



Aspects of Student Well-Being and Reading Achievement in PIRLS 2021

*Katherine A. Reynolds, Maya Komakhidze,
Bethany Fishbein, Matthias von Davier*



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For more information about PIRLS contact:
TIMSS & PIRLS International Study Center
Lynch School of Education and Human Development
Boston College
Chestnut Hill, MA 02467
United States

tel: +1-617-552-1600
e-mail: timssandpirls@bc.edu
timssandpirls.bc.edu

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Introduction

Overview

Student well-being has emerged as a topic of considerable interest to researchers and educators.¹ Recent work has sought to examine relationships between measures of student well-being and other constructs such as academic achievement, physical health, relationships with peers, and engagement in learning.^{2,3,4,5} Reading assessment and context questionnaire data available through PIRLS 2021 can be used to add to these conversations.

This report begins with a brief discussion of relevant research literature—including how student well-being is defined, as well as the relationships between well-being and other factors of interest. PIRLS 2021 was not designed to measure student well-being explicitly and does not provide a comprehensive well-being measure. However, the PIRLS 2021 Student Questionnaire collected data for several measures that can serve as indicators for this complex construct (see [PIRLS 2021 Context Questionnaire Framework](#)). This report presents these indicators and their relationships to students' reading achievement. The results are discussed in light of existing research on student well-being, as well as factors unique to PIRLS 2021. These discussions form the basis for a more complex analysis that integrates the individual indicators to describe multidimensional profiles related to students' well-being. The report concludes with key findings and directions for further exploration of student well-being in future cycles of PIRLS.

Defining Student Well-Being

Student well-being is a complex construct to define and measure. Subjective experience of well-being, which refers to one's own perception of well-being, is one of the most prominent definitions of well-being conceptualized in psychological research.⁶ The PIRLS 2021 Student Questionnaire collected students' self-report data with several items hypothesized to relate to subjective well-being. These data are a useful starting point for analysis and discussion of student well-being internationally, even though they may not capture the full breadth of the construct.

Subjective well-being is often described as a multidimensional construct, and researchers have defined these dimensions in different ways. One of the most widely accepted definitions

includes two dimensions: cognitive and affective.^{7,8,9,10} The cognitive dimension refers to a subjective cognitive evaluation of one's experiences. The affective dimension refers to an individual's positive and negative feelings. Positive affect relates to frequent experiences of positive emotions such as joy, enthusiasm, and interest, whereas negative affect involves frequent experiences of negative emotions such as fear, sadness, anger, and anxiety.^{11,12}

Domain-specific well-being is considered to be a stronger predictor of developmental outcomes within a particular domain of students' lives compared to global well-being.¹³ For example, compared to students' general feelings about life, students' well-being in school may be more relevant for explaining differences in academic achievement. Well-being in the school domain refers to how students subjectively experience and evaluate their school lives. Academic environment, sense of school belonging, and relationships with peers are all important components of subjective well-being in school.^{14,15,16,17}

Students' Well-Being, Learning, and Academic Achievement

Previous studies show the importance of school belonging, academic self-concept, and the experience of bullying in shaping students' subjective well-being and demonstrate relationships between each of these and academic achievement.^{18,19} The affective dimension of well-being (positive and negative feelings) has been shown to influence individuals' cognition, including thought processes, attention, and interpretation of information.²⁰ Thus, affect and cognition have a complex relationship. Personal evaluations of academic successes and failures influence the experience of positive and negative emotions in academic contexts. This relationship is supported by self-determination theory, which suggests that academic achievement may promote greater subjective well-being by fulfilling humans' innate need for competence.²¹

Conversely, emotions experienced in educational contexts can support or impede the learning process and students' motivation to learn. For example, the Broaden and Build Theory posits that more frequent experiences of positive emotions, such as joy or enthusiasm, broaden one's perspective and attention, increasing flexibility in interpreting and responding to stimuli.²² Negative emotions, such as anxiety or anger, tend to narrow one's perception and cognition and are associated with responses not conducive to positive development (e.g., "fight or flight"). A considerable body of research shows that experiencing frequent positive emotions results in greater resilience, better self-regulation, creativity, and a further increase in positive affect.^{23,24,25}

The relationship between well-being and actual academic achievement is more complex²⁶—while some studies show a relation between the two,^{27,28} others fail to find a meaningful effect.²⁹ However, there is some consensus that the relation between well-being and learning outcomes is reciprocal and positive.³⁰ Positive feelings such as enthusiasm, engagement, attention, and joy can increase motivation within the academic context.³¹ Simultaneously, high academic achievement can have a protective effect on students' mental health outcomes and further reinforce the states of joy, enthusiasm, and engagement.³²

Students' sociodemographic characteristics (e.g., gender or age) also can complicate the relationship between well-being and academic achievement. Subjective well-being tends to decrease during adolescence, during which time academic achievement also becomes a more important contributor to students' subjective well-being.³³ This suggests that the link between

well-being and achievement may be stronger in later adolescence and weaker among younger students, such as those assessed in PIRLS 2021. Students' gender also can moderate how they experience well-being and its relationship to their achievement. Girls often have higher academic achievement compared to boys (a finding supported in the domain of reading by [PIRLS 2021 International Results in Reading](#)) but also experience more worry about their academic achievement and evaluate themselves more negatively. Despite reporting lower levels of life satisfaction, girls tend to have more positive attitudes towards school and greater school engagement.^{34,35}

Studies of the relationship between student well-being and academic achievement often measure academic achievement through indirect means (such as course grades), which may introduce undesired variance in the data.^{36,37} In this respect, international large-scale assessments such as PIRLS offer a valuable avenue for more in-depth and reliable exploration of the relationship between well-being and direct and comparable measures of achievement across countries.³⁸

Student Well-Being in PIRLS 2021

The PIRLS 2021 Student Questionnaire collected data relating to several variables and scales that can serve as indicators of students' subjective well-being in school. As mentioned above, these indicators cover several important aspects of subjective well-being but do not cover all components of the construct. The indicators available through PIRLS 2021 cover a range of factors related to students' affective and physical states, which, in turn, can be related to well-being. The exhibits presented in the following sections showcase relationships between these indicators and students' reading achievement. These exhibits include:

- Students' Sense of School Belonging
- Student Bullying
- Students Report Arriving at School Feeling Tired
- Students Report Arriving at School Feeling Hungry
- Frequency of Student Absences
- Profiles of Student Well-Being

The first five of these exhibits are based on individual items or scales, while the sixth exhibit shows the results of a single analysis combining the individual measures. Each section provides information about how the variables can be understood as aspects of well-being associated with student achievement. Further details about the constructs and topics covered in the PIRLS 2021 Student Questionnaire, as well as other questionnaires in PIRLS 2021, can be found in the [PIRLS 2021 Context Questionnaire Framework](#). Chapter 15 in [Methods and Procedures: PIRLS 2021 Technical Report](#) provides technical details about the creation and interpretation of the two questionnaire scales included in this report (*Students' Sense of School Belonging* and *Student Bullying*). The chapter includes information about scale reliability, item factor loadings, and the scale's correlation with reading achievement across the countries participating in PIRLS 2021.

Students' Sense of School Belonging

Research has found that students' sense of school belonging is a positive contributor to students' subjective well-being in school.³⁹ The five items included in the PIRLS 2021 *Sense of School Belonging* scale asked students to report how their school experiences make them feel, reflecting the affective component of subjective well-being.

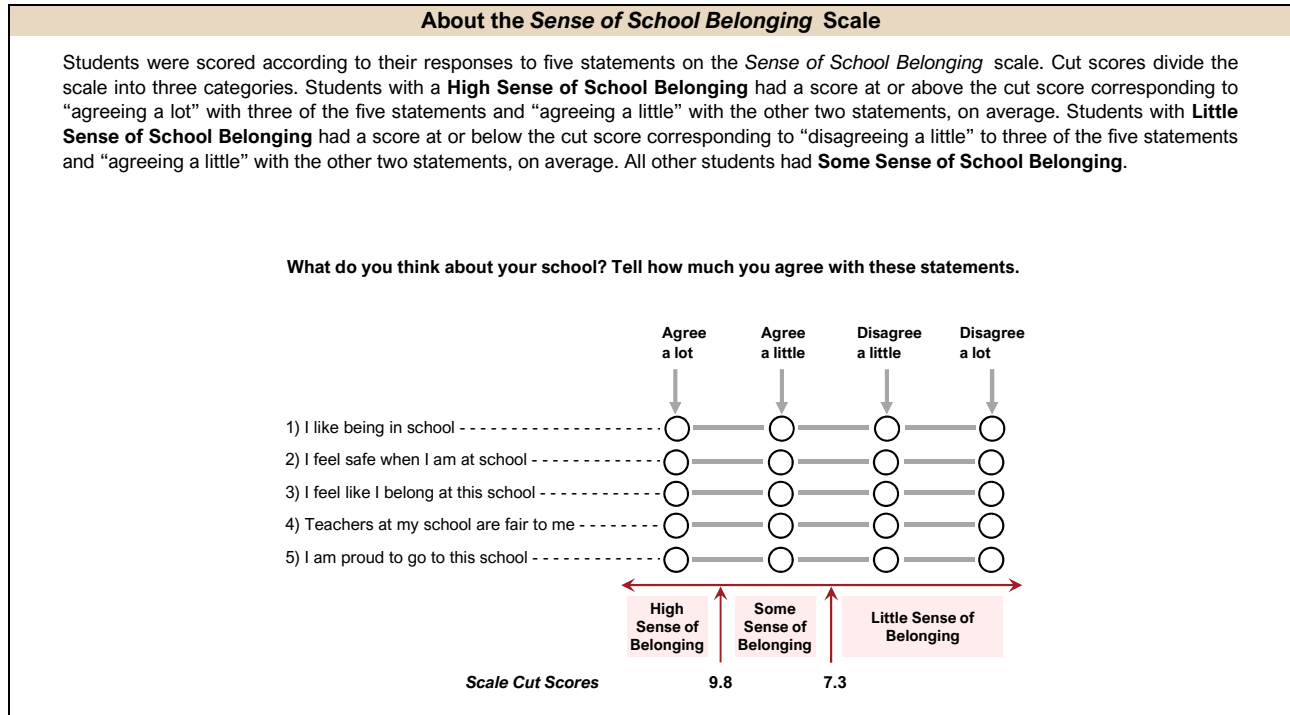


Exhibit 1 shows the association between students' sense of school belonging and their reading achievement. A substantial proportion of students across the PIRLS 2021 participating countries (93%, on average) reported having "High" or "Some" sense of school belonging, and a relatively small percentage of students expressed having "Little" sense of school belonging (7%, on average). Acknowledging this distribution is crucial, as these proportions have implications for inferences that can be drawn about how sense of school belonging relates to reading achievement. Standard errors (a measure of the uncertainty of the estimate) are larger for smaller groups of students, leading to less certainty about the average reading achievement for these groups.

The positive relationship between school belonging and reading achievement is apparent as students who reported a "High" sense of school belonging had the highest average reading achievement compared to students with "Some" or "Low" sense of belonging across the PIRLS 2021 countries on average (512 scale score points compared to 495 and 482). There are occasional exceptions to this international average pattern. In some countries such as Bulgaria, Iran, the Slovak Republic, and Poland, students with "Some" sense of school belonging have somewhat higher estimate of average reading achievement compared to the "High" group. However, it is important to consider that these apparent reversals of the pattern are small and infrequent.

Exhibit 1: Students' Sense of School Belonging

Students' Reports

Assessed Fourth Grade Students at the End of the School Year

✕ Assessed one year later than originally scheduled

■ Delayed Assessment of Fourth Grade Cohort at the Beginning of Fifth Grade

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2021
Grade 4

Country	High Sense of School Belonging		Some Sense of School Belonging		Little Sense of School Belonging		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Albania	95 (0.6)	516 (3.1)	5 (0.5)	493 (8.2)	0 ~	~	12.3 (0.03)
Australia ✕	54 (1.1)	549 (2.7)	37 (1.0)	537 (2.7)	8 (0.5)	508 (5.8)	9.9 (0.05)
Austria	59 (1.0)	537 (2.5)	33 (0.9)	523 (3.0)	7 (0.5)	505 (6.1)	10.1 (0.05)
Azerbaijan	78 (0.8)	451 (3.6)	19 (0.7)	432 (5.3)	3 (0.3)	398 (10.8)	11.1 (0.05)
Bahrain	73 (0.9)	476 (3.1)	23 (0.8)	430 (4.4)	5 (0.4)	391 (9.0)	10.9 (0.05)
Belgium (Flemish)	54 (1.2)	518 (2.5)	36 (0.9)	506 (2.8)	10 (0.6)	487 (4.9)	9.9 (0.06)
Belgium (French)	43 (1.1)	501 (3.3)	42 (1.0)	496 (3.1)	14 (0.8)	473 (4.2)	9.4 (0.06)
Brazil ✕	64 (1.4)	433 (6.0)	30 (1.2)	426 (5.5)	6 (0.5)	389 (13.4)	10.4 (0.08)
Bulgaria	77 (1.2)	541 (3.1)	20 (1.1)	546 (4.8)	3 (0.4)	515 (12.7)	11.0 (0.06)
Chinese Taipei	46 (1.0)	550 (2.4)	42 (0.8)	543 (2.5)	12 (0.6)	526 (4.4)	9.6 (0.04)
Croatia	38 (1.6)	563 (3.1)	51 (1.3)	558 (3.0)	11 (1.0)	534 (5.2)	9.2 (0.07)
Cyprus	61 (1.3)	518 (3.1)	29 (0.9)	506 (3.5)	10 (0.7)	484 (4.7)	10.2 (0.06)
Czech Republic	51 (1.2)	545 (3.0)	41 (1.0)	541 (2.2)	7 (0.5)	525 (5.2)	9.8 (0.05)
Denmark	59 (1.3)	550 (2.2)	34 (1.1)	528 (3.2)	7 (0.5)	520 (5.6)	10.2 (0.06)
Egypt	69 (1.5)	397 (5.9)	25 (1.3)	358 (5.5)	7 (0.6)	354 (7.4)	10.8 (0.08)
England ✕	56 (1.5)	566 (2.7)	35 (1.2)	554 (3.0)	8 (0.6)	523 (5.0)	9.9 (0.06)
Finland	66 (1.0)	556 (2.6)	29 (0.9)	543 (2.9)	5 (0.4)	518 (4.5)	10.5 (0.05)
France	42 (1.2)	522 (3.3)	50 (1.0)	511 (2.9)	8 (0.5)	495 (4.4)	9.5 (0.05)
Georgia	75 (0.9)	502 (2.5)	24 (0.8)	484 (3.9)	2 ~	~	11.0 (0.05)
Germany	62 (1.1)	539 (2.4)	31 (1.0)	516 (3.2)	7 (0.5)	495 (5.4)	10.2 (0.05)
Hong Kong SAR	43 (1.1)	584 (2.8)	44 (0.8)	569 (3.2)	13 (0.7)	553 (5.2)	9.4 (0.05)
Hungary	51 (1.2)	549 (3.9)	40 (0.9)	536 (3.6)	9 (0.6)	520 (5.4)	9.8 (0.06)
Iran, Islamic Rep. of ✕	62 (1.5)	411 (5.5)	34 (1.2)	425 (5.6)	4 (0.5)	385 (12.3)	10.5 (0.07)
Ireland	56 (1.6)	586 (3.1)	36 (1.1)	572 (2.6)	8 (0.7)	541 (5.2)	9.9 (0.06)
Israel ✕	52 (1.3)	517 (2.6)	33 (0.8)	512 (3.2)	15 (1.0)	510 (4.3)	9.7 (0.07)
Italy	61 (1.0)	545 (2.6)	32 (0.8)	530 (2.3)	7 (0.5)	513 (5.0)	10.2 (0.04)
Jordan	80 (1.2)	388 (6.2)	16 (1.0)	376 (6.6)	4 (0.4)	329 (12.2)	11.5 (0.07)
Kazakhstan	70 (1.0)	507 (2.5)	26 (0.9)	504 (4.6)	5 (0.4)	502 (6.1)	10.8 (0.05)
Kosovo	93 (0.5)	426 (3.0)	7 (0.5)	387 (9.2)	1 ~	~	12.1 (0.03)
Latvia	44 (1.1)	536 (3.1)	46 (1.0)	524 (2.9)	10 (0.6)	512 (5.3)	9.5 (0.04)
Lithuania	47 (1.4)	558 (3.0)	44 (1.1)	552 (2.3)	10 (0.7)	535 (4.9)	9.6 (0.05)
Macao SAR	47 (0.6)	549 (1.5)	42 (0.7)	528 (1.7)	11 (0.4)	508 (4.1)	9.6 (0.02)
Malta	69 (1.4)	522 (2.8)	26 (1.2)	513 (4.2)	5 (0.5)	478 (6.8)	10.7 (0.06)
Montenegro	83 (0.6)	494 (1.8)	15 (0.6)	468 (3.4)	2 ~	~	11.4 (0.03)
Morocco	81 (1.2)	379 (4.7)	17 (1.1)	351 (6.7)	2 ~	~	11.4 (0.07)
Netherlands	66 (1.2)	536 (2.5)	30 (1.0)	512 (3.5)	4 (0.4)	494 (6.7)	10.5 (0.05)
New Zealand	58 (1.0)	535 (2.5)	33 (0.8)	518 (3.1)	9 (0.5)	499 (5.7)	10.1 (0.05)
North Macedonia	88 (0.9)	449 (5.6)	11 (0.8)	421 (8.2)	1 ~	~	11.9 (0.04)
Northern Ireland	61 (1.4)	578 (2.6)	33 (1.0)	553 (3.1)	6 (0.6)	525 (7.7)	10.1 (0.06)
Norway (5)	64 (1.1)	546 (2.3)	30 (0.8)	534 (2.6)	6 (0.5)	513 (6.3)	10.3 (0.05)
Oman	70 (1.2)	445 (4.0)	25 (1.0)	408 (5.0)	6 (0.4)	391 (6.5)	10.8 (0.06)
Poland	43 (1.3)	546 (2.9)	47 (1.3)	556 (2.5)	10 (0.6)	541 (4.6)	9.5 (0.05)
Portugal	82 (0.8)	523 (2.1)	15 (0.7)	509 (3.7)	2 ~	~	11.4 (0.04)
Qatar	62 (1.1)	508 (3.8)	29 (0.8)	466 (4.9)	9 (0.6)	446 (6.4)	10.4 (0.05)
Russian Federation	46 (1.4)	570 (4.2)	43 (1.2)	569 (3.6)	11 (0.5)	562 (3.7)	9.5 (0.06)
Saudi Arabia ✕	72 (1.0)	477 (3.0)	23 (0.9)	428 (4.7)	5 (0.5)	405 (9.0)	11.0 (0.05)
Serbia	72 (1.5)	515 (3.5)	24 (1.3)	513 (3.4)	4 (0.4)	494 (7.3)	10.7 (0.08)
Singapore	52 (0.8)	597 (3.3)	37 (0.6)	584 (3.3)	11 (0.5)	560 (4.5)	9.8 (0.04)
Slovak Republic	59 (1.3)	529 (3.5)	33 (1.1)	538 (2.8)	9 (0.7)	520 (5.3)	10.1 (0.05)
Slovenia	51 (1.1)	528 (2.0)	40 (0.9)	516 (2.5)	9 (0.7)	500 (3.4)	9.8 (0.05)
South Africa ✕	61 (1.6)	308 (5.0)	30 (1.2)	278 (6.2)	8 (0.6)	266 (8.5)	10.5 (0.09)
Spain	73 (1.0)	527 (2.3)	22 (0.8)	513 (2.6)	5 (0.4)	501 (5.6)	10.8 (0.05)
Sweden	54 (1.3)	553 (2.8)	38 (1.0)	542 (2.4)	8 (0.7)	515 (5.0)	10.0 (0.06)
Türkiye	76 (1.0)	508 (3.2)	22 (0.9)	465 (5.1)	3 (0.3)	440 (10.6)	11.1 (0.05)
United Arab Emirates	67 (0.5)	511 (1.9)	26 (0.4)	460 (2.6)	7 (0.2)	423 (4.9)	10.6 (0.02)
United States	59 (1.9)	565 (5.9)	34 (1.8)	536 (10.8)	8 (0.9)	497 (11.1)	10.0 (0.08)
Uzbekistan	82 (0.9)	445 (2.7)	16 (0.8)	414 (4.7)	2 ~	~	11.4 (0.05)
International Average	63 (0.2)	512 (0.5)	30 (0.1)	495 (0.6)	7 (0.1)	482 (1.0)	
Benchmarking Participants							
Alberta, Canada	71 (1.1)	550 (3.4)	24 (1.0)	527 (5.0)	6 (0.6)	506 (9.2)	10.8 (0.05)
British Columbia, Canada	63 (1.0)	545 (3.7)	30 (0.9)	533 (4.2)	7 (0.5)	505 (6.7)	10.3 (0.05)
Newfoundland & Labrador, Canada	62 (1.9)	535 (3.3)	31 (1.5)	516 (4.2)	7 (0.8)	499 (10.0)	10.3 (0.07)
Quebec, Canada	54 (1.1)	556 (2.8)	38 (0.9)	549 (3.3)	8 (0.6)	531 (5.6)	9.9 (0.05)
Moscow City, Russian Federation	39 (1.1)	604 (2.4)	46 (0.7)	598 (2.5)	16 (0.7)	589 (2.8)	9.2 (0.05)
South Africa (6) ✕	59 (1.2)	406 (4.5)	33 (1.1)	367 (5.7)	8 (0.4)	338 (7.6)	10.2 (0.06)
Abu Dhabi, UAE	59 (0.8)	483 (3.8)	31 (0.7)	415 (4.1)	10 (0.5)	385 (6.0)	10.2 (0.04)
Dubai, UAE	71 (0.8)	565 (1.8)	24 (0.7)	536 (2.7)	4 (0.4)	514 (7.1)	10.8 (0.04)

This PIRLS context questionnaire scale was established in 2016 based on the combined response distribution of countries that participated in PIRLS 2016. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

An "r" indicates data are available for at least 70% but less than 85% of the students.

A tilde (~) indicates insufficient data to report result.

The group reporting “Little” sense of school belonging consistently displayed the lowest average reading achievement among the three groups across all countries. This finding supports an association between a positive school experience and academic outcomes. It should be noted that the relatively low percentage of students reporting “Little” belonging leads to larger standard errors (often twice as big as the standard error for the “Some” and “High” belonging groups) associated with average reading achievement in that group in each country. However, the aggregate international average reading achievement for students with “Little” sense of school belonging has a reasonably small error, and the pattern of lowest average achievement in the “Little” group is consistent across countries.

Note that Exhibit 1 shows some variability across countries in terms of the magnitude of the reading achievement differences between the “Little,” “Some,” and “High” scale categories. In some countries, the disparity in reading achievement is more pronounced between students with “High” and “Some” sense of school belonging, while in others, it is more prominent between students with “Some” and “Little” sense of school belonging. This variation is not easily explained but should not be ignored. Differences across countries in how students express positive attitudes towards their school may play a role here, with students reporting their sense of belonging in different ways depending on their cultural context.⁴⁰

Examples from specific countries provide further insight into this variation. In Oman, a notable 70 percent of students had a “High” sense of school belonging and a 37-point advantage in average reading achievement over the 25 percent of students with “Some” sense of school belonging. Furthermore, students in Oman with “Some” sense of school belonging showed a 17-point lead in average reading achievement over the 6 percent of students with “Little” sense of school belonging. In Chinese Taipei, these differences are much smaller between students with “High” and “Some” sense of school belonging. The 46 percent of students with a “High” sense of school belonging showed a 7-point advantage in average reading achievement over the 42 percent of their peers with “Some” sense of school belonging. However, those students with “Some” sense of school belonging had average reading achievement 17 scale score points higher than the 12 percent of students with “Little” sense of school belonging. These examples of Oman and Chinese Taipei highlight what appears to be a generally positive relationship between sense of school belonging and reading achievement, while also illustrating that the magnitude of these differences is not necessarily uniform across countries.

Exhibit 1 provides evidence of a consistent positive association between students’ sense of school belonging (a positive contributor to student well-being) and their reading achievement, with some variation in the magnitude of this association across countries. While most students across participating countries expressed a positive sense of belonging, the association between this sentiment and reading performance is noteworthy. Further research using longitudinal or quasi-experimental designs is needed to explore the directionality of this relationship and whether fostering a supportive and inclusive educational environment improves achievement.

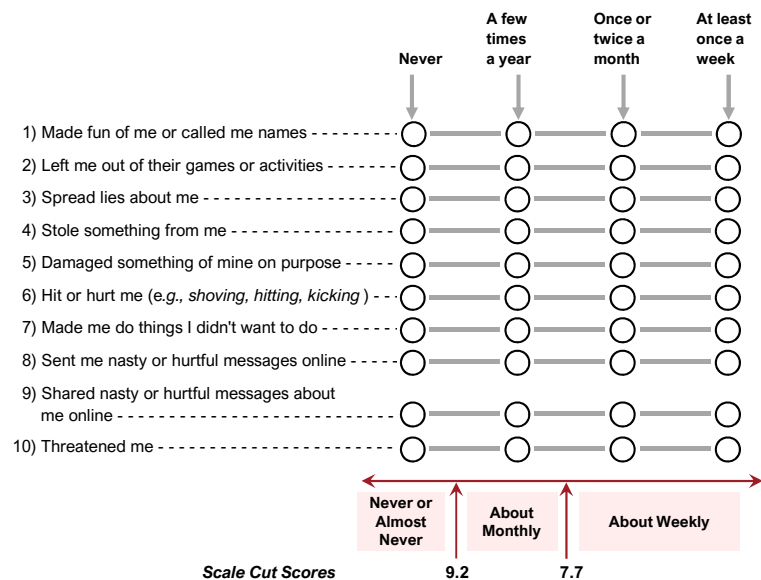
Student Bullying

Being subjected to bullying behaviors is a negative experience for students, so is hypothesized to be a negative contributor to student well-being. The ten items in the PIRLS 2021 *Student Bullying* scale asked students to report how often they experienced different bullying behaviors. The items include bullying behaviors that can occur face-to-face or online. Although frequent experience of bullying likely leads to negative affect at school, it is important to acknowledge that the scale items do not ask students to report how experiencing the bullying incidents made them feel.

About the *Student Bullying* Scale

Students were scored according to their reports regarding ten bullying behaviors on the *Student Bullying* scale. Cut scores divide the scale into three categories. Students bullied **Never or Almost Never** had a score at or above the cut score corresponding to reporting that they “never” experienced five of the ten bullying behaviors and experienced the other five “a few times a year,” on average. Students bullied **About Weekly** had a score at or below the cut score corresponding to reporting that they experienced five of the ten behaviors “once or twice a month” and the other five “a few times a year,” on average. All other students were bullied **About Monthly**.

During this school year, how often have other students from your school done any of the following things to you, including through texting or the internet?



Examination of the results in Exhibit 2 reveals noteworthy patterns and associations between student bullying and reading achievement. This exhibit shows the prevalence of bullying experiences among fourth-grade students across the PIRLS 2021 participating countries and reveals a negative association with their academic achievement.

Exhibit 2: Student Bullying

Students' Reports

Assessed Fourth Grade Students at the End of the School Year

✕ Assessed one year later than originally scheduled

■ Delayed Assessment of Fourth Grade Cohort at the Beginning of Fifth Grade

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Grade 4

Country	Never or Almost Never		About Monthly		About Weekly		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Albania	83 (1.2)	518 (3.1)	13 (1.0)	504 (5.9)	4 (0.4)	485 (9.4)	11.2 (0.05)
Australia ✕	52 (1.1)	553 (2.6)	35 (1.0)	537 (2.8)	13 (0.6)	508 (4.6)	9.4 (0.04)
Austria	61 (1.0)	545 (2.5)	28 (0.8)	518 (2.7)	11 (0.6)	480 (4.2)	9.9 (0.04)
Azerbaijan	67 (1.2)	461 (3.6)	21 (0.8)	431 (5.0)	12 (0.8)	382 (5.6)	10.2 (0.07)
Bahrain	63 (0.9)	490 (3.3)	21 (0.7)	447 (4.1)	16 (0.6)	371 (5.4)	10.0 (0.04)
Belgium (Flemish)	52 (1.1)	519 (2.3)	34 (0.9)	510 (2.7)	14 (0.6)	481 (3.9)	9.5 (0.04)
Belgium (French)	42 (1.3)	509 (3.4)	39 (1.0)	493 (3.1)	19 (0.9)	466 (4.4)	9.1 (0.04)
Brazil ✕	58 (1.4)	457 (5.1)	26 (1.0)	420 (5.8)	16 (1.1)	333 (7.6)	9.8 (0.07)
Bulgaria	58 (1.5)	555 (3.0)	30 (1.2)	528 (5.0)	11 (1.1)	499 (8.1)	9.7 (0.06)
Chinese Taipei	67 (1.0)	552 (2.2)	25 (0.8)	535 (2.6)	8 (0.5)	504 (7.5)	10.3 (0.05)
Croatia	69 (1.2)	566 (2.4)	21 (0.9)	548 (3.6)	9 (0.7)	511 (5.3)	10.2 (0.05)
Cyprus	63 (1.1)	524 (2.9)	26 (0.8)	499 (3.2)	11 (0.6)	469 (5.1)	10.0 (0.05)
Czech Republic	63 (1.1)	551 (2.5)	27 (1.0)	532 (4.0)	11 (0.8)	498 (5.5)	10.0 (0.05)
Denmark	67 (1.1)	547 (2.4)	27 (0.9)	533 (3.0)	7 (0.5)	498 (5.7)	10.0 (0.04)
Egypt	54 (1.9)	410 (5.4)	18 (1.0)	374 (7.0)	28 (1.6)	338 (7.5)	9.6 (0.11)
England ✕	54 (1.2)	568 (3.0)	35 (0.9)	555 (3.1)	11 (0.7)	518 (4.9)	9.5 (0.04)
Finland	75 (1.0)	557 (2.2)	20 (0.7)	539 (3.5)	5 (0.4)	495 (6.8)	10.4 (0.04)
France	73 (1.0)	522 (2.6)	22 (0.9)	499 (3.2)	5 (0.4)	468 (8.2)	10.4 (0.04)
Georgia	85 (0.8)	506 (2.3)	11 (0.6)	467 (4.9)	4 (0.4)	403 (8.4)	11.1 (0.05)
Germany	62 (1.0)	545 (2.2)	27 (0.9)	517 (2.8)	11 (0.6)	461 (5.2)	9.9 (0.04)
Hong Kong SAR	81 (0.8)	579 (2.7)	16 (0.6)	557 (3.9)	3 (0.4)	517 (12.2)	10.7 (0.04)
Hungary	60 (1.0)	551 (3.2)	29 (0.8)	536 (3.9)	11 (0.6)	490 (7.5)	9.7 (0.04)
Iran, Islamic Rep. of ✕	57 (1.4)	430 (4.5)	31 (1.0)	408 (6.7)	13 (0.9)	356 (9.4)	9.7 (0.06)
Ireland	74 (1.0)	585 (2.8)	20 (0.9)	566 (3.7)	6 (0.4)	526 (6.1)	10.4 (0.05)
Italy	60 (1.0)	547 (2.3)	28 (0.8)	534 (2.7)	12 (0.7)	496 (3.9)	9.8 (0.04)
Jordan	71 (1.5)	395 (6.7)	17 (1.0)	370 (6.6)	11 (0.9)	332 (8.1)	10.6 (0.08)
Kazakhstan	60 (0.9)	517 (2.5)	26 (0.6)	498 (3.6)	15 (0.6)	461 (4.5)	10.0 (0.04)
Kosovo	73 (1.2)	438 (3.0)	17 (0.9)	406 (4.3)	10 (0.7)	347 (6.1)	10.5 (0.06)
Latvia	51 (1.2)	543 (2.2)	35 (1.0)	524 (3.1)	14 (0.8)	483 (5.4)	9.4 (0.04)
Lithuania	59 (1.1)	568 (2.3)	28 (0.8)	544 (2.7)	13 (0.7)	502 (4.2)	9.8 (0.05)
Macao SAR	55 (0.7)	547 (1.7)	36 (0.6)	528 (1.9)	10 (0.4)	502 (3.8)	9.6 (0.02)
Malta	62 (1.2)	523 (2.3)	27 (0.8)	516 (4.4)	12 (0.7)	474 (7.9)	9.9 (0.05)
Montenegro	80 (0.8)	499 (1.6)	13 (0.6)	462 (3.2)	7 (0.4)	423 (5.5)	11.0 (0.04)
Morocco	62 (1.5)	390 (5.6)	25 (1.2)	363 (4.9)	13 (0.7)	314 (7.0)	10.0 (0.08)
Netherlands	59 (1.3)	538 (2.9)	31 (1.1)	519 (2.9)	10 (0.7)	490 (5.3)	9.7 (0.05)
New Zealand	46 (0.9)	542 (2.3)	35 (0.7)	530 (2.9)	19 (0.7)	468 (4.3)	9.1 (0.03)
North Macedonia	72 (2.1)	461 (4.6)	17 (1.3)	434 (6.1)	11 (1.1)	361 (10.8)	10.5 (0.11)
Northern Ireland	66 (1.1)	578 (2.8)	27 (0.8)	552 (3.4)	7 (0.6)	516 (6.4)	10.0 (0.05)
Norway (5)	66 (0.9)	547 (2.0)	27 (0.8)	535 (2.8)	7 (0.4)	499 (5.2)	10.0 (0.04)
Oman	63 (1.4)	455 (4.3)	21 (0.8)	418 (5.0)	16 (1.0)	363 (5.3)	10.1 (0.07)
Poland	74 (1.0)	559 (2.0)	20 (0.8)	534 (4.2)	6 (0.5)	493 (7.0)	10.5 (0.04)
Portugal	55 (0.9)	529 (2.2)	33 (0.6)	519 (3.0)	13 (0.5)	481 (3.9)	9.6 (0.04)
Qatar	57 (1.4)	518 (3.1)	23 (0.8)	478 (4.2)	20 (1.0)	407 (4.9)	9.8 (0.06)
Russian Federation	42 (1.3)	580 (4.4)	38 (0.9)	565 (4.2)	20 (0.9)	547 (4.8)	9.1 (0.05)
Saudi Arabia	55 (1.3)	483 (3.1)	18 (0.6)	441 (5.3)	27 (1.2)	392 (4.9)	9.7 (0.07)
Serbia	80 (1.2)	520 (3.2)	15 (0.9)	503 (4.8)	5 (0.5)	459 (7.7)	10.9 (0.06)
Singapore	59 (0.8)	602 (3.0)	29 (0.6)	579 (3.6)	12 (0.5)	537 (5.7)	9.8 (0.03)
Slovak Republic	62 (1.1)	540 (3.1)	26 (0.9)	525 (3.1)	12 (0.7)	488 (6.1)	9.9 (0.05)
Slovenia	61 (1.0)	533 (1.8)	27 (0.8)	514 (2.6)	11 (0.7)	468 (3.7)	9.9 (0.04)
South Africa ✕	27 (1.1)	359 (7.6)	32 (0.7)	304 (4.9)	42 (1.2)	243 (4.6)	8.4 (0.05)
Spain	57 (0.9)	534 (2.3)	30 (0.8)	515 (2.7)	13 (0.6)	482 (3.8)	9.7 (0.04)
Sweden	64 (0.9)	556 (2.5)	27 (0.7)	535 (2.6)	9 (0.6)	499 (5.1)	10.0 (0.04)
Turkiye	67 (1.0)	511 (3.0)	25 (0.8)	479 (4.9)	9 (0.5)	438 (6.7)	10.2 (0.04)
United Arab Emirates	55 (0.6)	530 (1.8)	22 (0.4)	479 (2.8)	22 (0.5)	382 (2.9)	9.6 (0.03)
United States	68 (2.0)	565 (5.2)	24 (1.7)	533 (8.1)	8 (1.1)	481 (14.4)	10.1 (0.08)
Uzbekistan	79 (1.1)	448 (2.7)	13 (0.8)	423 (5.0)	8 (0.5)	359 (6.5)	11.0 (0.06)
International Average	63 (0.2)	519 (0.4)	25 (0.1)	495 (0.6)	12 (0.1)	451 (0.9)	
Israel ✕	--	--	--	--	--	--	--
Benchmarking Participants							
Alberta, Canada	59 (1.5)	552 (3.4)	27 (1.2)	537 (4.1)	14 (1.0)	500 (6.9)	9.7 (0.06)
British Columbia, Canada	58 (1.1)	548 (3.6)	29 (1.0)	531 (4.7)	13 (0.7)	500 (5.4)	9.7 (0.05)
Newfoundland & Labrador, Canada	59 (1.5)	534 (3.4)	28 (1.1)	519 (3.3)	13 (0.9)	496 (5.9)	9.7 (0.06)
Quebec, Canada	57 (1.1)	559 (2.8)	32 (0.9)	547 (3.3)	11 (0.7)	526 (5.1)	9.6 (0.04)
Moscow City, Russian Federation	41 (1.1)	614 (2.0)	38 (0.8)	595 (2.7)	21 (0.7)	574 (2.8)	9.0 (0.04)
South Africa (6) ✕	31 (1.1)	460 (7.0)	36 (0.9)	386 (4.4)	33 (1.2)	318 (4.4)	8.6 (0.04)
Abu Dhabi, UAE	44 (1.0)	514 (3.8)	24 (0.6)	443 (4.6)	32 (0.8)	343 (3.7)	9.1 (0.05)
Dubai, UAE	66 (0.9)	573 (1.6)	22 (0.7)	540 (3.4)	13 (0.6)	475 (4.4)	10.1 (0.04)

This PIRLS context questionnaire scale was established in 2021 based on the combined response distribution of PIRLS 2021 participating countries that assessed fourth grade students at the end of the school year in 2020 or 2021. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A dash (-) indicates comparable data not available.

On average, 88 percent of students across countries reported experiencing bullying “Never or Almost Never” or “About Monthly.” Unfortunately, 12 percent of students on average across countries reported experiencing bullying “About Weekly,” with six countries having one-fifth of students or more in this category.

The international average results show a strong association between the frequency of bullying incidents and average reading achievement. The data indicate that students who face more frequent bullying tend to exhibit lower reading achievement. Students subjected to weekly bullying encounters demonstrated the lowest average reading achievement compared to the other groups across countries (451 scale score points compared to 519 and 495). In some countries, a striking average advantage of 100 reading scale score points or more is observed for students who reported being bullied “Never or Almost Never” in comparison to those facing bullying incidents “About Weekly.”

Internationally, the PIRLS 2021 data reveal a noteworthy 68-point average reading achievement disparity between students who were bullied “Never or Almost Never” and those bullied “About Weekly.” Moreover, a 44-point average achievement difference is observed between students who experienced bullying “About Monthly” and those who encountered bullying “About Weekly.” These statistics show a clear negative relationship between bullying frequency and students’ reading achievement.

The data in Exhibit 2 highlight the diversity of educational landscapes across PIRLS 2021 countries and benchmarking participants regarding student bullying and raise important questions about the cross-cultural comparability of students’ reports of bullying behaviors. While the majority of students reported experiencing little or no bullying, the prevalence of weekly bullying incidents in larger proportions within certain countries calls for caution in making international comparisons. Prior research draws attention to varying manifestations of bullying across contexts and to students’ varying definitions of bullying behaviors.⁴¹ Even with these caveats, student reports of experiencing bullying (even though the extent and types of bullying may vary) are an important indicator of students’ well-being in school, with implications for both their well-being at school and academic achievement.⁴² In situations where students experience high frequency of bullying, tailoring anti-bullying initiatives to suit the specific needs of countries’ educational contexts is essential.

Students Feeling Tired or Hungry

Students participating in PIRLS 2021 were asked to report how often they felt tired and hungry upon arriving at school. There can be several reasons why someone may feel tired or hungry, which introduces complexities in relating these types of questions to student well-being. Nevertheless, they may provide insights into students' subjective experiences in school.^{43,44}

About the Items				
How often do you feel this way when you arrive at school?				
	Every day	Almost every day	Sometimes	Never
I feel tired -----	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel hungry -----	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Exhibit 3 shows the PIRLS 2021 results for how frequently students arrive at school feeling tired. The majority of students (46%, on average) indicated experiencing tiredness “Sometimes” when they arrive at school. This finding may not be surprising, given that all individuals experience occasional fatigue. Because of this, it may not be appropriate to infer that students who are “Sometimes” tired have a lower degree of well-being compared to those who report “Never” being tired. The questionnaire item does not ask students why they feel tired, so it is difficult to draw concrete conclusions about well-being based on students' responses. However, students' feelings at the start of their school day are still a part of their subjective experience and engagement at school.

Exhibit 3: Students Report Arriving at School Feeling Tired

Students' Reports

Assessed Fourth Grade Students at the End of the School Year

✕ Assessed one year later than originally scheduled

■ Delayed Assessment of Fourth Grade Cohort at the Beginning of Fifth Grade

Country	Students Feel Tired					
	Never		Sometimes		Every Day or Almost Every Day	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Albania	39 (1.7)	519 (4.1)	48 (1.5)	516 (3.6)	13 (0.7)	504 (4.7)
Australia ✕	10 (0.5)	540 (5.6)	46 (0.8)	555 (2.9)	44 (0.9)	529 (2.9)
Austria	8 (0.5)	526 (5.3)	49 (1.1)	535 (2.9)	43 (1.1)	526 (2.6)
Azerbaijan	34 (1.3)	453 (5.0)	47 (1.1)	448 (3.6)	20 (0.9)	421 (5.2)
Bahrain	25 (0.8)	473 (4.0)	43 (0.8)	476 (4.0)	32 (0.9)	440 (3.8)
Belgium (Flemish)	11 (0.6)	509 (4.5)	54 (0.8)	517 (2.3)	36 (0.8)	503 (2.8)
Brazil ✕	20 (1.0)	403 (8.2)	41 (1.3)	463 (5.2)	40 (1.3)	412 (5.4)
Bulgaria	17 (1.0)	537 (5.5)	48 (1.1)	548 (4.0)	36 (1.3)	534 (4.0)
Chinese Taipei	22 (0.8)	542 (3.1)	52 (0.8)	549 (2.3)	26 (0.7)	537 (3.2)
Croatia	8 (0.6)	561 (5.9)	47 (1.4)	561 (3.1)	45 (1.5)	553 (2.9)
Cyprus	24 (0.7)	520 (4.1)	41 (0.9)	521 (2.8)	35 (0.9)	496 (3.6)
Czech Republic	8 (0.5)	530 (5.7)	46 (0.9)	554 (2.7)	46 (1.0)	530 (2.7)
Denmark	6 (0.4)	545 (5.4)	52 (1.0)	547 (2.3)	42 (1.1)	531 (2.9)
Egypt	20 (1.0)	396 (7.9)	47 (1.4)	404 (5.8)	33 (1.4)	355 (6.5)
England ✕	6 (0.4)	557 (7.4)	47 (1.1)	570 (3.2)	46 (1.1)	548 (2.6)
Finland	5 (0.4)	542 (6.3)	58 (1.0)	558 (2.3)	37 (1.0)	538 (2.8)
France	13 (0.5)	507 (5.0)	50 (0.9)	522 (2.4)	36 (1.0)	507 (3.5)
Georgia	25 (1.6)	511 (3.9)	50 (1.4)	500 (2.4)	25 (1.0)	478 (4.4)
Germany	9 (0.6)	527 (5.1)	45 (0.9)	538 (2.9)	46 (1.1)	520 (2.5)
Hong Kong SAR	13 (0.6)	578 (4.6)	59 (0.9)	577 (2.7)	28 (0.8)	563 (3.5)
Hungary	4 (0.4)	520 (8.6)	31 (0.8)	540 (4.2)	65 (0.9)	541 (3.3)
Iran, Islamic Rep. of ✕	42 (1.4)	409 (5.6)	37 (1.1)	438 (4.6)	21 (1.1)	388 (9.0)
Ireland	6 (0.6)	567 (6.3)	48 (1.2)	589 (2.9)	46 (1.3)	567 (2.6)
Israel ✕	8 (0.5)	503 (5.5)	42 (0.9)	522 (2.4)	50 (1.0)	505 (2.6)
Italy	11 (0.5)	528 (4.1)	45 (0.9)	547 (2.4)	44 (0.9)	531 (2.3)
Jordan	33 (1.7)	392 (8.8)	45 (1.7)	395 (6.2)	23 (1.2)	358 (7.1)
Kazakhstan	19 (0.8)	493 (4.5)	55 (0.9)	511 (2.6)	25 (0.8)	501 (3.9)
Kosovo	29 (1.1)	428 (3.7)	50 (1.0)	438 (3.4)	20 (0.9)	393 (5.6)
Latvia	5 (0.4)	533 (8.1)	43 (1.0)	537 (2.6)	51 (1.0)	524 (3.0)
Lithuania	7 (0.5)	543 (5.1)	44 (1.0)	562 (2.6)	50 (1.0)	547 (2.6)
Macao SAR	18 (0.6)	550 (2.6)	52 (0.7)	538 (1.8)	30 (0.7)	524 (1.8)
Malta	14 (0.8)	509 (4.1)	44 (0.9)	525 (2.9)	41 (1.0)	511 (3.9)
Montenegro	41 (0.8)	497 (2.5)	14 (0.6)	506 (3.9)	45 (0.9)	481 (2.2)
Morocco	34 (1.5)	362 (5.7)	44 (1.6)	393 (5.8)	22 (1.3)	359 (6.9)
Netherlands	10 (0.6)	524 (6.0)	57 (1.0)	534 (2.8)	33 (1.2)	518 (3.0)
New Zealand	5 (0.3)	510 (6.6)	39 (0.7)	545 (3.1)	55 (0.8)	516 (2.4)
North Macedonia	23 (1.3)	454 (7.4)	53 (1.7)	461 (4.8)	24 (1.3)	411 (7.0)
Northern Ireland	6 (0.4)	559 (6.8)	45 (1.1)	578 (3.0)	49 (1.1)	558 (2.7)
Norway (5)	7 (0.4)	535 (4.9)	47 (0.8)	547 (2.3)	46 (0.9)	533 (2.3)
Oman	27 (1.1)	438 (5.4)	49 (1.1)	444 (4.0)	23 (1.0)	409 (5.3)
Poland	10 (0.6)	553 (6.0)	46 (1.0)	566 (2.4)	43 (1.0)	532 (2.5)
Portugal	21 (0.8)	517 (3.3)	50 (0.8)	528 (2.5)	28 (0.8)	511 (2.9)
Qatar	18 (0.8)	485 (5.3)	44 (0.9)	502 (4.4)	39 (1.2)	474 (3.8)
Russian Federation	10 (0.6)	565 (5.9)	48 (0.9)	572 (3.9)	42 (1.2)	564 (3.6)
Saudi Arabia	23 (0.9)	465 (4.7)	47 (1.2)	468 (3.3)	30 (1.1)	423 (5.3)
Serbia	14 (1.0)	510 (6.1)	56 (1.8)	521 (3.5)	30 (1.3)	507 (3.6)
Singapore	9 (0.4)	588 (5.2)	43 (0.7)	596 (3.4)	48 (0.7)	580 (3.3)
Slovak Republic	7 (0.5)	521 (7.4)	44 (1.1)	535 (2.9)	50 (1.2)	528 (3.2)
Slovenia	9 (0.5)	517 (4.7)	45 (1.0)	534 (2.2)	46 (1.0)	508 (2.2)
South Africa ✕	33 (1.1)	293 (4.9)	28 (0.8)	347 (6.3)	39 (1.0)	265 (5.9)
Spain	15 (0.7)	518 (4.5)	50 (0.8)	527 (2.6)	36 (0.9)	517 (2.3)
Sweden	8 (0.5)	529 (6.5)	51 (1.0)	552 (2.5)	41 (1.1)	539 (2.7)
Turkiye	19 (0.6)	497 (5.4)	57 (0.8)	503 (3.4)	24 (0.8)	489 (4.1)
United Arab Emirates	15 (0.3)	485 (3.0)	45 (0.4)	508 (1.9)	40 (0.4)	468 (2.6)
United States	4 (0.6)	552 (16.9)	40 (1.6)	561 (8.1)	56 (1.9)	541 (6.2)
Uzbekistan	48 (1.2)	443 (3.0)	38 (1.1)	450 (3.2)	14 (0.8)	396 (4.9)
International Average	17 (0.1)	503 (0.8)	46 (0.1)	516 (0.5)	37 (0.1)	492 (0.5)
Belgium (French)	- -	- -	- -	- -	- -	- -
Benchmarking Participants						
Alberta, Canada	9 (0.7)	543 (6.6)	44 (1.2)	551 (3.8)	47 (1.3)	531 (4.1)
British Columbia, Canada	7 (0.6)	528 (6.5)	45 (1.3)	552 (3.9)	48 (1.3)	526 (3.8)
Newfoundland & Labrador, Canada	6 (0.4)	515 (8.5)	43 (1.2)	533 (3.6)	51 (1.2)	521 (3.6)
Quebec, Canada	8 (0.5)	541 (6.0)	53 (1.1)	558 (2.7)	39 (1.1)	546 (3.3)
Moscow City, Russian Federation	10 (0.6)	609 (4.0)	44 (0.8)	603 (2.1)	46 (1.0)	592 (2.4)
South Africa (6) ✕	26 (1.2)	380 (6.5)	47 (0.9)	407 (4.6)	27 (1.1)	368 (7.0)
Abu Dhabi, UAE	14 (0.5)	447 (6.9)	41 (0.7)	476 (3.8)	45 (0.7)	421 (4.3)
Dubai, UAE	14 (0.4)	547 (3.6)	49 (0.8)	562 (1.9)	38 (0.7)	547 (2.2)

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A dash (-) indicates comparable data not available.

Prior research can shed light on possible explanations for students feeling tired. Student tiredness can be associated with early school start times, long commutes to school, changing sleep patterns, and stress.^{45,46} Sleep deprivation and increased tiredness at school also are linked to lower self-esteem and more depressive symptoms.^{47,48} Research has shown that insufficient sleep and sleepiness have negative effects on learning, memory, and school performance, with the effect being the strongest during early adolescence.^{49,50}

The relationship between tiredness and PIRLS 2021 reading achievement is not linear. Students who reported “Sometimes” being tired when they arrive at school had higher reading achievement than their “Never” tired counterparts—516 scale score points compared to 503 points, on average across countries. However, looking country by country, the achievement differences between these two groups are mostly small. Students who were “Sometimes” tired when they arrived at school also outperformed those who reported arriving at school tired “Every day or almost every day,” who had reading achievement of 492 scale score points, on average. Previous research has focused on the negative relationship between sleep deprivation and academic performance.⁵¹ However, reporting to feel tired upon arrival at school may not perfectly reflect serious sleep deprivation patterns. Some students may be tired in the morning without experiencing serious sleep deprivation or adverse effects on academic achievement.

The results presented in Exhibit 4 concerning students reporting to feel hungry upon arrival at school also can be difficult to interpret without further context. Although food insecurity and poverty might explain why some students report arriving at school hungry, the presence of hunger does not necessarily equate to these issues. On average, 35 percent of students across countries reported arriving at school hungry “Every day or almost every day.” Considering additional information at the student, school, or country level can help contextualize this finding. Although the results presented here focus only upon students’ reports of feeling hungry, future research could examine these data in conjunction with information about students’ socioeconomic status (also available as a scale in PIRLS 2021). Higher-level policy information within countries also can contextualize these findings. For example, even in developed countries with higher levels of socioeconomic equality, relatively large percentages of students reported experiencing feeling hungry when arriving at school “Every day or almost every day.” National and school policy information about provision of meals during the school day may assist in the interpretation of these results.

Exhibit 4: Students Report Arriving at School Feeling Hungry

Students' Reports

Assessed Fourth Grade Students at the End of the School Year

✕ Assessed one year later than originally scheduled

■ Delayed Assessment of Fourth Grade Cohort at the Beginning of Fifth Grade

Country	Students Feel Hungry					
	Never		Sometimes		Every Day or Almost Every Day	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Albania	36 (1.3)	525 (3.8)	39 (1.5)	521 (3.8)	25 (1.3)	499 (4.8)
Australia ✕	23 (0.8)	558 (3.7)	43 (0.9)	550 (2.5)	34 (0.9)	522 (3.0)
Austria	24 (0.9)	546 (3.3)	43 (1.0)	537 (3.0)	33 (1.1)	511 (2.6)
Azerbaijan r	39 (1.2)	454 (4.5)	41 (1.0)	454 (3.9)	19 (0.8)	434 (5.1)
Bahrain	21 (0.8)	483 (5.1)	36 (1.1)	480 (4.1)	44 (1.2)	445 (3.4)
Belgium (Flemish)	19 (1.2)	528 (2.7)	38 (0.9)	513 (2.7)	44 (1.4)	504 (2.9)
Brazil ✕	20 (1.0)	424 (11.5)	32 (1.4)	451 (5.5)	48 (1.3)	426 (5.3)
Bulgaria	32 (1.4)	560 (3.6)	34 (1.4)	543 (4.3)	33 (1.3)	525 (4.7)
Chinese Taipei	32 (1.0)	560 (2.3)	45 (0.8)	544 (2.4)	23 (0.8)	525 (3.3)
Croatia	14 (1.1)	562 (5.1)	41 (1.2)	568 (2.8)	44 (1.5)	547 (3.3)
Cyprus	42 (1.0)	526 (3.3)	32 (0.8)	517 (3.3)	26 (0.9)	488 (3.6)
Czech Republic	17 (0.8)	559 (3.4)	40 (0.8)	554 (3.0)	43 (1.0)	528 (2.4)
Denmark	30 (0.8)	562 (3.2)	46 (0.8)	539 (2.3)	24 (0.8)	519 (3.4)
Egypt r	18 (1.2)	401 (9.3)	34 (1.2)	395 (6.6)	48 (1.6)	381 (5.4)
England ✕	25 (0.9)	577 (3.7)	41 (1.0)	562 (3.2)	34 (1.2)	543 (3.0)
Finland	21 (0.7)	568 (3.4)	51 (1.0)	556 (2.4)	28 (1.1)	531 (3.2)
France	24 (0.9)	526 (3.4)	38 (0.8)	519 (2.9)	38 (1.0)	504 (3.4)
Georgia	37 (1.2)	507 (3.4)	39 (1.1)	498 (3.1)	24 (0.8)	487 (3.9)
Germany r	27 (0.8)	549 (3.0)	41 (0.9)	535 (2.9)	32 (1.0)	508 (2.9)
Hong Kong SAR	17 (0.7)	570 (4.2)	45 (1.0)	578 (2.9)	39 (1.0)	570 (3.5)
Hungary	16 (0.7)	552 (5.0)	42 (0.9)	547 (3.6)	42 (0.9)	535 (3.5)
Iran, Islamic Rep. of ✕	32 (1.3)	416 (6.4)	37 (1.1)	433 (5.4)	31 (1.7)	398 (7.0)
Ireland	32 (1.0)	592 (3.5)	46 (0.9)	576 (2.9)	22 (0.9)	562 (3.3)
Israel ✕	11 (0.6)	509 (5.2)	40 (0.9)	528 (2.5)	49 (1.0)	504 (2.6)
Italy	17 (0.5)	563 (2.8)	30 (0.8)	544 (2.8)	53 (0.9)	528 (2.4)
Jordan	26 (1.6)	386 (10.7)	40 (1.5)	388 (7.1)	34 (1.5)	388 (5.8)
Kazakhstan	20 (0.8)	514 (3.7)	47 (0.9)	508 (2.9)	33 (0.8)	500 (3.3)
Kosovo	29 (1.0)	441 (3.4)	40 (1.2)	433 (3.4)	31 (1.2)	408 (4.4)
Latvia	13 (0.8)	551 (4.5)	38 (1.1)	536 (2.9)	49 (1.2)	518 (3.3)
Lithuania	20 (0.7)	567 (3.1)	43 (0.9)	558 (2.7)	37 (0.9)	545 (3.1)
Macao SAR	32 (0.6)	547 (2.0)	44 (0.6)	538 (1.9)	24 (0.6)	517 (2.2)
Malta	17 (0.8)	526 (5.3)	34 (1.1)	528 (3.6)	48 (1.0)	508 (3.1)
Montenegro	40 (1.1)	502 (2.5)	12 (0.6)	507 (4.4)	48 (1.0)	481 (2.2)
Morocco	22 (1.2)	369 (5.7)	42 (1.6)	382 (5.6)	37 (1.4)	377 (6.5)
Netherlands	29 (1.1)	545 (3.1)	41 (1.1)	526 (3.3)	30 (1.0)	514 (3.5)
New Zealand	20 (0.6)	554 (4.1)	37 (0.8)	540 (2.8)	43 (0.9)	505 (2.7)
North Macedonia	26 (1.3)	456 (8.0)	43 (1.4)	462 (4.8)	31 (1.3)	430 (6.5)
Northern Ireland	26 (0.9)	586 (3.9)	42 (0.8)	570 (3.3)	32 (0.9)	549 (3.8)
Norway (5)	23 (0.9)	556 (2.9)	50 (0.8)	545 (2.3)	27 (0.8)	520 (2.8)
Oman	25 (1.2)	445 (5.2)	42 (1.1)	442 (4.4)	34 (1.2)	428 (4.6)
Poland	42 (1.1)	568 (2.6)	35 (0.8)	550 (2.7)	22 (0.8)	526 (3.9)
Portugal	38 (0.9)	532 (2.5)	33 (0.6)	525 (2.7)	29 (0.8)	504 (2.8)
Qatar	15 (0.7)	503 (6.1)	37 (1.0)	504 (4.7)	47 (1.0)	476 (3.6)
Russian Federation	25 (0.8)	571 (4.6)	41 (0.8)	573 (3.1)	34 (1.0)	565 (3.8)
Saudi Arabia r	17 (0.9)	473 (4.5)	36 (1.0)	470 (3.7)	48 (1.2)	447 (3.9)
Serbia	44 (1.5)	524 (4.6)	34 (1.3)	520 (3.4)	22 (1.1)	493 (5.3)
Singapore	26 (0.7)	612 (3.7)	41 (0.6)	593 (3.2)	33 (0.7)	565 (3.8)
Slovak Republic	20 (1.0)	534 (6.3)	41 (0.9)	538 (3.0)	39 (1.0)	528 (2.5)
Slovenia	23 (0.9)	538 (3.4)	38 (0.7)	531 (2.2)	39 (1.1)	504 (2.5)
South Africa ✕	32 (1.2)	308 (5.8)	29 (0.9)	322 (6.3)	38 (1.0)	277 (5.4)
Spain	32 (0.7)	536 (3.5)	34 (0.9)	529 (2.8)	35 (1.0)	508 (2.3)
Sweden	30 (1.2)	561 (3.3)	44 (0.8)	548 (2.5)	26 (1.1)	528 (2.6)
Turkiye	16 (0.8)	499 (5.0)	47 (0.8)	506 (3.7)	37 (1.0)	492 (4.2)
United Arab Emirates	16 (0.4)	516 (2.6)	37 (0.4)	512 (2.2)	48 (0.4)	467 (2.3)
United States	15 (1.2)	573 (7.8)	43 (1.8)	561 (8.3)	42 (2.0)	536 (5.5)
Uzbekistan	49 (1.1)	446 (3.2)	36 (1.0)	447 (2.9)	16 (0.8)	414 (4.8)
International Average	26 (0.1)	518 (0.6)	39 (0.1)	513 (0.5)	35 (0.1)	492 (0.5)
Belgium (French)	- -	- -	- -	- -	- -	- -
Benchmarking Participants						
Alberta, Canada	25 (1.1)	558 (4.2)	44 (1.2)	550 (3.7)	31 (1.2)	523 (4.6)
British Columbia, Canada	28 (1.1)	557 (5.0)	43 (1.1)	545 (3.4)	30 (1.3)	515 (4.9)
Newfoundland & Labrador, Canada	21 (0.9)	548 (5.2)	45 (1.6)	533 (3.0)	34 (1.2)	509 (4.7)
Quebec, Canada	14 (0.9)	564 (4.5)	39 (1.0)	558 (3.0)	46 (1.2)	544 (3.1)
Moscow City, Russian Federation	21 (0.9)	611 (2.8)	40 (0.8)	602 (2.1)	39 (0.9)	590 (2.6)
South Africa (6) ✕	30 (0.8)	409 (6.6)	39 (0.8)	397 (4.8)	31 (1.0)	369 (5.0)
Abu Dhabi, UAE	14 (0.5)	477 (5.7)	34 (0.7)	481 (4.2)	52 (0.8)	425 (4.1)
Dubai, UAE	19 (0.5)	579 (3.3)	41 (0.8)	566 (1.9)	40 (0.7)	535 (2.2)

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

An "r" indicates data are available for at least 70% but less than 85% of the students.

A dash (-) indicates comparable data not available.

Furthermore, it is possible that student-level characteristics unrelated to food insecurity or poverty explain why students arrive at school hungry. Although much of the research in this area focuses on adolescents, some findings may still be applicable to younger students, such as those assessed in PIRLS 2021. Parental involvement and home eating practices seem to be an important predictor of adolescents' tendency to skip breakfast. Adolescents tend to eat breakfast if their parents eat breakfast themselves, if parents prepare breakfast for their children, and if parents habitually eat meals with their children. Not wanting to eat alone or not having anyone present to prepare breakfast are often cited by adolescents as reasons for skipping breakfast.^{52,53,54} Other reasons mentioned by adolescents internationally include not having enough time, fasting, poor appetite in the morning, imitating classmates, or preferring fast food options available outside of the home.^{55,56,57,58,59}

Research indicates that eating breakfast is positively associated with academic achievement and in-class behavior.^{60,61} However, arriving at school hungry does not necessarily imply that students are not eating breakfast at all. For example, breakfast may be provided at school. In these cases, students may be hungry upon arrival to school, but not necessarily when classes begin. As noted above, information about national and school policies regarding the provision of meals is an important complement to the data this item provides.

Exhibit 4 shows no or relatively modest achievement differences across countries between students who reported “Never” being hungry and those who reported “Sometimes” being hungry upon arrival at school (a 5-point difference favoring students who reported “Never,” on average). However, there was a somewhat larger average achievement difference across countries between students who indicated being hungry “Sometimes” and those hungry “Every day or almost every day” (513 vs. 492). These differences indicate a potential association between feeling hungry when arriving at school and reading achievement in some countries. However, the order of magnitude and direction of the relationship is not homogeneous across countries.

When comparing students who responded they are “Never” hungry to those who indicated they are “Sometimes” hungry, achievement differences vary considerably across countries, ranging from a 23-point disparity favoring “Never” hungry students in Denmark to a 27-point difference favoring those who are “Sometimes” hungry in Brazil. These examples demonstrate the variation in these contexts across countries.

The results in Exhibits 3 and 4 illustrate the complexity across countries surrounding students' experiences of tiredness and hunger upon school arrival. These findings highlight the need for a nuanced interpretation that considers additional contextual factors, such as school starting times, school breakfast provisions, and other cultural factors. By considering these complexities, educators and policymakers may better tailor any interventions that are meant to promote holistic well-being and contribute to improved reading proficiency among fourth-grade students.

Frequency of Student Absences

Although school absence itself may not be formally encompassed in the framework of subjective well-being, frequent absences may negatively impact students' well-being at school by reducing their opportunities to learn and develop positive feelings about school experiences. Students participating in PIRLS 2021 responded to a single item in the Student Questionnaire reporting how often they are absent from school.

About the Item	
About how often are you absent from school?	
Once a week - - -	<input type="radio"/>
Once every two weeks - - -	<input type="radio"/>
Once a month - - -	<input type="radio"/>
Once every two months - - -	<input type="radio"/>
Never or almost never - - -	<input type="radio"/>

Exhibit 5 presents the PIRLS 2021 results regarding the frequency of student absences. After considering the response distributions across countries, response categories for the questionnaire item were collapsed to enable a more robust analysis and enhance interpretability. The options “Once a week” and “Once every two weeks,” as well as “Once a month” and “Once every two months” were consolidated in an effort to produce fewer categories with more stable proportions.

Exhibit 5: Frequency of Student Absences

Students' Reports

Assessed Fourth Grade Students at the End of the School Year

☒ Assessed one year later than originally scheduled

☐ Delayed Assessment of Fourth Grade Cohort at the Beginning of Fifth Grade

Country	Never or Almost Never		Once Every 1–2 Months		Once Every 1–2 Weeks	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Albania	66 (1.4)	522 (3.1)	17 (1.0)	511 (5.9)	17 (0.9)	487 (5.0)
Australia ☒	60 (1.0)	549 (2.6)	28 (1.0)	545 (3.0)	12 (0.7)	492 (4.9)
Austria	81 (0.6)	534 (2.1)	12 (0.6)	532 (4.9)	7 (0.4)	476 (5.2)
Azerbaijan	48 (1.4)	462 (3.9)	18 (0.9)	432 (5.6)	34 (1.2)	419 (4.0)
Bahrain	70 (1.0)	483 (2.9)	11 (0.5)	443 (5.9)	19 (0.9)	398 (6.3)
Belgium (Flemish)	79 (0.8)	517 (2.3)	13 (0.6)	501 (4.3)	8 (0.4)	470 (4.6)
Belgium (French)	75 (1.0)	500 (2.7)	13 (0.7)	498 (5.9)	12 (0.7)	459 (4.2)
Brazil ☒	62 (1.2)	449 (5.5)	10 (0.6)	404 (9.9)	28 (1.0)	377 (7.0)
Bulgaria	65 (1.2)	555 (2.6)	21 (1.0)	541 (5.2)	14 (0.9)	476 (7.8)
Chinese Taipei	80 (0.7)	553 (2.0)	12 (0.6)	533 (3.2)	8 (0.5)	469 (4.6)
Croatia	67 (1.1)	563 (2.4)	23 (1.2)	559 (4.0)	10 (0.7)	513 (6.1)
Cyprus	75 (0.8)	519 (2.9)	16 (0.6)	507 (3.8)	9 (0.4)	454 (4.8)
Czech Republic	61 (0.9)	546 (2.3)	26 (0.7)	549 (3.0)	12 (0.7)	493 (4.6)
Denmark	68 (0.8)	544 (2.3)	24 (0.8)	544 (3.0)	8 (0.4)	503 (6.4)
Egypt	22 (1.1)	397 (6.0)	20 (1.4)	387 (8.9)	58 (1.7)	379 (5.5)
England ☒	65 (1.0)	564 (2.7)	26 (0.9)	561 (3.4)	9 (0.5)	508 (5.4)
Finland	47 (0.7)	554 (2.4)	42 (0.7)	555 (2.3)	10 (0.5)	508 (5.8)
France	82 (0.7)	520 (2.4)	11 (0.6)	506 (4.7)	7 (0.4)	458 (5.9)
Georgia	56 (1.1)	509 (2.9)	22 (0.9)	499 (3.9)	22 (0.9)	459 (4.5)
Germany	81 (0.8)	535 (2.2)	10 (0.5)	526 (4.5)	9 (0.5)	469 (5.2)
Hong Kong SAR	89 (0.5)	578 (2.5)	9 (0.5)	558 (4.9)	2 ~	~
Hungary	50 (0.9)	551 (3.2)	37 (0.8)	546 (3.9)	14 (0.8)	482 (6.4)
Iran, Islamic Rep. of ☒	62 (1.3)	426 (4.5)	18 (0.9)	425 (6.9)	21 (1.1)	370 (9.0)
Ireland	64 (1.2)	586 (2.7)	28 (1.1)	577 (3.2)	9 (0.6)	520 (5.7)
Israel ☒	55 (0.8)	527 (2.2)	22 (0.6)	508 (3.7)	23 (0.8)	475 (3.6)
Italy	76 (0.8)	545 (2.1)	12 (0.5)	531 (3.4)	11 (0.6)	498 (3.8)
Jordan	62 (1.5)	402 (5.7)	19 (1.4)	376 (8.9)	19 (1.2)	334 (9.0)
Kazakhstan	57 (1.0)	519 (2.8)	17 (0.6)	502 (3.9)	25 (0.9)	471 (3.1)
Kosovo	63 (1.3)	435 (3.1)	16 (0.9)	424 (4.9)	22 (1.0)	386 (4.8)
Latvia	76 (0.9)	531 (2.6)	14 (0.7)	534 (3.4)	10 (0.6)	506 (6.1)
Lithuania	75 (1.2)	557 (2.3)	15 (0.7)	559 (4.0)	10 (0.9)	514 (4.4)
Macao SAR	79 (0.6)	541 (1.4)	17 (0.5)	529 (2.7)	4 (0.3)	471 (6.6)
Malta	81 (0.7)	525 (2.4)	11 (0.6)	503 (5.8)	9 (0.5)	443 (8.1)
Montenegro	69 (0.8)	502 (1.8)	16 (0.5)	484 (3.7)	15 (0.6)	440 (3.2)
Morocco	79 (1.1)	383 (4.5)	9 (0.9)	352 (8.5)	12 (0.7)	334 (7.9)
Netherlands	76 (0.9)	532 (2.6)	16 (0.8)	525 (4.3)	8 (0.4)	494 (5.1)
New Zealand	55 (0.8)	535 (2.5)	25 (0.7)	542 (2.9)	20 (0.7)	465 (4.3)
North Macedonia	68 (1.6)	461 (5.1)	14 (0.9)	434 (7.0)	19 (1.3)	394 (6.9)
Northern Ireland	74 (1.0)	574 (2.7)	19 (0.9)	563 (4.0)	7 (0.5)	506 (7.7)
Norway (5)	68 (0.8)	543 (2.1)	24 (0.7)	543 (2.8)	8 (0.5)	505 (5.5)
Oman	62 (1.1)	450 (3.8)	14 (0.7)	411 (7.0)	23 (0.9)	396 (5.3)
Poland	70 (0.9)	559 (2.2)	18 (0.8)	551 (3.2)	12 (0.7)	500 (6.4)
Portugal	85 (0.7)	526 (2.0)	7 (0.4)	513 (4.9)	8 (0.5)	459 (5.4)
Qatar	64 (1.0)	511 (3.4)	13 (0.6)	462 (7.3)	23 (0.8)	431 (4.5)
Russian Federation	76 (1.0)	570 (3.3)	14 (0.6)	578 (4.0)	10 (0.9)	528 (8.4)
Saudi Arabia	67 (1.2)	468 (3.4)	14 (0.8)	427 (7.4)	18 (1.0)	402 (5.7)
Serbia	64 (1.5)	523 (3.0)	23 (1.1)	523 (4.0)	13 (1.0)	457 (6.1)
Singapore	81 (0.6)	599 (2.7)	12 (0.4)	568 (5.1)	7 (0.4)	489 (5.9)
Slovak Republic	48 (1.0)	544 (2.7)	31 (1.0)	539 (3.8)	21 (0.9)	486 (4.9)
Slovenia	74 (0.7)	528 (2.0)	15 (0.7)	518 (3.6)	11 (0.5)	472 (4.9)
South Africa ☒	43 (1.4)	331 (7.3)	15 (0.8)	279 (7.5)	42 (1.0)	264 (4.1)
Spain	77 (0.8)	530 (2.3)	10 (0.5)	518 (4.7)	13 (0.7)	476 (4.0)
Sweden	61 (0.8)	549 (2.3)	27 (0.8)	553 (3.1)	13 (0.6)	508 (4.1)
Turkiye	65 (1.1)	513 (3.5)	14 (0.6)	491 (4.8)	21 (0.8)	452 (4.9)
United Arab Emirates	65 (0.4)	521 (1.7)	16 (0.3)	440 (4.3)	19 (0.3)	401 (3.0)
United States	71 (1.3)	558 (6.8)	19 (1.1)	554 (8.1)	10 (1.1)	483 (11.7)
Uzbekistan	63 (1.3)	450 (2.9)	14 (0.7)	433 (4.6)	22 (1.1)	408 (3.5)
International Average	67 (0.1)	515 (0.4)	18 (0.1)	500 (0.7)	15 (0.1)	455 (0.8)
Benchmarking Participants						
Alberta, Canada	65 (1.0)	550 (3.5)	21 (0.8)	545 (4.7)	14 (1.0)	495 (6.1)
British Columbia, Canada	64 (1.2)	545 (3.5)	22 (1.0)	541 (4.3)	14 (0.9)	495 (5.7)
Newfoundland & Labrador, Canada	64 (1.5)	530 (3.7)	23 (1.0)	530 (3.8)	13 (1.1)	490 (5.3)
Quebec, Canada	75 (0.9)	555 (2.8)	18 (0.7)	552 (5.0)	7 (0.5)	515 (5.5)
Moscow City, Russian Federation	72 (0.8)	599 (2.1)	19 (0.6)	606 (2.8)	9 (0.5)	575 (3.9)
South Africa (6) ☒	53 (1.3)	421 (5.3)	15 (0.8)	368 (7.3)	31 (1.0)	338 (4.5)
Abu Dhabi, UAE	57 (0.8)	498 (3.6)	18 (0.5)	379 (6.6)	24 (0.6)	361 (4.6)
Dubai, UAE	75 (0.6)	569 (1.4)	14 (0.5)	540 (4.2)	11 (0.5)	469 (4.1)

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A tilde (~) indicates insufficient data to report result.

In the majority of PIRLS 2021 countries and benchmarking participants, at least 50 percent of students reported being absent from school “Never or almost never.” In 22 countries, more than 70 percent of students selected this response option. This broad finding points to an encouraging global norm with respect to school attendance.

On average across countries, reporting fewer absences was associated with higher reading achievement. The 67 percent of students absent “Never or almost never” had average reading achievement of 515 scale score points, compared to 500 points for the 18 percent of students absent “Once every 1 or 2 months” and 455 points for the 15 percent absent “Once every 1 or 2 weeks.”

The strength and direction of the association between absence frequency and average reading achievement varies considerably across countries. Average reading achievement differences between students who are absent “Never or almost never” and those who are absent “Once every 1 or 2 months” range from an 81-point advantage for students with the fewest absences in the United Arab Emirates to an 8-point disparity favoring those with slightly more frequent absences in the Russian Federation.

The achievement differences between students who experienced absences “Once every 1 or 2 months” and “Once every 1 or 2 weeks” show a more pronounced pattern, consistently favoring students with fewer absences by 45 points on average internationally. However, there is still a great deal of variation in the magnitude of these differences, spanning from a substantial 79-point difference in Singapore to a modest 8-point difference in Egypt.

It is important to acknowledge the potential influence of the COVID-19 pandemic on students’ reports of absences during the time that the PIRLS 2021 data were collected. The hybrid learning models necessitated by the pandemic may have led students to include at-home learning days as instances of absence. Further details about how the COVID-19 pandemic impacted PIRLS 2021 data collection are available in [PIRLS 2021 International Results in Reading](#).

Although the magnitude of achievement differences varies across countries, the results in Exhibit 5 suggest that regular school attendance is important for higher academic achievement. There are several factors to consider when reflecting on this interpretation, such as the collapsed response categories and the potential impact of the COVID-19 pandemic on students’ responses. Specific details regarding how the COVID-19 pandemic impacted countries’ education systems during the time of PIRLS 2021 data collection can be found in the [PIRLS 2021 Encyclopedia](#). Educators and policymakers could use PIRLS 2021 data to explore practices that cultivate a supportive environment and ensure students can attend school, with the goal of fostering not only academic growth but also a robust sense of well-being among fourth-grade students.

Profiles of Student Well-Being Using Multi-Level Latent Class Analysis

Contemporary well-being theories embrace multidimensionality as inherent to understanding an overall state of well-being, in contrast with individual measures that capture only a single component. Exhibits 1 through 5 presented the results of individual measures that are indicative of different aspects of student well-being and their relationships with reading achievement. Collectively, students' sense of school belonging and their experiences of bullying, hunger, tiredness, and absenteeism provide a partial but meaningful perspective on students' subjective experiences that are related to well-being at school. Prior research has investigated these phenomena as predictors of students' subjective well-being, and their integrative analysis may provide useful insights into the experiences of students.^{62,63,64,65} Students' bullying experiences can shape their negative affective experiences in school, while attitudes related to school belonging elucidate experiences of positive affect in school. Student fatigue, hunger, and absence can be construed as proxy measures for students' level of engagement in school, thereby influencing affective as well as cognitive dimensions of subjective well-being.

Latent class analysis (LCA) is a powerful and versatile statistical method for identifying groups of cases with distinct profiles within complex datasets.⁶⁶ This analytical method has a long history in the research of complex subjective experiences and attitudes in educational contexts, including student well-being, because of its methodological rigor and its flexibility in aggregating different non-linearly related variables.^{67,68,69,70} LCA flexibly integrates different measures by assigning them different weights to distinguish meaningful patterns in students' experiences. Multi-level latent class analysis (ML-LCA) builds upon traditional LCA by recognizing that latent class sizes can vary across different groups, such as countries.^{71,72} An ML-LCA approach enables investigating whether the prevalence of identified latent classes differs across countries in an international student sample from diverse cultural backgrounds and educational systems.

The results in this section describe profiles of student well-being created using all the individual measures reported in previous sections, brought together in a comprehensive analysis by means of ML-LCA. This procedure integrated students' self-reported sense of school belonging, experiences of bullying, hunger, tiredness, and absenteeism to create a multifaceted indicator of student well-being. This technique can discern distinct clusters of students who exhibited similar patterns of responses on these variables and provide insight into how these factors interact to influence well-being and relate to reading achievement. As noted above, these five indicators do not provide complete coverage of the subjective well-being construct; however, they can be related to students' affective and cognitive experiences at school.

Based on the PIRLS 2021 data, the ML-LCA procedure helped identify four latent classes that describe distinct patterns of subjective well-being experienced by participating students. Exhibit 6 shows how the four classes compare across the five indicators included in the analysis. Each class is described by the international mean scale category or item response for each indicator with the accompanying standard error in parentheses. The table note provides information about how to interpret the means with respect to individual scale or response categories.

Exhibit 6: Summary of Well-Being Indicators by Latent Class

	Class 1	Class 2	Class 3	Class 4
Sense of School Belonging	1.1 (0.00)	1.3 (0.00)	2.0 (0.00)	1.2 (0.00)
Student Bullying	1.6 (0.00)	1.3 (0.00)	2.0 (0.00)	1.2 (0.00)
Tired Upon School Arrival	2.4 (0.00)	2.6 (0.00)	1.9 (0.00)	3.6 (0.00)
Hungry Upon School Arrival	2.1 (0.00)	2.9 (0.00)	2.1 (0.01)	3.5 (0.00)
Frequency of Absence	3.7 (0.01)	4.6 (0.00)	3.8 (0.01)	4.5 (0.01)

() Standard errors appear in parentheses. Note: The categories for each indicator are coded numerically as follows. Sense of School Belonging: 1 = High sense of school belonging; 2 = Some sense of school belonging; 3 = Little sense of school belonging. Student Bullying: 1 = Bullied never or almost never; 2 = Bullied about monthly; 3 = Bullied about weekly. Tired Upon School Arrival: 1 = Every day; 2 = Almost every day; 3 = Sometimes; 4 = Never. Hungry Upon School Arrival: 1 = Every day; 2 = Almost every day; 3 = Sometimes; 4 = Never. Frequency of Student Absences: 1 = Once a week; 2 = Once every two weeks; 3 = Once a month; 4 = Once every two months; 5 = Never or almost never.

These classes revealed through the ML-LCA procedure provide a data aggregation of the individual indicators that are not necessarily ordered along a linear continuum of student well-being. Rather, they present different profiles of students' experiences with respect to the five well-being indicators included in the analysis. The four classes can be characterized as follows:

- **Class 1:** High Sense of School Belonging, Bullied About Monthly, Tired Almost Every Day, Hungry Almost Every Day, Absent Once Every Two Months
- **Class 2:** High Sense of School Belonging, Bullied Never or Almost Never, Sometimes Tired, Sometimes Hungry, Absent Never or Almost Never
- **Class 3:** Some Sense of School Belonging, Bullied About Monthly, Tired Almost Every Day, Hungry Almost Every Day, Absent Once Every Two Months
- **Class 4:** High Sense of School Belonging, Bullied Never or Almost Never, Never Tired, Never Hungry, Absent Never or Almost Never

The four classes can be comparably characterized by these patterns across countries.

Exhibit 7 shows the proportions of students falling into each of the four latent classes created by the ML-LCA procedure, together with their average reading achievement. On average across countries, Class 2 is the largest and includes 33 percent of students, followed by Class 3 with 25 percent of students, Class 4 with 22 percent of students, and Class 1 with 20 percent of students.

Exhibit 7: Profiles of Student Well-Being

Students' Reports

Assessed Fourth Grade Students at the End of the School Year

☒ Assessed one year later than originally scheduled

☐ Delayed Assessment of Fourth Grade Cohort at the Beginning of Fifth Grade

IEA
PIRLS
2021
Grade 4

Country	Class 1		Class 2		Class 3		Class 4	
	Average Class Size (Percent)	Conditional Average Achievement	Average Class Size (Percent)	Conditional Average Achievement	Average Class Size (Percent)	Conditional Average Achievement	Average Class Size (Percent)	Conditional Average Achievement
Albania	31 (0.9)	500 (3.6)	6 (0.2)	518 (4.3)	1 ~	~	62 (1.1)	519 (3.2)
Australia ☒	6 (0.2)	519 (4.3)	44 (0.6)	556 (2.3)	37 (0.8)	519 (2.7)	13 (0.5)	556 (3.7)
Austria	6 (0.2)	511 (2.8)	55 (0.7)	541 (2.3)	26 (0.7)	505 (2.8)	12 (0.5)	540 (3.3)
Azerbaijan	34 (0.7)	428 (3.7)	4 (0.1)	454 (4.6)	10 (0.4)	410 (5.2)	52 (1.0)	454 (3.8)
Bahrain	40 (0.6)	448 (3.1)	15 (0.3)	489 (3.4)	17 (0.5)	408 (4.4)	28 (0.7)	489 (3.8)
Belgium (Flemish)	12 (0.3)	505 (2.6)	41 (0.6)	522 (2.3)	35 (0.8)	496 (2.8)	12 (0.5)	522 (2.9)
Belgium (French)	7 (0.2)	491 (3.3)	26 (0.5)	509 (3.1)	58 (0.8)	487 (2.7)	9 (0.2)	506 (3.4)
Brazil ☒	43 (0.6)	418 (5.2)	9 (0.3)	466 (4.9)	28 (0.9)	395 (6.1)	20 (0.8)	432 (8.8)
Bulgaria	28 (0.8)	518 (4.3)	34 (0.8)	556 (3.0)	14 (0.6)	522 (5.3)	24 (0.9)	552 (4.0)
Chinese Taipei	2 ~	~	39 (0.5)	554 (2.0)	26 (0.7)	522 (3.2)	34 (0.7)	551 (2.4)
Croatia	2 ~	~	45 (1.0)	569 (2.4)	44 (1.3)	543 (3.0)	10 (0.6)	563 (4.4)
Cyprus	5 (0.1)	487 (4.2)	29 (0.5)	520 (3.1)	29 (0.8)	486 (3.2)	37 (0.8)	526 (2.9)
Czech Republic	11 (0.3)	522 (3.2)	44 (0.7)	556 (2.4)	36 (0.9)	523 (2.7)	9 (0.4)	550 (3.7)
Denmark	1 ~	~	67 (0.6)	545 (2.2)	21 (0.7)	515 (3.4)	10 (0.4)	553 (3.1)
Egypt	63 (0.9)	383 (5.5)	1 ~	~	24 (1.0)	348 (5.7)	13 (0.7)	409 (7.8)
England ☒	3 (0.1)	536 (3.8)	53 (1.0)	569 (2.5)	35 (1.1)	537 (2.6)	9 (0.3)	575 (4.3)
Finland	3 (0.1)	520 (4.9)	74 (0.7)	556 (2.2)	15 (0.7)	519 (3.6)	8 (0.4)	554 (4.0)
France	3 (0.1)	499 (4.4)	52 (0.6)	523 (2.5)	28 (0.7)	494 (3.0)	17 (0.5)	520 (3.5)
Georgia	25 (0.6)	475 (3.4)	29 (0.7)	499 (2.6)	5 (0.3)	456 (5.8)	41 (1.1)	507 (2.8)
Germany	9 (0.2)	508 (2.7)	52 (0.5)	537 (2.1)	26 (0.6)	496 (2.7)	13 (0.4)	538 (3.1)
Hong Kong SAR	1 ~	~	59 (0.6)	578 (2.5)	22 (0.6)	553 (4.3)	18 (0.5)	580 (3.5)
Hungary	9 (0.2)	524 (4.9)	40 (0.8)	557 (3.2)	48 (0.9)	527 (3.8)	3 (0.2)	547 (6.5)
Iran, Islamic Rep. of ☒	22 (0.7)	396 (6.4)	8 (0.2)	442 (5.1)	20 (0.9)	398 (7.1)	50 (1.3)	422 (5.0)
Ireland	1 ~	~	65 (0.8)	587 (2.5)	22 (0.8)	548 (2.7)	11 (0.5)	584 (4.2)
Israel ☒	26 (0.6)	503 (2.6)	20 (0.4)	530 (2.2)	48 (0.8)	504 (2.6)	6 (0.3)	519 (4.5)
Italy	30 (0.5)	533 (2.6)	29 (0.5)	554 (2.1)	31 (0.7)	521 (2.3)	10 (0.3)	552 (3.1)
Jordan	36 (0.9)	373 (5.9)	12 (0.4)	393 (6.5)	10 (0.8)	347 (7.8)	43 (1.3)	391 (7.2)
Kazakhstan	33 (0.5)	494 (2.7)	19 (0.3)	524 (2.7)	19 (0.6)	491 (4.1)	29 (0.7)	509 (3.1)
Kosovo	47 (0.9)	405 (3.7)	6 (0.2)	438 (3.8)	2 ~	~	46 (0.9)	436 (3.1)
Latvia	7 (0.2)	518 (4.8)	40 (0.8)	543 (1.9)	48 (1.0)	514 (3.3)	6 (0.4)	546 (5.8)
Lithuania	3 (0.1)	532 (4.0)	47 (1.0)	566 (2.2)	40 (1.0)	536 (2.7)	10 (0.4)	558 (3.7)
Macao SAR	1 ~	~	42 (0.5)	542 (1.5)	30 (0.5)	513 (1.7)	28 (0.5)	550 (2.0)
Malta	34 (0.6)	507 (3.2)	30 (0.5)	533 (2.4)	21 (0.7)	495 (4.2)	15 (0.5)	524 (3.5)
Montenegro	46 (0.6)	478 (1.9)	10 (0.2)	501 (2.5)	8 (0.3)	455 (3.1)	36 (0.8)	502 (2.4)
Morocco	42 (0.9)	371 (5.1)	9 (0.3)	388 (5.2)	8 (0.5)	338 (6.2)	41 (1.1)	377 (5.0)
Netherlands	7 (0.2)	514 (3.8)	55 (0.7)	535 (2.3)	19 (0.7)	501 (3.5)	18 (0.7)	537 (3.7)
New Zealand	21 (0.4)	507 (2.8)	31 (0.5)	553 (2.3)	42 (0.6)	503 (2.7)	5 (0.2)	545 (3.5)
North Macedonia	44 (1.0)	424 (5.8)	16 (0.5)	458 (5.0)	4 (0.3)	391 (9.3)	37 (1.0)	461 (5.5)
Northern Ireland	4 (0.1)	547 (3.7)	62 (0.8)	578 (2.6)	26 (0.9)	536 (3.1)	9 (0.4)	577 (4.2)
Norway (5)	3 (0.1)	517 (3.7)	66 (0.6)	546 (1.8)	21 (0.6)	516 (2.5)	10 (0.4)	545 (3.7)
Oman	35 (0.7)	424 (4.1)	9 (0.2)	451 (4.6)	19 (0.7)	393 (4.7)	37 (1.0)	449 (4.1)
Poland	2 ~	~	50 (0.7)	560 (2.0)	29 (0.7)	525 (3.1)	20 (0.6)	561 (3.4)
Portugal	25 (0.5)	502 (2.7)	29 (0.5)	531 (2.3)	9 (0.3)	499 (4.0)	37 (0.7)	529 (2.4)
Qatar	36 (0.4)	487 (3.8)	14 (0.4)	522 (3.5)	32 (0.9)	450 (4.0)	18 (0.7)	513 (4.4)
Russian Federation	2 ~	~	35 (0.7)	578 (3.3)	47 (1.1)	559 (3.8)	16 (0.7)	571 (5.1)
Saudi Arabia	45 (0.6)	450 (3.6)	6 (0.2)	476 (3.5)	23 (0.7)	408 (4.5)	25 (0.7)	477 (3.5)
Serbia	10 (0.4)	482 (6.0)	50 (0.7)	522 (2.7)	10 (0.6)	485 (4.6)	31 (0.9)	519 (4.1)
Singapore	4 (0.1)	562 (4.1)	46 (0.5)	605 (2.8)	36 (0.6)	562 (3.7)	13 (0.4)	603 (4.0)
Slovak Republic	24 (0.5)	513 (3.5)	36 (0.6)	546 (2.8)	33 (0.8)	521 (2.9)	7 (0.4)	533 (5.4)
Slovenia	9 (0.2)	504 (2.6)	44 (0.7)	536 (1.8)	35 (0.8)	498 (2.3)	12 (0.5)	535 (3.0)
South Africa ☒	34 (0.5)	290 (4.4)	1 ~	~	40 (1.1)	263 (5.1)	25 (1.0)	324 (6.7)
Spain	27 (0.5)	509 (2.1)	33 (0.5)	535 (2.3)	17 (0.6)	501 (2.5)	22 (0.5)	532 (3.5)
Sweden	2 ~	~	58 (0.7)	555 (2.2)	27 (0.8)	520 (2.5)	13 (0.5)	545 (4.2)
Türkiye	42 (0.7)	490 (3.6)	24 (0.4)	512 (3.2)	10 (0.4)	455 (4.9)	25 (0.5)	509 (4.1)
United Arab Emirates	38 (0.2)	481 (2.0)	16 (0.2)	536 (1.9)	29 (0.4)	432 (2.6)	17 (0.3)	523 (2.0)
United States	11 (0.5)	538 (5.7)	51 (1.4)	566 (5.6)	33 (1.6)	519 (8.2)	5 (0.5)	567 (11.1)
Uzbekistan	19 (0.6)	416 (3.9)	4 (0.2)	445 (3.8)	6 (0.4)	379 (5.9)	71 (0.9)	447 (2.6)
International Average	20 (0.1)	488 (0.6)	33 (0.1)	520 (0.5)	25 (0.1)	477 (0.6)	22 (0.1)	516 (0.6)
Benchmarking Participants								
Alberta, Canada	17 (0.4)	526 (4.5)	44 (0.8)	553 (3.3)	25 (0.9)	513 (4.8)	14 (0.6)	554 (3.8)
British Columbia, Canada	12 (0.4)	516 (4.4)	47 (0.9)	552 (3.4)	29 (0.8)	512 (3.9)	12 (0.5)	547 (4.7)
Newfoundland & Labrador, Canada	12 (0.4)	511 (3.9)	49 (1.1)	536 (3.2)	32 (1.2)	505 (3.8)	7 (0.3)	534 (6.1)
Quebec, Canada	9 (0.2)	543 (2.9)	48 (0.8)	560 (2.6)	34 (0.9)	539 (3.3)	9 (0.4)	556 (4.9)
Moscow City, Russian Federation	1 ~	~	29 (0.6)	609 (2.1)	57 (1.0)	590 (2.4)	13 (0.7)	613 (2.8)
South Africa (6) ☒	29 (0.5)	380 (4.0)	4 (0.2)	451 (7.8)	37 (0.9)	350 (4.9)	30 (0.9)	421 (5.8)
Abu Dhabi, UAE	36 (0.5)	452 (3.6)	9 (0.2)	520 (3.8)	43 (0.6)	392 (3.6)	12 (0.4)	507 (4.7)
Dubai, UAE	26 (0.3)	535 (2.2)	37 (0.4)	575 (1.7)	19 (0.5)	514 (2.6)	19 (0.3)	567 (2.2)

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A tilde (~) indicates insufficient data to report result.

Although the results in Exhibit 7 suggest that there is some relationship between class membership and reading achievement, it is not straightforward to interpret. Average achievement is highest for students in Class 2 (520 scale score points), with students in Class 4 having similar achievement on average (516). Note that Classes 2 and 4 are similar in how they reported high levels of belonging, low frequency of bullying, and low absenteeism. They only differ in terms of reports of being tired or hungry. Compared to Classes 2 and 4, students in Class 1 and Class 3 have comparatively lower average achievement (488 and 477, respectively) and reported somewhat more frequent bullying and absenteeism.

The differences in average achievement across classes may be influenced by the differences in class proportions across countries. Classes with internationally lower achievement likely contain a larger proportion of students in lower-performing countries, while classes with a higher international average contain a larger proportion of students in higher-performing countries. Hong Kong SAR and Jordan serve as instructive examples. Classes 2 and 4, which have the highest reading achievement, represent the majority of students in high-performing Hong Kong SAR. Large percentages of students in Hong Kong SAR reported being “Sometimes” or “Often” hungry and tired when arriving at school, while large proportions also reported lower levels of student bullying and rare absences. In contrast, 55 percent of students in Jordan belong to the higher achieving Classes 2 and 4. Fewer students reported “Often” arriving at school hungry or tired in Jordan compared to Hong Kong SAR; however, fewer students also reported the lowest frequencies of bullying and absence.

The profiles created by the ML-LCA procedure and their association with reading achievement provide information about how different well-being indicators, and combinations of those indicators, relate to students’ reading achievement in PIRLS 2021. This analysis relied on the statistical associations of self-reports to find meaningful groups and does not depend on knowing why these patterns may vary across countries. Causality is neither a prerequisite for these analyses, nor is it implied by the outcomes. Instead, this ML-LCA revealed the patterns of differences in self-reports and their variability across countries, as well as how the classes relate to reading achievement country-by-country and on average internationally.

Conclusion

The PIRLS 2021 data presented in this report draw attention to several important findings and issues in the realm of student well-being. The results may have implications for research and policy that aims to improve student well-being worldwide.

- 1. While a higher sense of school belonging is generally associated with higher reading achievement, the magnitude of the relationship varies across countries.** Cultural differences in perception and questionnaire response styles may contribute to this variation. Further research is needed to explore this finding.
- 2. In most countries, relatively few students experience frequent bullying; however, students who do frequently experience bullying have lower reading achievement than their peers.** More in-depth, controlled studies at the country level could evaluate whether reducing students’ experiences of bullying behaviors may lead to improved academic achievement.

3. Theoretical indicators of students' physiological states, such as tiredness and hunger, require attention to other contextual factors in order to arrive at meaningful inferences about their relationships with student achievement.

Students' reports of their feelings upon arrival at school are not necessarily reflective of deprivation or poor well-being, although they might be. Further research at the country level is needed to better contextualize relationships among these variables and academic achievement.

4. Regular school attendance is the norm for most PIRLS 2021 countries, and less frequent school absences are generally associated with higher reading achievement. However, these data must be interpreted with care due to the impact of the COVID-19 pandemic during the time of PIRLS 2021 data collection.

5. Incorporating multiple well-being indicators using appropriate statistical methods can show how patterns of students' reports vary across countries. The ML-LCA procedure used information from the individual well-being indicators to create groups of students. These groups can be characterized using the original indicator variables and these characterizations are comparable across countries, along with reading achievement. The results obtained from this analysis supported the findings reported on the individual indicators. Two classes with higher average achievement are characterized by relatively lower levels of bullying and absenteeism and higher levels of school belonging compared to the other groups. Attention to the variation in class proportions across countries is important when interpreting average reading achievement differences across the groups.

Future Directions

PIRLS 2021 includes several indicators of students' subjective well-being; however, its coverage of this complex construct can be increased. Increasing coverage of student well-being is a priority for the next cycle of PIRLS in 2026. Building on the foundation of PIRLS 2021, the forthcoming assessment will integrate expert perspectives and innovative methodologies to enable a more comprehensive portrayal of student well-being. This collaborative endeavor will involve researchers from the TIMSS & PIRLS International Study Center at Boston College, along with questionnaire experts and National Research Coordinators representing the diverse PIRLS participating countries.

PIRLS 2026's commitment to delving deeper into student well-being extends beyond academic achievement. Including aspects of students' emotional, social, and psychological experiences will enable constructing a more comprehensive narrative of their well-being that acknowledges the construct as an intricate fusion of academic achievement, emotional resilience, and a nurturing educational environment.

Appendix:

About PIRLS 2021

The 2021 cycle of the Progress in International Reading Literacy Study (PIRLS 2021) aims to measure and compare the reading achievement of fourth-grade students around the world. PIRLS provides valuable insights into reading achievement differences and helps policymakers and educators understand factors related to students' reading abilities.

The data presented in this report come from the PIRLS 2021 reading assessment and student questionnaire. PIRLS 2021 also collected data from students, parents, teachers, and school principals, and national policy-level data were provided by National Research Coordinators from the participating countries and benchmarking entities.

There are several important contextual factors to keep in mind when interpreting PIRLS 2021 data. In particular, all PIRLS 2021 data likely was impacted to some degree by the onset of the COVID-19 pandemic, which had implications for both student achievement and the administration of PIRLS 2021 itself. These are described in detail in [PIRLS 2021 International Results in Reading](#).

There are many resources available for obtaining more information about PIRLS 2021, as well as accessing PIRLS 2021 data and conducting other analyses.

- [PIRLS 2021 Assessment Frameworks](#) provide information about the PIRLS 2021 reading assessment, context questionnaires, and assessment design.
- [PIRLS 2021 International Results in Reading](#) provides a summary of participating countries' reading achievement, as well as information about how different contextual factors are related to students' reading achievement.
- [PIRLS 2021 Encyclopedia](#) contains information about national contexts for countries participating in PIRLS 2021, including a chapter written by each country describing its educational system and the national circumstances of the COVID-19 pandemic.
- [Methods and Procedures: PIRLS 2021 Technical Report](#) provides details about instrument development, sample design and implementation, operations, and analytical procedures of PIRLS 2021.
- [PIRLS 2021 Context Questionnaires](#) show all of the contextual items to which students, parents, school principals, teachers, and National Research Coordinators responded.
- [PIRLS 2021 International Database](#) includes data collected from the reading assessment and context questionnaires as well as achievement and contextual scale estimates for the 57 countries and 8 benchmarking entities that participated in PIRLS 2021. The accompanying User Guide provides information about database contents and analysis resources.

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