-1.0	-1.0	-2.0	-0.6	-1.0	-1.0	-1.0	-1.2
30th	0.0	0.0	0.7	0.0	0.4	0.7	0.0	0.0	-1.0	0.0	0.0	0.0	0.0	-0.8
40th	0.9	1.0	1.5	1.0	1.2	1.3	0.7	1.0	0.0	0.8	0.7	0.6	1.0	0.0
50th	1.9	2.0	2.9	2.0	2.0	2.0	1.0	1.1	0.8	1.2	1.4	1.0	1.4	0.7
60th	2.1	2.8	3.9	3.0	2.4	3.0	2.0	2.0	1.0	2.4	2.6	1.7	2.2	1.8
70th	3.0	3.8	4.9	4.4	4.0	4.0	2.7	3.0	2.0	3.1	4.0	2.1	3.0	2.2
80th	4.8	4.8	6.2	5.9	5.4	5.0	4.0	4.0	3.0	4.8	5.8	3.5	4.0	3.3
90th	7.0	7.0	9.5	7.7	8.6	8.0	5.0	6.2	5.0	7.1	8.0	6.9	6.0	4.4
95th	9.2	8.5	11.2	10.9	14.6	10.0	7.8	10.3	6.2	10.6	11.1	9.0	10.0	6.0
N	90	136	156	183	216	308	310	103	133	158	190	219	307	309
How often PPS declined	23.3%	27.2%	19.2%	25.7%	22.7%	20.1%	28.1%	28.2%	38.3%	22.8%	27.9%	29.7%	25.7%	36.6%

Gender

Table B1 in Appendix B illustrates the distribution of changes in PPS for reading and mathematics, collapsed over time, grade, and state for mathematics and reading, but calculated separately for each gender. Typical changes in PPS for mathematics ranged from a 2.1% decline to a 7.0% increase for males and ranged from a 2.5% decline to a 7.2% increase for females. Typical changes in PPS for reading ranged from a 3.0% decline to a 6.2% increase for males and ranged from a 2.9% decline to a 5.7% increase for females. The median PPS change and the frequency of declines in PPS rates were similar across genders.

Figure 3 shows the median PPS change over time, broken down by subject and gender. The median PPS change in mathematics was very similar for males and females over time, but

Figure 3 Median change in PPS across grades and states, by gender, 2002-2008.

median values for reading were more variable, especially in the years before 2006. Males, on average, showed slightly larger improvements in reading than females since from 2004-2008. More detailed percentile information, calculated for each gender and year, is shown in Tables B2 and B3 in Appendix B.

Subgroups

Table B4 in Appendix B shows the distribution of changes in PPS for reading and mathematics, collapsed over time, grade, and state for mathematics and reading, but calculated separately for three subgroups: ELLs, students receiving special education services, and low SES students. PPS changes for these groups tended to be more variable than changes in the total population, likely reflecting the smaller size of the subgroups. Typical changes in PPS for mathematics ranged from a 6.9% decline to a 7.3% increase for ELLs, from a 3.8% decline to a 9.0% increase for students receiving special education services, and from a 2.4% decline to an 8.5% increase for low SES students. Typical changes in PPS for reading ranged from an 8.6% decline to a 12.0% increase for ELLs, from a 4.4% decline to an 8.5% increase for students receiving special education services, and from a 3.2% decline to a 7.9% increase for low SES students. The median PPS change was slightly higher for ELLs than for the other subgroups for both subjects. However, PPS rates declined more often for ELLs than for the other subgroups in both reading and mathematics. Of the three subgroups, low SES students saw declines the least often, equaling or doing better than full student population with declines in PPS occurring 23.7% and 28.1% of the time for mathematics and reading, respectively

In order for achievement gaps to close, it is necessary for PPS rates to increase at a greater rate in lower-achieving subpopulations than in the general population. Figures 4 and 5 show the median change in PPS over time, by subgroup, for mathematics and reading, respectively. Figure 4 shows that there has not been a consistent pattern of performance for the SPED and Low SES groups relative to the general population in mathematics. That is, in some

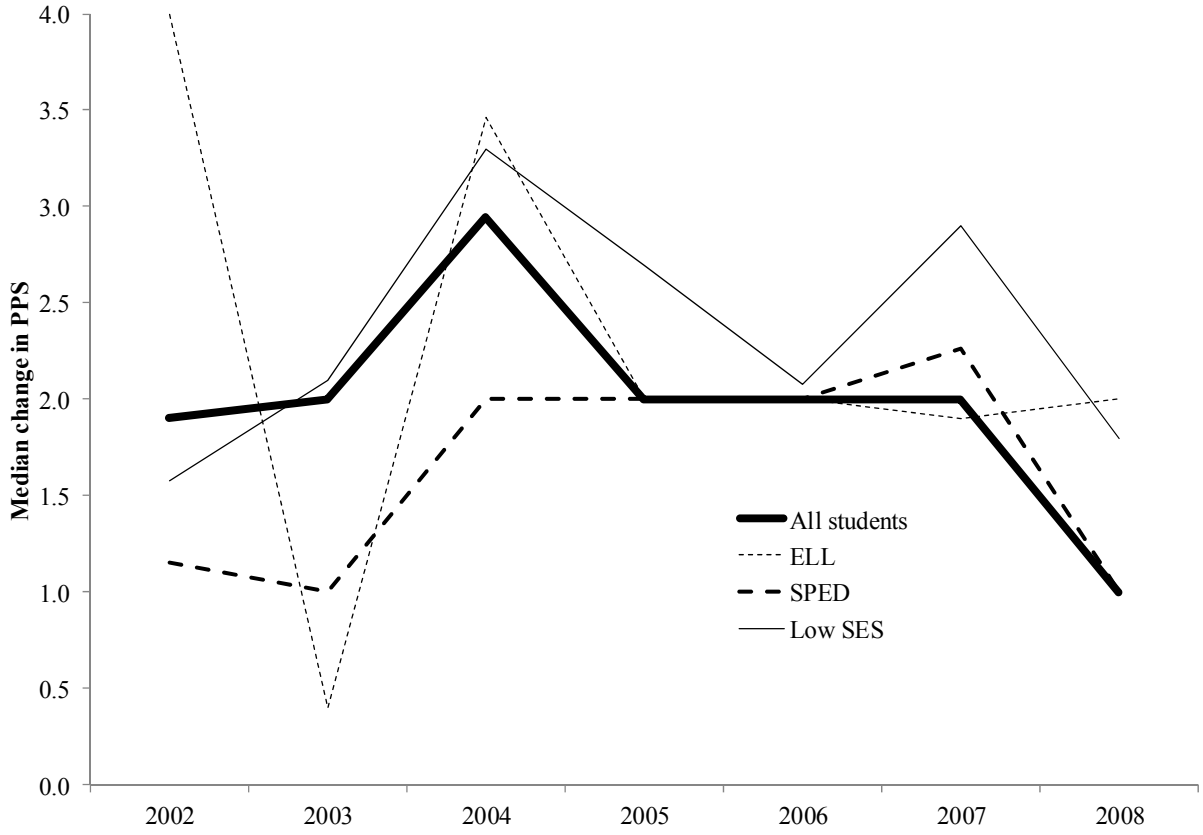


Figure 4. Median change in PPS in mathematics across grades and states, by subgroup, 2002-2008.

years these groups improve more than the general population, in other years they see smaller gains. However, the Low SES group saw larger median PPS change than the general population from 2003 to 2008. Figure 5 shows a more consistent pattern of performance for the subgroups relative to the general population in reading. That is, from 2004 to 2008 all subgroups saw larger

median PPS change than the general population. More detailed percentile information, calculated for each subgroup and year, is shown in Tables B5, B6, and B7 in Appendix B.

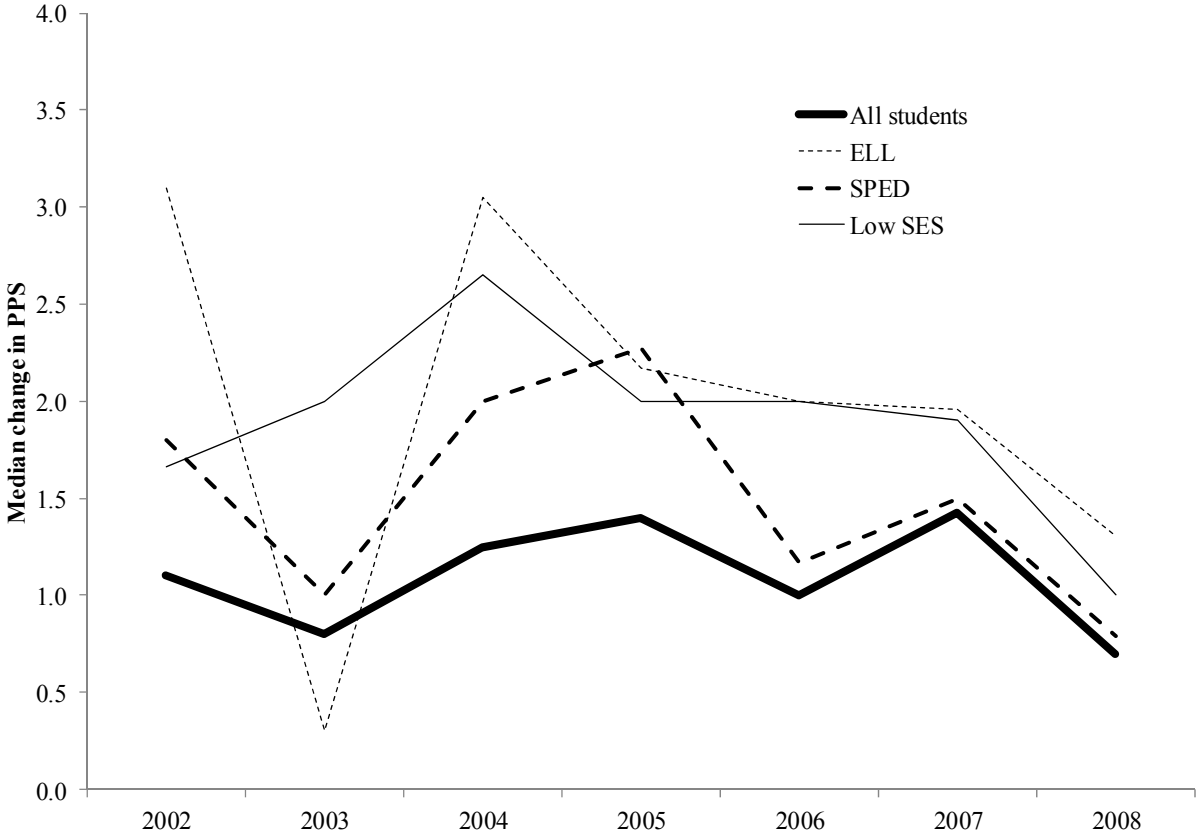


Figure 5. Median change in PPS in reading across grades and states, by subgroup, 2002-2008.

Grades

Table B8 in Appendix B shows the distribution of changes in PPS for reading and mathematics, collapsed over time and state for mathematics and reading, but calculated separately for seven grades (3-8 and HS). Across subjects, PPS changes and the frequency of PPS deceases across grades tended to be very similar, with the exception of HS. HS proficiency change tended to be lower than that of other grades in the 10^{th}-70^{th} percentile range, and HS proficiency rates tended to decline more often than did those from other grades. Figure 6 shows

that this trend is consistent for the median PPS change as well, but the lower PPS change in HS was less pronounced for reading than it was for mathematics

.

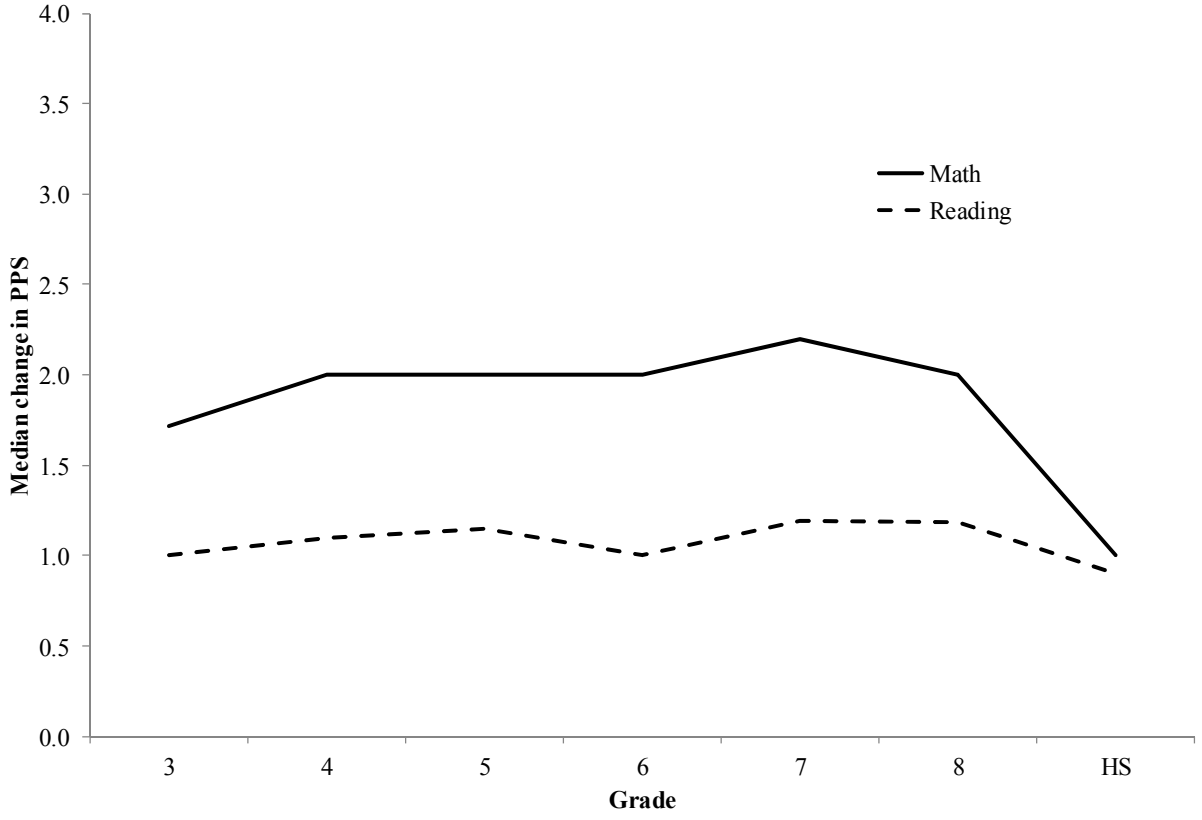


Figure 6. Median change in PPS across states and years, by grade, 2002-2008.

Table B8 also shows that the amount of available PPS data varied by grade. More data was available for the 4th, 8th and HS levels than for the other grades. This was true for both reading and mathematics. For example, the sample size for grade 8 mathematics was 254, indicating about 5 years' worth of 8th grade PPS data per state, on average. In contrast, the sample size for grade 7 mathematics was 149, indicating only about 3 years' worth of 7th grade PPS data per state.

Previous year's PPS and PPS change

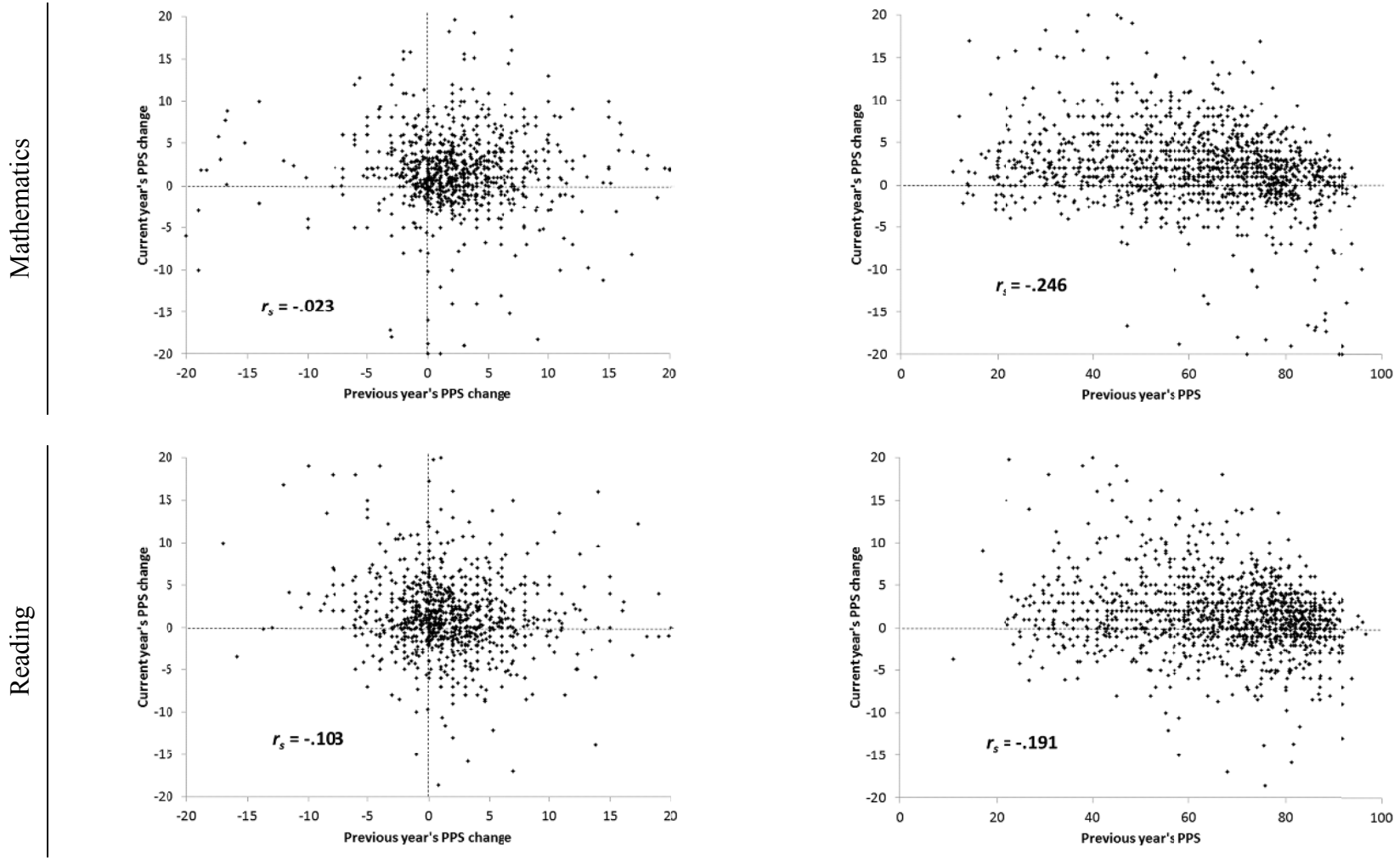
Table 4 shows the Spearman correlations between changes in PPS and the value and change in PPS from the previous year for mathematics and reading. Using Cohen's (1992) guidelines for effect size, there is effectively no relationship between PPS change and the PPS change of the previous year for mathematics (r_s = -.023). There is a weak negative relationship between PPS change and the PPS change of the previous year for reading (r_s = -.103, small effect size). There is a stronger negative relationship between PPS change and the previous year's PPS (not the change, but the PPS itself) with Spearman correlations of -.246 and -.191 for mathematics and reading, respectively (small effect sizes). This indicates that higher PPS rates the previous year were associated with lower PPS change the following year. These results are shown graphically in Figure 7.

Table 4

Spearman intercorrelations between changes in PPS and the value and change in PPS from the previous year for mathematics and reading, all students, 2002-2008

Measure	1	2	3
1. PPS change		-0.246	-0.023
2. Previous year's PPS	-0.191		0.034
3. Previous year's PPS change	-0.103	0.079	

Note. Intercorrelations for mathematics are presented above the diagonal, and intercorrelations for reading are presented below the diagonal.



**Scales for scatterplots were selected to show detail in the main concentration areas for the data. There were outliers that fell outside of the ranges shown that were not included in these graphs. However, correlations were calculated using all data.*

Figure 7. Previous year's PPS change and previous years PPS vs. current year's PPS change across grades, states, and years, 2002-2008*.

The relationships between changes in PPS and the value and change in PPS from the previous year were also analyzed using hierarchical linear regression. As mentioned earlier, change in PPS was the dependent variable, and previous year's PPS, previous year's PPS change, and their interaction (calculated after mean-centering the two variables to minimize collinearity) were treated as predictors and entered into a regression model in that order. At each stage of the regression analysis, the r^2_{change} was calculated to evaluate the additional variance explained by the addition of the predictor, beyond that of the previously entered predictors.

For mathematics, the r^2_{change} using only previous year's PPS as a predictor was .079 (f^2 = 0.087, small effect size). Including the previous year's PPS change as a predictor resulted in a negligible increase in variance explained (r^2_{change} =.0009, f^2 = 0.0009, negligible effect size). Similarly, including the interaction between the previous year's PPS and previous year's PPS change as a predictor resulted in a negligible increase in variance explained (r^2_{change} =.00006, f^2 = 0.00006, negligible effect size). In summary, there was not an interaction between the previous year's PPS and previous year's PPS change, nor did previous year's PPS change explain any additional variance beyond that already explained by previous year's PPS.

Reading results mirrored those of mathematics. The r^2_{change} using only previous year's PPS as a predictor was .058 (f^2 = 0.062, small effect size). Including the previous year's PPS change as a predictor resulted in a negligible increase in variance explained (r^2_{change} =.003, f^2 = 0.003, negligible effect size). Similarly, including the interaction between the previous year's PPS and previous year's PPS change as a predictor resulted in a negligible increase in variance explained (r^2_{change} =.00003, f^2 = 0.00003, negligible effect size). In summary, there was not an interaction between the previous year's PPS and previous year's PPS change, nor did previous

year's PPS change explain any additional variance beyond that already explained by previous year's PPS.

Detailed PPS change percentiles for mathematics and reading, broken down by previous year's PPS are included in Tables B9 and B10, respectively. Figure 8 reinforces the results of the correlational analysis above. We can see that, on average, PPS change rates tended to decline as the previous year's PPSs rates increased. This is true for both mathematics and reading. For example, when the previous year's mathematics PPS rate was less than 30%, the median PPS change for the current year was an increase of 2.5%. When the previous year's mathematics PPS rate was greater than 90%, the median PPS change for the current year was a decline of 0.3%.

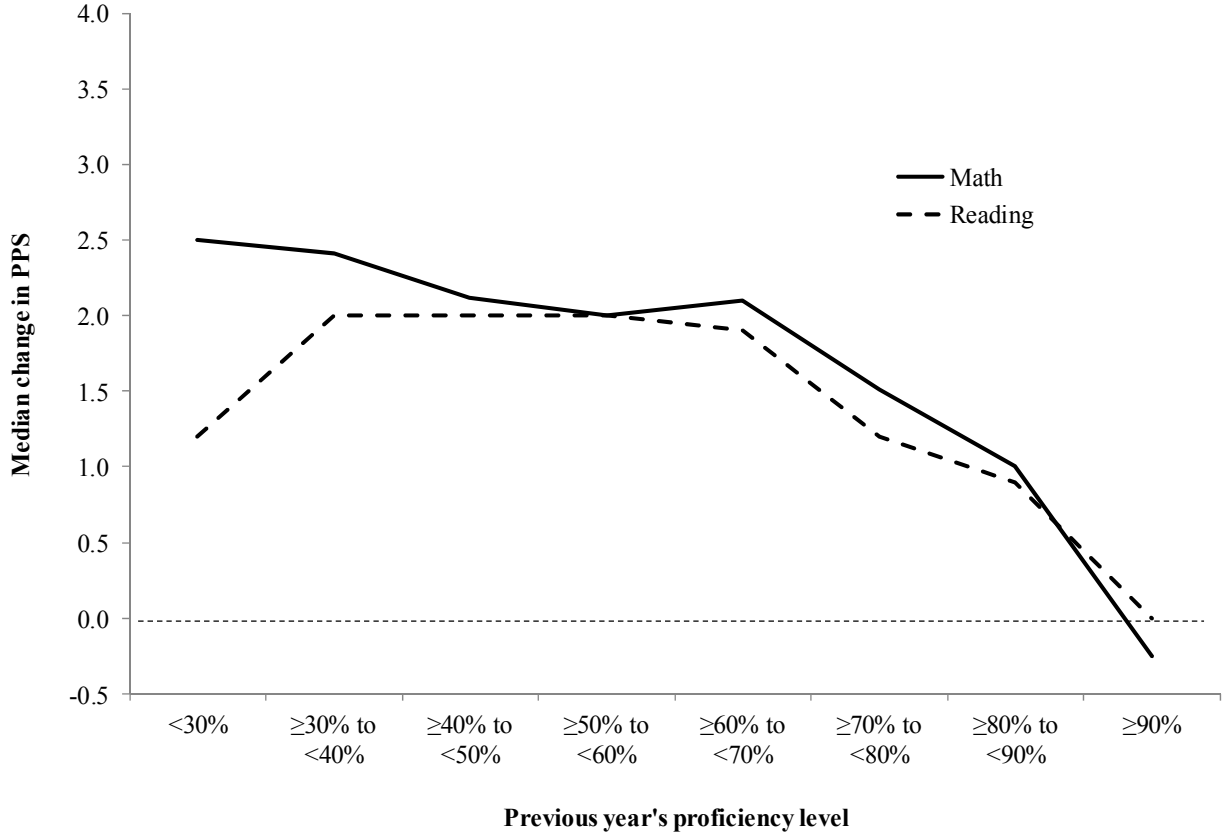


Figure 8. Median change in PPS across grades, states, and years, by previous year's proficiency level, 2002-2008.

Similarly, Figure 9 shows that, for both mathematics and reading, declines in PPS rates occurred more frequently when the previous year's PPS rates were high. For example, when the previous year's mathematics PPS rate was less than 30%, PPS rates for the current year declined about 17% of the time. However, when the previous year's mathematics PPS rate was greater than 90%, PPS rates for the current year declined more than half (56%) of the time. Because the correlation and regression analyses showed only minimal relationship between the previous year's PPS change and the current year's PPS change, results broken out by previous year's PPS change were not calculated.

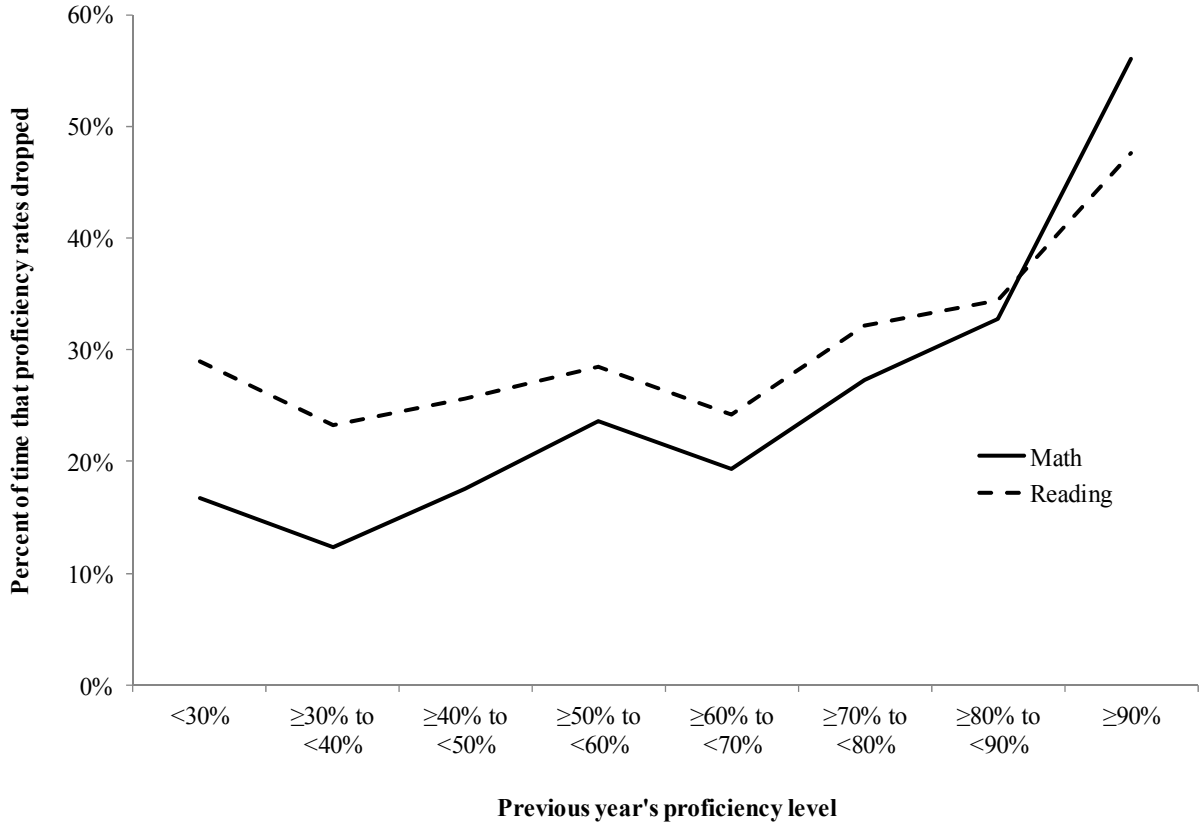


Figure 9. Percent of time that proficiency rates declined across grades, states, and years, by previous year's proficiency level, 2002-2008.

Discussion

The purposes of this study were to summarize yearly state-level changes in PPS across for various grades, subgroups, and subject areas for the past several years and to determine if there were relationships between changes in PPS and the value and change in PPS from the previous year. Based on the results of this study, several conclusions can be drawn:

1. **Typical changes in PPS ranged from a 2.0% decline to a 7.2% increase for mathematics and from a 3.0% decline to a 6.0% increase for reading. On average, the PPS for mathematics tended to increase about 2% per year, while the PPS for reading tended to increase about 1% per year.**

PPS change was similar across genders, but PPS change differed when historically lower-performing subgroups were considered on their own. PPS change was similar for grades 3-8, but tended to be lower for HS. Additionally, PPS change varied as a function of the previous year's PPS levels.

2. **There was some evidence of achievement gaps narrowing. For mathematics, the Low SES group saw larger median PPS change than the general population from 2003 to 2008. For reading, from 2004 to 2008 the ELL, SPED, and Low SES saw larger median PPS change than the general population.**

In order for achievement gaps to close, lower-performing groups need to improve more quickly to catch up with their higher performing peers. The fact that there was some evidence of this occurring, especially in reading, is encouraging.

3. **There was only a week relationship between previous year's proficiency change and the current year's proficiency change.**

When PPS rates increase for several years in a row, it is tempting to assume that another increase is likely. However, this assumption was not born out in the data. For mathematics, PPS change appeared to be nearly independent of the previous year's PPS change. In other words, knowing how much a state improved last year provides very little guidance about what kind of PPS change should be expected this year. There was a weak negative relationship for reading, indicating that larger improvements in PPS were slightly more likely to be followed by smaller improvements (or declines) in PPS.

4. **High PPS levels are hard to maintain: declines in PPS rates occurred more frequently when the previous year's PPS rates were high.**

It is somewhat intuitive that there is a negative relationship between PPS change and the previous year's PPS rate. That is, because PPS is a percentage, states that have low PPS rates have more room for improvement than states with high PPS rates. Stakeholder should also be aware that there was little evidence that once PPS levels get high they will stay high. The higher the PPS level, the more likely it was that PPS would decline the following year.

Limitations

There are several important limitations that should be kept in mind when considering the results of this study. One of the most important set of limitations deals with the limitations of PPS itself as an accountability measure. Comparability of PPS across states of suffers due to (1) different content standards across states, (2) different definitions of "proficient" across states, (3) different performance standards (e.g., cut scores, standard setting methods) across states (see, for example, Sparks, 2010) , and (4) changes in standards (both content and performance) over time

(see, for example, "N.Y. test scores plummet", 2010). Each of these factors calls into question the validity of PPS comparisons. It is hoped that using PPS change (rather than PPS itself) as the variable of interest makes the results more robust to these limitations, but this assumption has not been tested.

A second set of limitations deals with the issue of overrepresentation. Overrepresentation appears in this study in several ways: (1) overrepresentation of states that tested more grades earlier than was required by NCLB, (2) overrepresentation of grades that have been required to be tested for more years (e.g., grade 4 and grade 8), and (3) overrepresentation of later years where more grades were tested. This overrepresentation does not make the results of this study wrong, but is a factor that should be considered when making interpretations. For those especially troubled by this limitation, it is recommended that recent year-level results be used in favor of those results calculated across years.

When comparing results from previous years to the current year, this study uses a cohort, rather than a growth model. In other words, PPS change for South Dakota 4th graders in 2005 was calculated by comparing the PPS of 4th graders in 2005 to the PPS of 4th graders in 2004. A growth model design would have compared the PPS of 4th graders in 2005 to the PPS of 3rd graders in 2004, in order to track the growth of the specific group of students. Although interpretation of PPS change using a cohort model is complicated by the fact that one is comparing different groups of students, it is still a common method for calculating adequate yearly progress (AYP).

Finally, while this study focuses on PPS change, Ho (2008) has shown that state level changes are not consistent across achievement levels (e.g., basic, proficient, advanced).

Therefore, results from this study should not be generalized to achievement levels other than "proficient."

Future work

The results of this study are more useful at the state level than at the classroom, school, and district level, where PPS results are likely to be more variable. Therefore continuing research providing norms for PPS change at these levels is necessary to provide a meaningful context for interpretation of different amounts of PPS change. As other accountability measures are developed to compete with PPS, similar sets of norms should be developed to aid in interpretation and to help moderate expectations. Finally, as new PPS change data becomes available, the results of this study should be updated and expanded.

It is hoped that the results of this study will be useful for K-12 educational administrators and policy makers, as well as other consumers of accountability data. The set of norms presented here can help inform interpretations of yearly changes in PPC at the state level. Additionally, results from this study may allow policymakers to set more realistic goals for mandated PPS increases, for the full student population as well as important subgroups, over time.

References

Braden, J., & Tayrose, M. (2008). Best practices in educational accountability: High-stakes testing and educational reform. In A. Thomas & J. Grimes (Eds.), *Best Practices in School Psychology* (5th Ed., pp. 575-588). Bethesda, MD: National Association of School Psychologists.

Center on Education Policy. (2009). *State profiles and worksheets for state test score trends through 2007–08: General information about state profiles and worksheets*. Retrieved from http://www.cep-dc.org/page.cfm?FloatingPageID=9

Chudowsky, N., Chudowsky, V., & Kober, N. (2009). *State test score trends through 2007-08, Part 3: Are achievement gaps closing and is achievement rising for all?* Washington, DC: Center on Education Policy.

Cohen, J. (1992). A power primer. *Psychological Bulletin, 112*, 155-159.

Fuller, B., Wright, J., Gesicki, K., & Kang E. (2007) Gauging growth: - How to judge No Child Left Behind? *Educational Researcher, 36*, pp. 268-278. doi: 10.3102/0013189X0730655

Ho, A.D. (2008). The problem with "Proficiency": Limitations of statistics and policy under No Child Left Behind. *Educational Researcher, 37*, pp. 351-360.

Kober, N. Chudowsky, N., & Chudowsky, V. (2010). *State test score trends through 2008-09, Part 2: Slow and uneven progress in narrowing gaps.* Washington, DC: Center on Education Policy.

Linn, R.L. (2005). *Fixing the NCLB accountability system* (CRESST Policy Brief No. 8). Los Angeles: National Center for Research on Evaluation, Standards, and Student Testing.

Matus, R. (2007, May 3). Reading scores drop. *St. Petersburg Times*. Retrieved from http://www.sptimes.com

N.Y. test scores plummet. (2010, August 11). Associated Press. *Education Week, 29*(37), 5.

Solochek, J.S. (2007, May 3). More may repeat third grade. *St. Petersburg Times*. Retrieved from http://www.sptimes.com

Sparks, S.D. (2010, November 3). Tests' rigor varies plenty state to state. *Education Week, 30*(10), 12-13.

Stein, L. (2007, May 3). Third-grade reading scores take historic fall. *St. Petersburg Times*. Retrieved from http://www.sptimes.com

Toppo, G., Amos, D., Gillum, J., & Upton, J. (2011, March 7). When scores seem too good to be true. *USA Today*, pp. 1A, 6A-7A.

Powers, S. & Waltman, K. (2009). *Norms for describing "typical" change in student achievement at the school level* (IARP Report #11). Iowa City, IA: Center for Evaluation and Assessment, University of Iowa.

Appendix A: Subgroup coding

Group for analysis	Groups from files
ELL	Bilingual/ESL
	Currently receiving LEP servic
	Currently Receiving LEP Servic
	ELL
	English Language Learner
	English language learners
	English Language Learners
	English Learner
	LEP
	LEP (currently
	LEP for NCLB
	Limited English
	Limited English Proficiency
	Limited English Proficient

Group for analysis	Groups from files
Low-SES	Econ Disadvantaged
	Econ. Disadvantaged
	Econo. Dis
	Economic Disadvantaged
	Economically Di
	Economically Disadvantag
	Economically disadvantaged
	Economically Disadvantaged
	Free/Reduced Lunch
	Free/Reduced Meals
	Free/Reduced price meals
	FreeAndReducedLunch
	Low-Income
	Low income
	Low Income
	Subsidized Meals

Group for analysis	Groups from files
SPED	Disabled
	Disabled (SPED)
	IEP
	Spec Ed
	Special Ed
	Special Ed.
	Special Education
	Student w/ disability
	Students w/ disabilities
	Students w/ Disabilities
	Students w/ disabilities (IEP)
	Students w/Disabilities
	Students with an IEP
	Students with Disabilities
	StudentsWithDisabilities

Appendix B: Additional Tables

Table B1

Summary of changes in PPS for math and reading across grades, states, and years (2002-2008), by gender

	Math			Reading		
Percentile	State	Male	Female	State	Male	Female
5th	-5.0	-5.0	-5.0	-5.3	-6.0	-5.0
10th	-2.0	-2.1	-2.5	-3.0	-3.0	-2.9
20th	-0.8	-1.0	-0.8	-1.0	-1.0	-1.1
30th	0.1	0.0	0.0	0.0	-0.1	-0.1
40th	1.0	1.0	1.0	0.5	0.4	0.4
50th	2.0	1.8	2.0	1.0	1.1	1.0
60th	2.7	2.5	2.5	2.0	2.0	2.0
70th	3.8	3.3	3.5	3.0	3.0	2.6
80th	5.0	4.8	5.0	4.0	4.0	3.9
90th	7.2	7.0	7.2	6.0	6.2	5.7
95th	10.0	9.0	9.1	8.7	9.0	8.0
N	1,399	1,434	1,434	1,419	1,457	1,457
How often PPS declined	23.8%	25.8%	24.5%	30.0%	30.3%	30.4%

Table B2

Summary of changes in PPS for math and reading across grades and states, male students, 2002-2008

	Math							Reading						
Percentile	2002	2003	2004	2005	2006	2007	2008	2002	2003	2004	2005	2006	2007	2008
5th	-3.0	-5.5	-4.1	-5.0	-8.8	-3.3	-6.7	-3.6	-6.8	-4.1	-5.3	-4.6	-5.7	-10.6
10th	-2.0	-2.5	-1.3	-3.0	-2.9	-2.0	-2.5	-2.2	-4.1	-2.1	-2.8	-2.2	-3.0	-4.6
20th	-0.7	-1.0	-0.3	-1.0	-1.0	-0.6	-1.1	-1.0	-2.2	-1.0	-1.0	-1.0	-1.0	-2.0
30th	0.3	0.0	1.0	0.5	0.0	0.2	-0.4	0.0	-1.1	0.3	0.0	0.0	0.0	-0.9
40th	1.0	0.9	2.0	1.2	1.0	1.0	0.1	1.0	-0.3	1.0	0.6	0.4	1.0	0.0
50th	2.0	1.7	3.0	2.0	1.8	2.0	1.0	2.0	0.2	2.0	1.9	1.1	1.4	0.8
60th	2.0	2.3	3.9	3.0	2.3	2.9	2.0	2.0	1.1	3.0	2.5	2.0	2.0	1.7
70th	3.0	3.6	5.0	4.0	3.0	3.9	2.7	3.0	2.0	4.0	4.0	2.2	3.0	2.4
80th	4.0	5.0	6.0	5.2	4.6	5.0	3.6	4.8	3.0	5.0	5.7	3.0	4.0	3.7
90th	7.2	6.6	9.6	7.0	7.6	7.4	5.1	7.0	5.7	9.0	7.1	7.2	6.9	5.0
95th	8.3	8.0	11.7	9.1	11.0	10.0	7.0	10.2	7.0	11.0	8.0	10.0	11.3	7.0
N	87	125	148	188	224	326	336	100	126	149	195	227	325	335
How often PPS declined	23.0%	24.0%	22.3%	25.0%	25.4%	22.7%	32.4%	24.0%	42.1%	22.8%	26.2%	29.5%	28.3%	35.8%

Table B3

Summary of changes in PPS for math and reading across grades and states, female students, 2002-2008

	Math							Reading						
Percentile	2002	2003	2004	2005	2006	2007	2008	2002	2003	2004	2005	2006	2007	2008
5th	-4.1	-6.6	-4.4	-5.6	-10.2	-3.7	-6.6	-3.0	-6.0	-3.9	-4.2	-4.0	-4.5	-8.8
10th	-2.2	-3.1	-2.0	-3.0	-2.8	-2.0	-2.8	-2.1	-4.1	-2.0	-2.5	-2.5	-3.0	-4.5
20th	-0.4	-0.9	0.0	-1.0	-0.9	-0.4	-1.2	-1.0	-1.5	-0.5	-1.0	-1.3	-1.0	-2.0
30th	0.0	0.0	1.0	0.0	0.0	0.4	0.0	0.0	-0.6	0.0	-0.2	0.0	0.0	-0.9
40th	1.0	1.0	1.9	1.0	1.0	1.2	0.7	1.0	0.5	0.9	0.8	0.5	0.5	0.0
50th	2.0	2.0	3.0	2.0	1.8	2.0	1.3	1.5	1.0	1.0	1.2	1.0	1.0	0.7
60th	2.0	2.2	4.0	3.0	2.4	2.9	2.0	2.0	2.0	2.0	2.0	1.4	2.0	1.2
70th	3.0	4.0	5.0	4.0	3.4	3.8	2.8	3.0	2.1	3.3	3.1	2.0	3.0	2.0
80th	4.0	5.0	7.0	5.6	5.0	5.0	3.7	4.2	3.0	4.7	4.9	3.3	3.7	3.0
90th	7.8	7.0	10.0	7.0	8.0	8.0	5.1	6.9	5.2	7.4	6.1	6.0	5.0	4.2
95th	8.9	8.0	12.2	9.8	10.8	9.7	7.9	9.8	6.3	11.5	8.0	8.0	9.3	5.7
N	87	125	148	188	224	326	336	100	126	149	195	227	325	335
How often PPS declined	24.1%	28.0%	18.9%	25.5%	25.4%	21.2%	27.7%	28.0%	34.1%	24.8%	30.3%	28.2%	28.0%	36.1%

Table B4

Summary of changes in PPS for math and reading across grades, states, and years (2002-2008), for various subgroups

	Math				Reading			
Percentile	State	ELL	SPED	Low SES	State	ELL	SPED	Low SES
5th	-5.0	-12.5	-9.0	-6.0	-5.3	-14.0	-8.8	-6.9
10th	-2.0	-6.9	-3.8	-2.4	-3.0	-8.6	-4.4	-3.2
20th	-0.8	-2.3	-1.1	-0.7	-1.0	-4.0	-1.6	-1.0
30th	0.1	-0.5	0.0	0.4	0.0	-1.0	0.0	0.0
40th	1.0	1.0	1.0	1.3	0.5	0.7	0.6	1.0
50th	2.0	2.1	2.0	2.3	1.0	2.0	1.3	1.9
60th	2.7	3.8	2.9	3.1	2.0	3.4	2.3	2.7
70th	3.8	5.0	4.0	4.4	3.0	5.0	3.7	4.0
80th	5.0	7.3	6.0	6.0	4.0	7.7	5.6	5.1
90th	7.2	10.9	9.0	8.5	6.0	12.0	8.5	7.9
95th	10.0	14.0	11.3	11.0	8.7	14.8	12.0	10.1
N	1,399	1,394	1,381	1,393	1,419	1,399	1,386	1,397
How often PPS declined	23.8%	31.4%	27.7%	23.7%	30.0%	34.7%	30.0%	28.1%

Table B5

Summary of changes in PPS for math and reading across grades and states, ELL students, 2002-2008

	Math							Reading						
Percentile	2002	2003	2004	2005	2006	2007	2008	2002	2003	2004	2005	2006	2007	2008
5th	-5.1	-19.6	-6.5	-8.0	-12.9	-8.0	-23.2	-8.3	-21.2	-12.3	-9.9	-9.0	-11.4	-32.4
10th	-3.1	-9.9	-3.5	-6.0	-6.1	-5.0	-12.9	-4.2	-13.5	-6.0	-5.1	-7.0	-6.8	-16.4
20th	0.1	-6.0	-0.1	-2.3	-1.7	-2.0	-4.0	-1.0	-8.0	-1.0	-2.4	-3.5	-3.8	-6.1
30th	2.0	-2.0	1.6	-0.8	-0.5	-0.6	-1.0	0.4	-4.0	0.7	-0.2	-1.0	-1.0	-3.0
40th	3.0	-1.0	2.4	0.9	1.0	0.5	1.0	1.9	-1.9	2.0	1.2	1.0	0.0	0.0
50th	4.0	0.4	3.5	2.0	2.0	1.9	2.0	3.1	0.3	3.1	2.2	2.0	2.0	1.3
60th	5.0	3.0	5.0	3.0	3.6	3.2	3.3	5.0	2.4	4.6	4.0	3.3	3.0	3.0
70th	6.0	5.0	6.8	5.0	4.9	5.4	5.0	7.9	4.0	6.5	6.0	4.5	5.0	4.3
80th	8.5	7.3	9.0	7.0	7.3	7.6	6.6	10.5	7.6	9.0	8.5	6.9	7.5	7.0
90th	21.5	10.0	12.8	10.6	11.6	10.3	10.0	17.2	12.3	12.7	13.0	11.0	11.0	11.9
95th	26.4	16.5	16.6	13.2	14.0	13.7	12.7	23.0	14.0	17.7	14.5	14.8	14.4	14.8
N	67	122	148	183	222	321	331	76	123	148	183	219	320	330
How often PPS declined	17.9%	47.5%	19.6%	31.7%	30.6%	32.1%	33.2%	27.6%	44.7%	21.6%	31.1%	32.9%	36.9%	39.4%

Table B6

Summary of changes in PPS for math and reading across grades and states, students receiving special education services, 2002-2008

	Math							Reading						
Percentile	2002	2003	2004	2005	2006	2007	2008	2002	2003	2004	2005	2006	2007	2008
5th	-2.5	-3.7	-11.1	-7.0	-10.0	-6.2	-17.8	-5.0	-6.4	-14.0	-7.0	-6.7	-6.7	-26.0
10th	-2.0	-2.0	-4.1	-3.1	-4.2	-3.0	-7.8	-2.1	-3.4	-4.5	-3.2	-3.2	-4.0	-10.2
20th	-0.9	-0.7	-1.0	-1.0	-1.6	-0.9	-2.1	-1.0	-1.6	-1.4	-0.5	-2.0	-1.1	-3.0
30th	0.0	0.0	0.0	0.3	-0.2	0.6	-1.0	0.0	-0.6	-0.3	0.5	0.0	0.0	-1.0
40th	0.4	0.6	1.0	1.2	1.0	1.3	0.2	0.7	0.2	0.8	1.3	0.9	1.0	0.0
50th	1.2	1.0	2.0	2.0	2.0	2.3	1.0	1.8	1.0	2.0	2.3	1.2	1.5	0.8
60th	2.0	2.0	3.0	3.0	3.0	3.0	2.1	2.4	1.8	2.6	3.3	2.3	2.4	2.0
70th	3.0	3.0	4.5	5.0	4.1	4.0	3.2	4.0	2.1	3.5	5.2	3.7	4.0	3.0
80th	6.0	4.6	6.7	7.1	6.0	6.0	5.1	8.6	4.1	5.8	7.1	5.3	5.7	4.9
90th	13.5	7.0	10.0	9.0	8.2	10.0	9.0	12.3	6.9	7.6	11.0	8.3	8.8	7.4
95th	22.4	10.9	12.2	12.0	9.4	13.3	11.0	15.4	9.3	9.0	16.0	13.1	11.9	10.0
N	64	109	148	187	226	322	325	69	111	149	188	224	321	324
How often PPS declined	23.4%	24.8%	27.7%	24.1%	31.0%	22.4%	34.5%	27.5%	31.5%	32.9%	22.3%	28.1%	28.3%	36.1%

Table B7

Summary of changes in PPS for math and reading across grades and states, low SES students, 2002-2008

	Math							Reading						
Percentile	2002	2003	2004	2005	2006	2007	2008	2002	2003	2004	2005	2006	2007	2008
5th	-14.4	-12.3	-5.6	-6.0	-10.0	-5.0	-5.0	-6.9	-7.6	-3.3	-4.0	-6.3	-7.0	-10.5
10th	-5.4	-1.4	-1.9	-3.0	-3.1	-2.0	-2.6	-5.3	-3.1	-2.0	-2.2	-3.1	-4.0	-5.0
20th	-1.8	-0.2	0.0	0.0	-0.9	-0.7	-1.0	-1.6	-1.7	0.0	-1.0	-1.0	-1.6	-1.6
30th	-0.1	0.7	1.6	0.9	0.7	0.3	0.0	0.0	-0.1	1.0	0.3	0.0	0.0	-0.7
40th	0.9	1.2	2.5	1.5	1.5	1.5	1.0	0.6	1.0	1.6	1.0	1.0	1.0	0.0
50th	1.6	2.1	3.3	2.7	2.1	2.9	1.8	1.7	2.0	2.7	2.0	2.0	1.9	1.0
60th	3.0	3.1	5.0	4.0	3.0	3.7	2.4	2.1	2.4	4.0	3.4	2.5	3.0	2.0
70th	3.9	4.8	6.4	5.5	4.0	4.7	3.3	3.0	3.4	5.0	5.0	3.3	4.0	3.0
80th	5.2	6.3	8.2	6.4	6.4	6.0	4.5	4.0	5.0	7.0	7.3	4.4	5.3	4.2
90th	7.3	8.2	11.6	9.0	10.0	9.0	6.0	7.4	7.1	9.2	9.2	9.0	7.3	6.0
95th	8.8	9.2	15.0	11.0	13.3	11.0	8.0	12.8	8.7	11.5	11.9	10.1	9.7	8.1
N	55	106	153	195	234	326	324	56	107	154	198	223	325	324
How often PPS declined	29.1%	19.8%	16.3%	20.0%	24.4%	23.9%	29.0%	28.6%	29.9%	19.5%	23.7%	27.0%	27.7%	35.5%

Table B8

Summary of changes in PPS for math and reading across states, by grade, 2002-2008

	Math							Reading						
Percentile	3	4	5	6	7	8	HS	3	4	5	6	7	8	HS
5th	-5.2	-6.8	-7.1	-5.4	-5.4	-5.0	-5.0	-5.0	-5.2	-7.2	-5.0	-6.3	-5.0	-7.0
10th	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-3.0	-2.7	-3.0	-3.8	-2.0	-2.9	-2.8	-4.0
20th	-0.6	-1.0	-0.1	-0.1	0.3	-0.9	-1.3	-1.2	-1.0	-1.4	-0.6	-1.0	-1.0	-1.8
30th	0.0	0.0	0.8	0.4	1.0	0.0	-0.2	-0.4	0.0	0.0	0.0	0.0	0.0	-1.0
40th	1.0	1.0	1.4	1.3	1.5	1.0	0.3	0.0	0.8	0.7	0.9	1.0	0.6	0.0
50th	1.7	2.0	2.0	2.0	2.2	2.0	1.0	1.0	1.1	1.2	1.0	1.2	1.2	0.9
60th	2.6	2.6	3.0	2.9	3.0	2.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.5
70th	3.3	4.0	4.0	4.0	4.0	3.8	2.8	2.6	3.0	3.0	3.0	3.0	3.0	2.3
80th	4.0	5.4	5.0	5.6	6.0	5.0	4.0	3.8	4.0	4.2	4.0	4.0	4.0	4.0
90th	7.0	8.0	6.8	8.0	8.0	7.0	7.2	5.2	6.3	5.9	6.0	7.0	6.0	8.0
95th	8.0	11.0	9.4	10.3	9.2	11.0	10.7	7.0	8.0	8.2	7.8	9.0	8.0	13.5
N	182	217	189	167	149	254	241	200	221	188	164	169	238	239
How often PPS declined	23.1%	25.8%	20.1%	21.0%	16.1%	24.8%	31.1%	35.0%	28.5%	28.2%	23.2%	25.4%	29.0%	37.7%

Table B9

Summary of changes in PPS for math across grades and states, by previous year's proficiency level, 2002-2008

	Math							
Percentile	<30%	≥30% to <40%	≥40% to <50%	≥50% to <60%	≥60% to <70%	≥70% to <80%	≥80% to <90%	≥90%
5th	-2.3	-1.9	-2.6	-4.8	-3.0	-6.0	-16.5	-27.3
10th	-1.4	-0.8	-1.7	-2.3	-1.7	-2.2	-5.1	-20.0
20th	0.0	0.2	0.0	-0.4	0.0	-1.0	-2.0	-9.6
30th	1.0	1.0	0.9	0.1	1.0	0.0	-0.7	-2.4
40th	1.6	2.0	1.7	1.1	1.6	0.9	0.4	-1.0
50th	2.5	2.4	2.1	2.0	2.1	1.5	1.0	-0.3
60th	3.3	3.2	3.5	3.2	3.0	2.2	1.7	0.0
70th	4.1	4.5	5.0	4.8	4.0	3.0	2.3	0.0
80th	6.2	6.0	6.0	6.2	5.7	4.0	3.0	0.8
90th	10.6	10.6	10.0	9.0	8.0	5.8	4.0	1.2
95th	16.9	18.7	12.0	10.3	9.1	7.0	5.0	2.0
N	102	113	159	208	284	300	183	50
How often PPS declined	16.7%	12.4%	17.6%	23.6%	19.4%	27.3%	32.8%	56.0%

Table B10

Summary of changes in PPS for reading across grades and states, by previous year's proficiency level, 2002-2008

	Reading							
Percentile	<30%	≥30% to <40%	≥40% to <50%	≥50% to <60%	≥60% to <70%	≥70% to <80%	≥80% to <90%	≥90%
5th	-4.8	-3.7	-3.7	-5.4	-4.2	-5.2	-7.0	-32.8
10th	-3.8	-2.1	-2.6	-3.9	-2.0	-3.0	-4.0	-11.8
20th	-1.4	-1.0	-1.0	-1.1	-0.9	-1.2	-1.1	-3.4
30th	-0.1	0.0	0.0	0.0	0.0	-0.2	-0.6	-2.0
40th	0.9	0.9	0.9	0.9	1.0	0.5	0.0	-1.0
50th	1.2	2.0	2.0	2.0	1.9	1.2	0.9	0.0
60th	2.6	3.0	2.6	2.2	2.4	2.0	1.0	0.7
70th	3.5	4.0	3.6	4.0	3.3	3.1	1.8	1.6
80th	5.1	5.6	5.0	6.0	4.9	4.0	2.1	2.0
90th	14.1	8.4	10.8	8.7	7.0	5.8	3.3	3.1
95th	20.8	16.0	17.3	10.9	10.0	6.9	4.1	3.9
N	38	86	121	179	268	327	358	42
How often PPS declined	28.9%	23.3%	25.6%	28.5%	24.3%	32.1%	34.4%	47.6%