

Connecticut Council for Education Reform

Best Practices Forum

Breakout Session: Turning Data* into Action

*Cognitive and Non-Cognitive

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What “Data into Action” Measures?

Cognitive Measures

Reading/ELA and Math

Non-Cognitive Measures

CCSS *

- Growth Mindset
- Intrinsic Motivation
- Grit/Perseverance
- Sense of Belonging ... safety ... aggression ...

* Measuring 21st Century Competencies, Guidance for Educators. Rand (2013).

Cognitive Measures ... Reporting Actionable Data

Cognitive Diagnostic Assessments*

- Expected to be included in PARCC and SBAC by 2018
- Fine grain level and pattern of errors

Meriden District Assessments (2004 to present)

- Designed for teachers and students to help instruction
- Report specific errors and pattern of errors
- Items used for instruction
- Online

* Test Theory for a New Generation of Tests, Edited by Frederiksen, N., Mislevy, F. J., Bejan, I. I., (1993).
Cognitive Diagnostic Assessment for Education. Editing by Leighton, J. P., Gierl, M. J. (2007).
The Future of Assessment. Editing by Dwyer, C. A., (2008).

The Fine Grain Level and Error Description in Math

Teachers are good at fixing errors ... so identify the errors ...

A student is asked to calculate ...

$$\frac{1}{2} + \frac{1}{4} = ?$$



- A 1/6 (error description)
- B 2/4 (error description)
- C 2/6 (error description)
- D 3/4
- E 1/8 (error description)

An error description is written for each distractor/misconception

- correct responses are ignored

The Fine Grain Level and Error Description in Math

$$\frac{1}{2} + \frac{1}{4} = \frac{2}{6}$$

A 1/6

B 2/4

C 2/6

D 3/4

E 1/8

Error description

If the student selected “C”, then the error description to the teacher is the student is “adding both numerator and denominator”. ←

- Actionable data

There are over 1,000 error descriptions embedded in this software.

Meriden District Assessments Individual Math Reports

Home »
Printable Probes »
Overall Summary »

Key:
Scale Score
Correct Answer
Skipped
View Question
Mouse-over an icon to the right to see its meaning.

Math Error Descriptions for this student

Kevin (

Question #	Error Description
1	
2	B: error: word prob; added 100 instead of subtracting 100: $(443 - 100 = 543)$
3	
4	
5	A: error: pictorial rep of mixed #; used unshaded as numerator: $(1 \frac{4}{5} = 1 \frac{1}{5})$
6	
7	
8	E: error: number line; selected too much on scale: (place 0.4 ml on # line; = 0.9 ml)
9	
10	A: error: word prob; added vs subtracted (R has 48 & S has 71; how many more = $71 + 48$)
11	B: error: word prob; subtracted vs added & incorrect order (78 and 53 more = $53 - 78$)
12	C: error: word prob; multiplied rather than divided (42 in bunches of 7 = 42×7)
13	

What pattern of errors is Kevin making?

Only errors are printed

Historical database is accessible to teachers.

Meriden District Assessments Math Report(s): What to do with this class?

especially Kevin

Home »

Printable Probes »

Overall Summary »

Key:

- Scale Score
- Correct Answer
- Skipped
- View Question

Mouse-over an icon to the right to see its meaning.

Error Identification in Math

Click to see this item

Click item 11 to sort by answer

click on the column header to s

Math Summary															
Last	First	Level			1	2	3	4	5	6	7	8	9	10	11
	Brianna	Below Basic	25									D	A	A	B
	Sierra	Goal	40											C	B
	Luis	Goal	44												
	Victor	Proficient	36			B					E	A	A	A	B
	Kevin	Basic	33			B		A				E		A	B
	Anthony	Goal	45						E						
	Jazmin	Basic	32					A						C	B
	Brian	Below Basic	22			B		C	A			A	B	C	C
	Courtney	Basic	30									D	C	C	C
Garcia	Hector	-	-												

Only errors are printed. For items #2 and #11, most students selected "B" (errors)

Error Descriptions in Reading Comprehension

Types of inefficient reading behaviors identified during testing

ERROR	ERROR DESCRIPTION
No-Support (answer grabbing)	This answer has no support in the passage, but sounds good if you didn't read the passage
Text Matching (look for a literal answer and did not re-read)	Student selects a literal answer from the text – recognizable word
Related (good but not the “BEST” = “tricky”)	Good answer but not the “best” answer for this question
Opposite	The opposite of the correct answer
Anaphoric Pronoun Referent	Mis-identifies the pronoun to appropriate noun in the passage
Skipped Items	

Text Matching Did Not “Look Back” and No Support Answer Grabbing Foils

58 Original Passages

Exhibit 1 (Teacher Copy)		
JOHN ROCK		
	Why did the author write paragraph 4 ?	(is the student re-reading?)
Text Matching	A. To show how he became a dentist.	(he was a “dentist” in paragraph 3)
Text Matching	B. To show John was a teacher.	(he was a “teacher” in paragraph 2)
Best Answer	C. To show John was a hard worker who wanted to help black people.	(inference)
Text Matching	D. To show John was the first black lawyer to be recognized by the Supreme Court.	(this was described in paragraph 5)
No Support	E. To show John moved to the South during the Civil War.	(he did not move to the South)
↑ Errors	↑ Foils	↑ Comment

The purpose is not to get the right answer, but to discuss the errors and have the student improve his/her thinking and foster good reading behaviors.

**The Carefully Crafted ... Related Foil:
requires students to evaluate subtle differences between foils**

Exhibit 2 (Teacher Copy)		
CLIMBING HIGH		
Which statement BEST describes what the passage is MOSTLY about?		
Related Best Answer	A. Annie was a woman who took many risks.	<i>(she did take risks)</i>
Related Text Matching Text Matching	B. Annie was a person who wasn't afraid to follow her dreams.	<i>(implied, best answer)</i>
	C. Women can be mountain climbers.	<i>(she did)</i>
	D. Most mountains can be climbed.	<i>(text matching)</i>
	E. Most people never climb mountains.	<i>(text matching)</i>

The purpose is not to get the right answer, but to discuss the errors and have the student improve his/her thinking and foster good reading behaviors.

Meriden District Assessments Classroom Reading Report (2 of 7)

MDA Reading Reports

What pattern of reading errors is Mary making?

Seven Reading Reports

- Home »
- Printable Probes »
- Critical Reading Exercises »
- Key Concepts »
- CCSS-Math »
- Overall Summary »
- Reading Summary »
- Passage 1 »
- Passage 2 »
- Passage 3 »
- Open Ended Responses »
- Individual Report

- Key:
- Correct Answer
 - Related Answer
 - Text Matching
 - Answer Grabbing
 - Opposite
 - Skipped
 - View Question

Mouse-over an icon to the right to see its meaning.

Error Identification in Reading: December - Grade 5

Reading Comprehension Summary

click on the column header to sort

Last	First	Level						
	Jomara	Goal	16	2	1	1	0	0
	Mary	Proficient	14	1	4	1	0	0
	Keanu	Below Basic	9	1	7	3	0	0
	Marques	Below Basic	10	5	4	1	0	0
	Jamieonna	Below Basic	10	2	5	3	0	0
	Lilly	Below Basic	7	2	7	2	0	0
	Kiley	Goal	16					
	Carlos	Advanced	18					
	Briana	Below Basic	8					
	Jadah	Advanced	20					
	Joseph	Proficient	13	2	5	0	0	0
	Pedro	Goal	16	2	1	1	0	0
	Anastasia	Advanced	18	2	0	0	0	0
	D'Ante-Tahli	Goal	15	3	1	1	0	0
	David	Below Basic	6	4	7	3	0	0
	Joselyn	Below Basic	10	5	3	2	0	0
	Harry	Goal	15	2	2	1	0	0
	Dylan	Basic	12	4	3	1	0	0
	Keyshlianis	Proficient	14	1	4	1	0	0
	Luis	Below Basic	10	4	5	1	0	0

Click student name to view Individual student report (next page)

Meriden District Assessments Individual Reading Report (7 of 7)

What inefficient reading behavior is Mary demonstrating?

Home »

Printable Probes »

Critical Reading Exercises »

Key Concepts »

CCSS-Math »

Overall Summary »

Reading Summary »

Passage 1 »

Passage 2 »

Passage 3 »

Open Ended Responses »

Key:

- Correct Answer
- Related Answer
- Text Matching
- Answer Grabbing
- Opposite
- Skipped
- View Question

Mouse-over an icon to the right to see its meaning.

Error Identification in Reading

Mary, [redacted]

Question #:	Passage 1	Passage 2	Passage 3
1			
2			
3	c:		
4	a:		
5			
6			b: seq
7	e:	e:	
8		b:	
9			
10	d:		

4 text matching errors ... she is not re-reading for comprehension

Total Reading Comprehension of 20:	14
Total Edit / Revising of 10:	8
Total Overall Reading of 30:	22

MDA Reading Comprehension Level:	Proficient
MDA Edit / Revising Level:	Goal
MDA Overall Reading Level:	Goal
Progress Monitoring Reading Scale Score:	268

Error Strand Summary:

A	MDA Strand A (mastery > 66%):	67%
B	MDA Strand B (mastery > 66%):	83%
D	MDA Strand D (mastery > 66%):	75%

Meriden District Assessments Classroom Reading Report (3 of 7)

MDA Reading Reports

Common error for #7 is E; and #10 is D (a difficult item)

Reading Comprehension: Passage 1 Summary											click on the co		
Last	First	Level	✓	1	2	3	4	5	6	7	8	9	10
	Jomara	Goal	8							E			D
	Mary	Proficient	6			C	A			E			D
	Keanu	Below Basic	6		A	A					A		A
	Marques	Below Basic	7	D								E	D
	Jamieonna	Below Basic	6			D			B	E			D
	Lilly	Below Basic	2		C	D		E	C	C	E	D	C
	Kiley	Goal	8								C		D
	Carlos	Advanced	10										
	Briana	Below Basic	4	A	A	E					A	E	A
	Jadah	Advanced	10										
	Joseph	Proficient	9					E					
	Pedro	Goal	9										D
	Anastasia	Advanced	10										
	D'Ante-Tahli	Goal	8							E			D
	David	Below Basic	5		C	D			C			E	A
	Joselyn	Below Basic	5		C	D			E			E	D
	Harry	Goal	7			C			C				D
	Dylan	Basic	8	D									D
	Keyshlianis	Proficient	8								E		D

These Cognitive Online Tools: Free to LEAs

- Seen as helping to increase student achievement in Meriden
- Math (grades 2-9)
- Reading (grades 2-10)

Both will need some revision over next 2-3 years

(new SBAC item formats)

- Form a working group of LEAs to pilot and revise these diagnostic assessments together* with measurement specialists and access to psychometric software (*e.g.* IBM SPSS v22).

* Measuring 21st Century Competencies, Guidance for Educators. Rand (2013).

Two Non-Cognitive Measures ... Reporting Actionable Data

- 1) Social-emotional health and development constructs ...
embedded within a climate survey (well established); and
- 2) Measure of intrinsic motivation and perseverance ...
embedded in a “Getting to Know You” survey (developing).

Non-Cognitive Measure #1: Meriden's School Climate Survey

- Based on National School Climate Standards
- Scientifically validated and reliable
 - LEA level Exploratory Factor Analysis and
 - Independent university researcher Confirmatory Factor Analysis
 - Manuscript accepted 2014: School Psychology Quarterly (APA).
- Confidential online survey
 - Based on student log in (ID), we know the student.

Seven Factor Model (sense of belonging and student aggression)

1. Teachers Motivate & Care
2. Mean to Me (Safety)
3. Respect Differences
4. Parent Values School
5. Parental Support
6. Caring Friends
7. Mean to Others (Aggression)



Factor descriptions
in appendix

Meriden tracks social-emotional development by student over time

- Sense of belonging to school ... actionable data
 - Teachers care/motivate
 - Friends
- Student aggression ... actionable data
 - Pre-bullying behaviors (students do report via computer)
 - Trigger e-mails (students in social emotional crisis)

Trigger E-Mails						
		Never	Rarely	Sometimes	Very Often	Always
34.	I get hit or threatened ...	1	2	3	4	5
OR						
35.	... mean rumors ... about me	1	2	3	4	5

Would you like to tell us about it? 

When a student responds with a “4” or “5” on either of these two items, a trigger e-mail* is immediately sent to:

- School Psychologists
- School Social Workers
- School Administrators
- Office of Research and Evaluation

LEA Assessment Theme of Climate Surveys:

Design assessments and programming to produce diagnostic, and actionable data that practitioners can use to address each individual student's needs.

Confidential and Responsive Online School Climate Survey

The following student quotes are samples of student “trigger e-mails”. They deal with suicide, harm, threats, relational and racial issues. The underlined segments, added by the presenter, align with national qualitative research findings.

Case 1	
Hispanic, male, grade 7, Free Lunch, not special education, not ELL, Language exposed to Spanish but English Dominant, Basic Math, Basic Reading	there are some people who call me names and ... people start <u>rumors about me</u> that i dont like sometimes i want to <u>die and kill myself</u> before the next day. i feel like everyone hates me and for no reason. ive sometimes been nice but <u>when they bring up the rumor i say realy bad things to keep them away</u> ... one day i was thrown a note saying im ###. and it was my by bestfriend ... <u>i lost the only thing that i can trust</u> . i was alone for a long time. if this is un healthy then <u>pleace help me</u> ...
Case 2	
White, male, grade 5, Pay Lunch, not special education, not ELL, Language is English, Goal Math, Proficient Reading.	At school some people dont like me so they bully me and pick on me. I feel horrible and I feel like <u>I want to stay at home doing nothing than get bullyed at school</u> .
Case 3	
Hispanic, male, grade 4, Free Lunch, not special education, not ELL, Language is English, Goal Math, Goal Reading	evrey day steve and his little bro <u>beats me up</u>

Responsive Online School Climate Survey for Students

Case 4	
White, Female, grade 5, Free Lunch, not special education, not ELL, Language is English, Basic Math, Proficient Reading	some kids <u>threaten me</u> by telling me they will punch me if i dont give them my stuff
Case 5	
Hispanic, female, grade 8, Free Lunch, not special education, not ELL, Language exposed to Spanish but English Dominant, Basic Math, Basic Reading	they make <u>threats</u> about how there going to fight me after school then i always have to keep looking overmy shoulder. the <u>make fun of my red hair , and my race</u> also they say mean thing like they <u>spread rumer about me</u> that are not true and most of the kids believe that they are true and that make me mad <u>when i have no one to talk to</u> about the things happening to me
Case 6	
Hispanic, female, grade 7, Free Lunch, not special education, not ELL, Language is English, Below Basic Math, Below Basic Reading	in the past of the school year people were spreading <u>rumors about me</u> and like what do i do to them. like i be crying cause i changed and people are <u>talking behide my back</u> like why would they do that like <u>i really dont know what to do</u> . other kids in this school be saying really bad stuff and (i dont want to say it but really bad stuff.) <u>i dont kown what to do any motre.</u>
Case 7	
White, female, grade 5, Free Lunch, not special education, not ELL, Language is English, Advanced Math, Advanced Reading	Sometimes people in my class and out of my class spread <u>rumors</u> like I have head lice or they say mean things to me or write mean things about me. Once not to long ago some one wrote a very mean letter that had alot of bad words and nasty thing about me. <u>Allmost all the people who tease me are girls.I feel like I have no friends!</u>
Case 8	
White, female, grade 11, Free Lunch, not special education, not ELL, Language is English, <u>Advanced Math, Goal Reading</u>	People have spread lies about me sleeping around and being pregnant. People have <u>spread rumors that I slept with teachers to get good grades</u>

Student Social-Emotional Health Profile (Kara)

Insights from Confidential Climate Data Over Time

Factor-Based Scores by Year

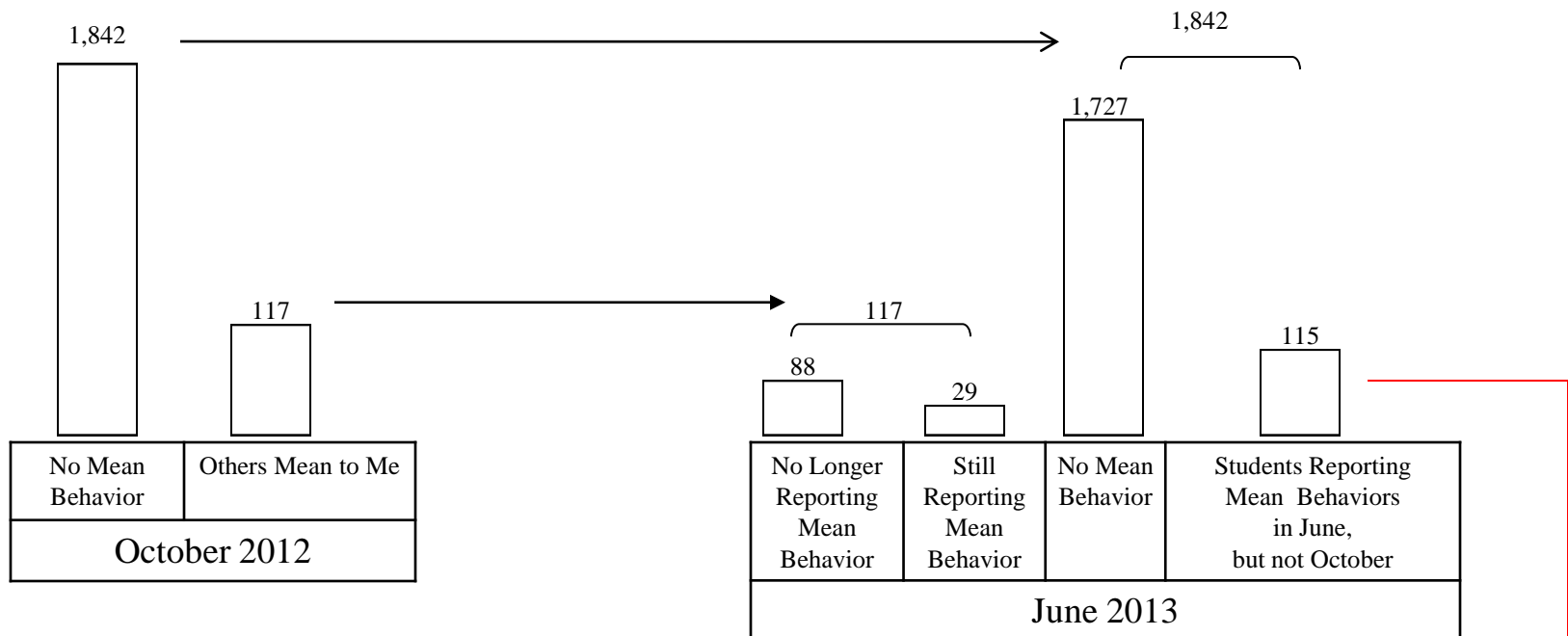
(1 to 5 scale: 1=lowest, 5=highest and most positive climate)

Social-Emotional Profile: Kara (Grade 8)							
	Factor Names and Factor-Based Scores						
Climate Survey Date	(1) Teachers Motivate and Care	(2) Mean to Me (Safety)	(3) Respect Differences	(4) Parents Value School	(5) Parental Support	(6) Friends	(7) Aggression Towards Others
Avg Factor Scores	SF1	SF2	SF3	SF4	SF5	SF6	SF7
Student Survey Fall 2013	1.36	1.00	1.50	3.25	2.75	1.00	4.33
Student Survey Spring 2013	3.00	1.40	1.00	2.25	1.00	4.40	5.00
Student Survey Fall 2012	2.55	2.71	1.83	4.00	4.75	2.33	5.00
Student Survey Spring 2012	3.08	3.57	3.33	1.60	1.50	3.12	3.33
<p>Partial Diagnosis:</p> <div style="display: flex; justify-content: space-between;"> <div style="width: 30%;"> <p>Factor 1 (SF1) <u>Teachers Motivate and Care</u> was very low in fall 2013 (1.36), much lower than previous surveys, so Kara thinks teachers no longer care about her.</p> </div> <div style="width: 30%;"> <p>Factor 2 (SF2) <u>Mean to Me</u> has decreased since spring 2012 (3.57) to the lowest score of (1.00) in fall 2013. Kara feels threatened by other students, who spread mean rumors about her; she does not feel safe and is sad in school.</p> </div> <div style="width: 30%;"> <p>Factor 6 (SF6) <u>Friends</u> Kara also feels she has lost friends since spring 2013 (4.40) to the lowest possible score in fall 2013 (1.00).</p> </div> </div>							

Actionable data for school counselors: 2014 AERA presentation.

Matched Scores on Factor 2 “Mean to Me” (hits/threats or mean rumors) October 2012 to June 2013

- Of the 1,959 students who took both climate surveys last year:



New student application: “**Meriden Cares**” open all year ...

- Do you have a problem with
- Want to tell us
- Trigger email

Non-Cognitive Measure #2: “Getting to Know You” Survey

Ask students about their interests and values:

Do you play a musical instrument ... sport ... sing ... other activity?

How much do you **like** ... math ... reading ... art ... music?

How hard did you work last year? (**effort**) ... math ... reading ... art ... music?

What is **important**? ... math ... reading ... art ... music?

What type of classroom instruction do you like best ... lecture, small group ...?

I have **perseverance**

... I want to do better this year.

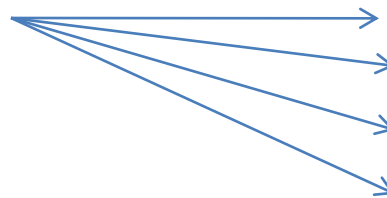
... mistakes are OK, as long as you're learning.

... if a person works harder, he/she can do better.

... when class work gets hard, I just work harder.

What is intrinsic motivation?

(factor analysis, build equation
and track over time)



What's important

Effort ...

What they like ...

Perseverance

“Getting to Know You” Survey Objectives:

- Help foster teacher-student relationships; and
 - teachers are very positive
- Provide guidance on how to modify instructional methods to maximize and maintain student perseverance/motivation over time.

Both teacher-student relationships and student perseverance/motivation correlate with student cognitive achievement.

Summary: Instruments that Produce Actionable Data

Cognitive Measures

- Diagnostic assessments in Math and Reading (2009 AERA Symposium)

Non-Cognitive Measures

- Confidential Climate Survey (“cutting edge” 2014 research: APA & AERA)
 - Social-emotional health and development
- Getting to Know You Survey (developing over next few years)
 - Student interest, values and intrinsic motivation

Both cognitive and non-cognitive measures are free to LEAs but will need further development over the next 2-3 years.

Form a working group of LEAs ... al.larson@meridenk12.org

Appendix

School Climate Survey for Students

Factors Defined

There are seven (7) verified factors on the Meriden School Climate Survey for Students each on a 5-point scale; the higher the score, the better the school climate. In general, group changes in factor-based scores are significant if greater than 0.15. Alpha reliabilities (r) of factor-based scales should be greater than .70 on any scale in the affective domain.

Factor 1: **Teachers Motivate and Care**, is composed of 11 items ($r = .914$)

Students perceive teachers as helpful, fair, caring and motivating; teachers listen to them, tell them when they do a good job and are happy to be in this school. The average factor-based scores decrease as grade level increases from 5 through 9.

Factor 2: **Mean to Me** or **School Safety** is composed of 7 items ($r = .758$)

Students perceive other students as hurting their feelings, saying mean things, possibly hitting and threatening; they worry more about their safety. The average factor-based scores are generally high and steady across grade levels.

Factor 3: **Respect Differences** is composed of 5 items ($r = .759$)

Students respect each other's differences, but they see skin color as a potential problem; other problems are fighting and students being mean to other. The average factor-based scores decrease as grade level increases from 5 through 9.

Factor 4: **Parent Values School** is composed of 4 items ($r = .746$)

Students perceives s/he has a parent or other adult at home who cares about his/her school work, and wants the student to do his/her best and follow school rules; the student also feels s/he will be successful in life. The average factor-based scores are generally high and steady across grade levels.

Factor 5: **Parental Home Support** is composed of 4 items ($r = .721$)

Student perceives s/he has a place and time to do his/her homework and there is a parent who listens and will help with homework if needed. The average factor-based scores decrease as grade level increases from 5 through 12.

Factor 6: **Caring Friends** is composed of 4 items ($r = .749$)

Students perceive they have a friend their own age who cares about them and they trust and can talk about their problems. The average factor-based scores are generally high and steady across grade levels.

Factor 7: **Aggression Towards Others** is composed of 3 items ($r = .720$)

Student claims to have hit, pushed or spread mean rumors about other during the past few months, sometimes in anger. The average factor-based scores are generally high and steady across grade levels.