

The Academic Cost of Worry and Loneliness among Disadvantaged Children

Abbreviations: ECLS-K 2010-2011, Early Childhood Longitudinal Study: 2010-2011; ECLS-K 1998-1999, Early Childhood Longitudinal Study: 1998-1999; NCES, National Center for Education Statistics; OLS, Ordinary Least Squares; Socioeconomic Status, SES.

What's Known on This Subject: The socioemotional experiences of adolescents matter for academic progress in school, but less is known in the elementary school years.

What This Study Adds: Utilizing a nationally representative survey of early adolescence, we show that worry and loneliness are associated with math and reading skills and that these associations are moderated by socioeconomic status—disadvantaged students have a higher negative association with math and reading performance when they worry and report being lonely compared to advantaged students.

Key Words: academic worry, loneliness, early adolescence, cognitive development

ABSTRACT

OBJECTIVES: Worry and loneliness looms large in American schools, especially in the social years of early adolescence where friendships are in flux and children strive to fit in and do well academically. We examine a nationally-representative sample of American 5th graders to document the extent of academic worry and loneliness, its costs for academic performance, and how social class can disrupt or exacerbate its associations.

METHODS: Based on a nationally representative longitudinal survey (ECLS-K 2010-2011) of childhood (N = 5,750), we examine how a child's self-reported worry and loneliness are associated with standardized math and reading scores using OLS regression. We explore whether these associations vary by socioeconomic status.

RESULTS: We find that academic worry and loneliness are strong predictors of math and reading skill. The association is amplified for disadvantaged students. Patterns hold when accounting for a host of other factors and are replicated in the ECLS-K 1998-1999.

CONCLUSIONS: As academic worry and feelings of loneliness are negatively associated with standardized math and reading skills, practitioners can be especially attuned to how these patterns are amplified for children in low socioeconomic households.

Adolescence is full of new anxieties and worry.¹ Recently, research has grown on how these socioemotional experiences impact academic outcomes in the middle school years,²⁻³ but much less is known about how loneliness, stress, and academic pressure impact youth in early adolescence—as children conclude elementary school.^{1,4} This is an important developmental stage both socially and biologically, and represents the onset of socioemotional skills and experiences that set the stage for the often turbulent years of middle school⁵⁻⁷. In an era of COVID-19 where such phenomenon is only heightened,⁸ this focus is even more important.

Additionally, child socioemotional struggles are magnified in disadvantaged households. Children growing up in low-socioeconomic homes are more likely to experience family conflict, separation, household crowding, and neighborhood disorder.⁹ These kinds of stressors increase the risk of anxiety, loneliness and depression.¹⁰⁻¹¹ Likewise, a child's internalizing problem behaviors—high anxiety, loneliness, sadness, and low self-esteem¹²—vary by social class¹³⁻¹⁵ and are linked to the risk high school dropout and lower levels of academic achievement.¹² Other socioemotional struggles, such as emotional well-being,¹⁶ school belonging,⁷ and stress¹⁷ show similar patterns. If socioemotional experiences shape educational outcomes and vary by socioeconomic status, to what extent are the “costs” of these emotional struggles magnified in disadvantaged homes? Conversely, do these struggles matter less in advantaged homes? If so, understanding these connections may elevate the importance of early intervention for disadvantaged children and can be a critical way to enhance their long-term well-being.¹⁸

To date, research on children's socioemotional experiences, such as peer anxieties, academic self-efficacy, and internalizing/externalizing problem behaviors, have had limited sociological insight—specifically how a child's family background might influence these outcomes.¹⁹⁻²¹ We offer an important addition to this kind of scholarship by specifically

examining academic worry and loneliness—an understudied dimension of a child’s socioemotional development.¹ And although this study is not an assessment of the impact of COVID-19 for academic achievement, results could have important implications for growing socioemotional vulnerabilities of adolescent children in today’s era.²²⁻²³ And as socioeconomic achievement gaps in American schools may grow by up to 30% due to the global pandemic,²⁴⁻²⁵ any impact of a child’s socioeconomic background on socioemotional struggles and school achievement may be even more pronounced today.

METHOD

Sample

We use the ECLS-K 2010-2011 collected by NCES.²⁶⁻²⁷ These data are a nationally representative sample of 16,450 students who were enrolled in kindergarten in the fall of 2010. The ECLS-K used a multistage probability sampling design in which PSUs were sampled, then roughly 1,000 schools were sampled within each PSU, and about 20 students within each school were selected. Children’s socioemotional experiences were self-reported by fifth graders in 2016 (ages 10-11). Measures of socioeconomic status, child health, disability, gender, race/ethnicity, family structure and BMI were collected in the first waves in the school year 2010-2011. All other measures were collected from the child, parent or teacher in the 5th grade wave of data. We found that, when available in the data, using the same measures in different waves did not change the patterns we observe.

Measures

Math and Reading Scores. The math assessment measures skills in conceptual knowledge and problem solving using questions about number sense, properties, and operations; measurement; geometry and spatial sense; data analysis, statistics, and probability; and patterns, algebra, and functions. The reading assessment includes questions measuring basic skills (e.g., word recognition), vocabulary knowledge, and reading comprehension. Reading comprehension questions asked the child to identify information specifically stated in text (e.g., definitions, facts, supporting details); to make complex inferences within texts; and to consider the text objectively and judge its appropriateness and quality. Both math and reading assessments use item-response methods (IRT) to gauge the level of difficulty, discriminating ability, and “guessability” of each item.²⁶⁻²⁷

Socioemotional Struggle. We examine socioemotional struggles using two school-centric assessments of child worry and loneliness. We should not that these measures are not conventional operationalizations of worry and loneliness, as most metrics focus on general anxiety and depression scales that are often developed from adult-centered constructs.¹ Our *worry about school* measures were child-reported in fifth grade. Students were asked “How true is each of these things about you? 1=not at all true, 2=a little bit true, 3=mostly true, 4=very true.” We used the following items; “I worry about taking tests,” “It’s hard for me to finish my school work,” “I feel ashamed when I make mistakes at school,” “I worry about doing well in school,” and “I worry about finishing my work.” We factored these items, with a reliability coefficient of .78. Our *child feels lonely* measures were child-reported. Students were asked “Think about yourself and your experiences this school year. How often do the following things happen? 1=never, 2=rarely, 3=sometimes, 4=often, 5=very often.” We used these three items; “I

feel lonely at school,” “I feel left out at school,” and “I feel alone at school.” Items were factored with a reliability coefficient of .89.

Socioeconomic Status. This measure was computed at the household level using data from parents in fall 2010 or spring 2011. SES is a composite measure of the following: the father’s and mother’s (or guardians) highest education level, the father’s and mother’s (or guardians) occupational prestige scores, and household income. We transformed the continuous measure of SES into a percentile measure for ease of comparison between the highest and lowest SES quintiles.

Confounding Factors

It is possible that our socioemotional measures of worry and loneliness are proxies for unmeasured, but related factors. We account for this possibility by including a host of potentially confounding factors, including both child and parental characteristics.^{9,28-30} One pronounced way advantaged homes might offset the academic costs of socioemotional struggles is through *concerted cultivation*—the active development of a child’s talents by organizing daily activities to foster a child’s self-efficacy and accustom children to the pressures of performance and evaluation.³¹ We operationalization *concerted cultivation* as an additive measure of *parental involvement at home and school*, and the frequency of *extracurricular activities and trips*.³²⁻³³

For the measure of *home involvement*, parents (guardians) were asked the following; “In a typical week, how often the parent or any other family members did the following things with child? Tell stories, help with arts and crafts, play games or do puzzles, and talk about nature or do science projects.” Response categories for each item were; 1=not at all, 2=once or twice a week, 3=3 to 6 times a week, and 4=every day. *Extracurricular activities* is a measure of the

following whether the child participated in music lessons, art classes or lessons, organized clubs or recreational programs, organized athletic activities, drama classes, and organized performing arts programs. For each response, 1=yes, 0=no. *Trips* is based on the following question, “In the past month, has anyone in the family done the following with the child: visited a library or bookstore, visited an art gallery, museum, or historical site, visited a zoo, aquarium, or petting farm, gone to a play, concert, or other live show, or attended an athletic or sporting event?” For each response, 1=yes 0=no. Finally *school involvement* measures whether the parent or the other adults in the household attended an open house or back-to-school night, attended a meeting of a PTA or PTO, attended a school or class event, served as a volunteer in the classroom or elsewhere in the school, and gone to a regularly-scheduled parent-teacher conference. For each response, 1=yes 0=no.

We also account for *homework effort*. We use the following measures of how often the parent (guardian) checks for completed homework (1=never, 2=rarely, 3=sometimes, 4=always), how often child does homework at home (1=never, 2=less than once a week, 3=1 to 2 times a week, 4=3 to 4 times a week, 5=5 or more times a week), how often the parent or guardian helped with homework (1=never, 2=rarely, 3=sometimes, 4=always) and how often the parent or guardian knows how much homework the child has (child-reported) (1=never, 2=rarely, 3=sometimes, 4=often, 5=very often, 6=always).

For child characteristics, we include measures of *school belonging* (parent-reported), *child grit* (teacher-reported), *approaches to learning* (teacher-reported), and *internalizing problem behaviors* (teacher-reported). *School belonging* is measured with the following questions, “How often would you say that child *complains about going to school, asks to stay home from school, seems to dread going to school, and makes up reasons to stay home from*

school? Responses ranged from 1=almost never, 2=rarely, 3=sometimes, 4=a lot, and 5=almost always. For *child grit*, teachers were asked how often the child *showed eagerness to learn new things, easily adapted to changes in routine, persisted in completing tasks* (1=never, 2=sometimes, 3=often, 4=very often) and how often the *child worked to the best of his or her ability* (1=never, 2=seldom, 3=usually, 4=always). *Approaches to learning* captures a child's citizenship in the classroom by asking the teacher if the child keep belongings organized, shows eagerness to learn new things, works independently, easily adapts to changes in routine, persists in completing tasks, pays attention well, and follows classroom rules. Each item was factored for a reliability coefficient of .92. Finally, we account for *internalizing problem behaviors*, developed from the original *Social Skills Rating System*. We use the teacher-rated assessments of the child's anxiety, loneliness, low self-esteem, and sadness with a reliability coefficient of .79.

We also account for child health characteristics. *Child Disability* is measured by asking parents (guardians) about their child's ability to be independent and take care of himself or herself, ability to pay attention and learn, overall activity level, overall behavior and ability to relate to adults and children, emotional or psychological difficulties, ability to communicate, difficulty in hearing and understanding speech, and eyesight. If parents (guardians) indicated that their child had any issues or difficulties in response to these questions, they were asked to indicate if a diagnosis was obtained by a professional. If so, 1=yes and 0=no. *Child BMI* was calculated by multiplying the child's weight by 703 and dividing by the square of the child's composite height.²⁶⁻²⁷ Finally, *child poor health* was measured by asking parents (guardians) about their child's health; 1=excellent, 2=very good, 3=good, and 4=fair or poor.

Control Measures

We account for several other factors. For *female*, information was collected from schools and confirmed by parents in subsequent waves. If inconsistent, the most recent parent reporting of sex was used, 0=male, 1=female. For *race/ethnicity*, parents were asked whether or not their child was Hispanic or Latino and to indicate to which of five race categories (White, Black or African American, Asian, Native Hawaiian or other Pacific Islander, American Indian or Alaska Native) their child belonged. Parents could also select if their child belonged to more than one race category. For the measure of *family structure*, we use a measure for the number of siblings in the household (1=1, 2=2, 3=3, 4=4 plus) and a measure of the parents/guardians relationship status, 1=two biological/adoptive parents and 0=one biological/adoptive parent, one other parent/partner, one biological/adoptive parent only or other guardians.

Analytic Strategy

All analyses were performed in Stata 16.1. Because dependent variables are continuous, we used Ordinary Least Squares (OLS) regression. We employed wave-specific weights to produce estimates of population parameters. Using recommended NCES procedures,³⁵ data weighting adjustments for attrition and complex sampling resulted in 5,790 cases. Missing data ranged from 0-15% across measures. We used multiple imputation procedures (20 data files, 150 burn-ins) to account for missingness using the MI command.³⁴

RESULTS

Overall, we find that 43% of American children worry about tests (by indicating “very true” or “mostly true”), 16% feel that it is hard to finish work, 31% feel ashamed at making

mistakes, 47% worry about doing well, and 40% worry about finishing work. The percent of American children feeling lonely (by indicating “very true” or “mostly true”) was less pronounced, with about 7% of respondents feeling lonely, left out, and feeling alone (results available upon request).

Descriptive statistics of estimated means (with 95% confidence intervals) for the full sample and mean estimates for the highest and lowest socioeconomic quantiles are reported in Tables 1 and 2. The mean estimate between children in the lowest socioeconomic quintile and the highest socioeconomic quintile is about $2/3^{\text{rds}}$ of a standard deviation for both math and reading (.68 SD and .64 SD, respectively; $p < .001$). The socioeconomic gap in worry is about $1/5^{\text{th}}$ of a standard deviation (.21 SD) between the highest and lowest socioeconomic backgrounds ($p < .001$), yet there is a more modest gap in self-reported loneliness at about $1/8^{\text{th}}$ of a standard deviation (.12 SD) ($p < .001$). Other patterns in the descriptive data are as expected, with evidence of socioeconomic gaps by race/ethnicity, family structure, and child health.

Our set of potential confounding factors reveal strong social class differences for *school belonging*, *child grit*, *approaching to learning*, and *internalizing problem behaviors* in the expected directions. However, parental involvement with homework is more frequent in disadvantaged homes (as is home-based parental involvement). This is likely because children in these homes, on average, have lower math and reading scores and therefore need more help.³⁶ In contrast, child homework awareness and completion is more likely to occur in advantaged homes where achievement scores are on average higher.

Regression results are reported in Tables 3 and 4. With standardized math and reading scores as the outcome, OLS regression estimates reveal an important association between child-reported worry and loneliness with academic performance. In bivariate modeling, a one standard

deviation increase in child's self-reported level worry is associated with a .40 standard deviation ($p < .001$) decrease in math performance and a .34 standard deviation ($p < .001$) decrease in reading (see Table 3, Models 1 and 3). Likewise, a one standard deviation increase in child-reported feelings of loneliness is associated with a .23 ($p > .001$) and .21 ($p > .01$) standard deviation decrease in math and reading scores, respectively (see Table 4, Models 1 and 3). R-squared values range from .16 to .20. In multivariate modeling, accounting for gender, race/ethnicity, family structure, child health, school belonging, homework effort, child grit (teacher assessment), approaches to learning, parental involvement, and internalizing problem behaviors explains about 32% of the association between worry and math and 24% of the association with reading (Table 3, Model 2 and 3). Likewise, these controls reduce the association between loneliness and math by 43% and loneliness and reading by 28% (Table 4, Model 2 and 3). R-squared values range from .32 to .40. Also, we find that children in the highest socioeconomic quintile have math and reading scores over one standard deviation higher than children from the lowest socioeconomic quintile and that these associations are, on average, reduced by half in the full models (comparing Models 1 and 3 with Models 2 and 4).

Our key analyses are the interactions of socioeconomic status with worry and loneliness. Results are sobering. In multivariate analyses (see Models 2, Tables 3 and 4), the negative associations between worry and math/reading outcomes are durable in disadvantaged homes (-.27 and -.26, respectively) and negligible in high socioeconomic homes (-.05 and -.03, respectively) (see Figure 1). Likewise for estimates of loneliness and math/reading scores, the interaction between loneliness and socioeconomic status suggests no negative link between loneliness and academic scores in the highest socioeconomic homes (.04 and .03, respectively) (see Figure 2). This suggests that advantage works (in some unmeasured way) to nullify the link

between socioemotional struggles and poor academic performance and that these patterns are most pronounced among disadvantaged children.

Finally, to understand which of the sub-items of academic worry and loneliness have the strongest association with academic performance, we replicated Models 1 and 3 (in Tables 3 and 4), but with each sub-item measured separately (see Table 5). Across the worry sub-items, a child who *worries about tests*, is *ashamed about mistakes*, and reports that it is *hard to finish work* has the lowest average math and reading scores. *Ashamed about mistakes* has the most pronounced association with academic outcomes. For disadvantaged children, the association is about -.27 and -.25 for math and reading. For advantaged children, there is virtually no association (-.06 for math; -.03 for reading). We suspect that the variation of these patterns is likely due to the low correlation between sub-items (from .26 to .56). In contrast, we find that loneliness sub-items operate similarly, likely due to high correlations across measures (from .71 to .75) (see Table 6).

For robustness checks, analyses (available upon request) reveal the following: (1) patterns hold up across various measures of socioeconomic status when modeled in isolation (including father's education level, occupational prestige and income, and the mother's education level, occupational prestige, and income). (2) Teacher-reported assessments of classroom performance produced patterns in the same direction as the NCES administered math and reading assessments, but few associations were statistically significant. (This suggests that standardized assessments may be more likely to reveal the "advantage buffer" between socioemotional struggles and school performance than will teacher assessments.) (3) To examine if these patterns are time invariant, we replicated the same analyses using the ECLS-K 1998-1999 data collected twelve years earlier. With nearly identical measures, we found surprisingly

similar results. (4) We examined whether our interaction patterns extended to interactions by race/ethnicity or gender. They did not. (5) As worry and loneliness have strong associations with academic performance and reveal statistically significant interactions, we did not find these patterns when modeling internalizing and externalizing problem behaviors, or related measures. And finally, (6) we did not find meaningful change in our results when using various transformations of worry and loneliness measures (e.g. raw scores, additive).

DISCUSSION

This work is timely. As of 2016, we find that more than 1/3rd of American 5th graders worry about aspects of school work, and about 7% report feeling lonely. With the COVID-19 pandemic, these estimates have surely increased. Overall, we argue that these socioemotional struggles matter for children's academic performance in school—a one standard deviation increase in worry is associated with a quarter standard deviation decrease in math and reading scores, even accounting for a host of potentially confounding factors. Additionally, the child's feeling of loneliness show similar patterns (albeit more modest). To the best of our knowledge, this is the first nationally representative sample to demonstrate these important relationships, especially in early adolescence.¹

These findings vary across socioeconomic conditions—disadvantaged kids almost exclusively feel this cost. Why? We are not sure. With a host of reasonable controls in the model, the associations remain robust, but we nonetheless offer the following potential explanations—*gene-environment interaction*, *class-based internalization*, and *unmeasured supports*.

Gene-environment interaction. There is emergent evidence that socioeconomic status impacts brain development—driven by genetic and environmental influences (i.e. epigenetics).⁹

For example, one study finds that the link between low birthweight and school readiness, once set in motion, cannot be modified by parenting practices, even in advantaged homes. However, the prevalence of very low birthweight is strongly shaped by socioeconomic status and related factors.³⁷ Thus, environmental forces can meaningfully shape the biological development of children, even in utero. Similarly, in a *Pediatrics* review article, Johnson et al. (2016)⁹ document how social class associates with cognitive development across several important regions of the brain. Thus, if socioeconomic conditions impact the brain, especially during critical developmental periods, this could create somewhat immutable effects on later learning.³⁸

Class-based internalization. Social class may impact self-efficacy (i.e. motivation) such that disadvantaged students employ negative social comparisons, feel a lack of controllability, and limit their goals more than their advantaged peers.³⁹ The strongest pattern we observed with our worry sub-items was *ashamed about mistakes*—something that could indicate a psychological internalization of shame. Whereas this is a pattern only observed for children in disadvantaged homes, it may be that advantaged students have more cognitive supports in their home environments in ways that buffer the psychological impact of worry on schooling.⁴⁰

Unmeasured supports. As with any study that relies on survey and observational methods, there is the possibility that the mechanisms of how social class matters are simply not measured, either due to the omission of relevant factors, or the inability to scale behaviors into a quantitative metric. For example, as Gibbs et al. show with parental involvement in elementary schools, qualitative measures of effective parenting behaviors do not always align with quantitative metrics.⁴¹ In this study, it could be that advantaged parents are better able to address socioemotional struggles through efforts such as medication, counseling, or related supports.⁴²⁻⁴⁴ Or qualitatively, it may be a sense of security advantaged children feel, even when they worry

about grades or feel left out at school. For example, advantaged parents could be coaching their children to develop effective help-seeking behavior in the classroom when they struggle compared to disadvantaged children who more often internalize their failure.²¹

We should also note here that our results have limitations, we will mention two. First, our evidence is not causal. Measures for worry and loneliness were only available in the last wave of data (5th grade). Thus, we can only document associations. Nonetheless, this limitation may not be too critical—were the causal arrows reversed, the impact of poor performance on socioemotional struggles would still be found to be more prevalent among disadvantaged students compared to their more affluent peers. And second, we rely on child self-reporting. Although it is invaluable to know how children assess themselves,⁴⁵ parent/teacher reports and qualitative assessments could reveal new insight and potentially divergent patterns from what we find in this study.

Implications

The *American Academy of Pediatrics* has emphasized “the need to build pediatricians capacity to address poverty in their practice” (p.12).¹² As children may be particularly vulnerable to the negative effects of poverty, especially in the developmental window of early adolescence,⁴ “their systems are also likely to be more malleable in response to intervention.”⁹ (p.11) So what might pediatricians and practitioners do? If we know that the detrimental link between worry/loneliness and academic outcomes are amplified in largely disadvantaged homes, they can pursue compensatory efforts such as more frequent follow-up appointments, discounted services, and when appropriate, develop strategies to ensure better prescription adherence.⁴⁶⁻⁴⁷

But to do so, we recommend utilizing screening instruments that assess patient's social class backgrounds and document their socioemotional experiences. Although depression (CES-DC),⁴⁸ anxiety (SCARED),⁴⁹ or other child wellness screens may be useful, directly assessing worry and loneliness in the context of schooling may be the most effective approach. For worry, we suggest matching the sub-item measures of this study by asking children how often in the school year they worry about academic performance. For loneliness, we suggest asking children how often they feel lonely in the context of their school environments using the loneliness sub-items.

Overall, negative socioemotional experiences in early adolescence matter for academic progress in school and are especially detrimental for disadvantaged kids who likely have limited supports at home to overcome setbacks. As COVID-19 has put into acute focus the mental health of students, we argue that earlier and better assessments/interventions may significantly enhance the welfare and academic development of American youth, especially children in disadvantaged settings.

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Table 1: Descriptive Statistics, ECLS-K 2010-2011. (n=5750)

			Lowest SES	Highest SES	
Standardized Math Score	0.08	(0.01 to 0.15)	-0.06	0.62	***
Standardized Reading Score	0.10	(0.04 to 0.16)	-0.03	0.61	***
Worry about School (self-reported)	-0.04	(-0.07 to -0.01)	-0.01	-0.22	***
Worry about Tests	2.51	(2.47 to 2.56)	2.56	2.33	***
Hard to Finish Work	1.77	(1.73 to 1.80)	1.83	1.55	***
Ashamed about Mistakes	2.15	(2.11 to 2.18)	2.17	2.04	***
Worry about Doing Well	2.50	(2.47 to 2.54)	2.54	2.38	**
Worry about Finishing Work	2.31	(2.27 to 2.35)	2.35	2.18	***
Child Feels Lonely (self-reported)	0.01	(-0.02 to 0.05)	0.03	-0.09	***
Have Felt Lonely	1.74	(1.71 to 1.78)	1.76	1.66	**
Have Felt Left Out	1.71	(1.66 to 1.75)	1.73	1.58	***
I feel Alone	1.60	(1.56 to 1.64)	1.62	1.50	**
Female	0.49	(0.47 to 0.50)	0.48	0.50	
Race/Ethnicity					
NH White	0.57	(0.52 to 0.61)	0.52	0.71	***
NH Black	0.12	(0.09 to 0.15)	0.14	0.06	***
Hispanic	0.22	(0.18 to 0.26)	0.26	0.08	***
Asian American	0.04	(0.02 to 0.05)	0.03	0.08	***
Pacific Islander	0.00	(0.00 to 0.01)	0.00	0.00	
Native American	0.01	(0.00 to 0.03)	0.02	0.00	
Biracial	0.04	(0.03 to 0.05)	0.03	0.07	**
Family Structure					
Number of Siblings	1.41	(1.36 to 1.45)	1.42	1.36	
Both Biological Parents	0.65	(0.62 to 0.68)	0.61	0.82	***
Child Health					
Child has Disability (parent-reported)	0.21	(0.19 to 0.22)	0.21	0.16	**
Child BMI	16.64	(16.54 to 16.73)	16.79	16.03	***
Child Poor Health	1.59	(1.55 to 1.63)	1.65	1.37	***
Socioeconomic Status					
Lowest Quintile	0.15	(0.13 to 0.17)			
2nd Quintile	0.22	(0.20 to 0.24)			
3rd Quintile	0.25	(0.23 to 0.27)			
4th Quintile	0.20	(0.18 to 0.21)			
Highest Quintile	0.18	(0.16 to 0.20)			

*** p<.001; ** p<.01; *p<.05

Note: Results are weighted by PSU (W9C29P_9T29PSU), stratum (W9C29P_9T29STR), and pweights (W9C29P_9B0).

Table 2: Descriptive Statistics, ECLS-K 2010-2011. (n=5750)

			Lowest SES	Highest SES	
School Belonging					
Child Complains about Going to School	1.51	(1.47 to 1.54)	1.52	1.45	*
Child Asks to Stay Home from School	1.41	(1.38 to 1.44)	1.43	1.30	***
Child Seems to Dread School	1.40	(1.37 to 1.43)	1.43	1.32	***
Child Makes Reasons to Stay Home	1.36	(1.33 to 1.39)	1.40	1.22	***
Homework Effort					
Parent Checks for Completeness	3.55	(3.52 to 3.57)	3.60	3.34	***
How often Child does Homework	4.00	(3.93 to 4.06)	3.97	4.16	***
Child Aware of Homework	4.87	(4.81 to 4.92)	4.83	5.04	***
How often Parent Helps with Homework	3.12	(3.08 to 3.16)	3.14	3.04	**
Child Grit (teacher assessment)	0.04	(0.00 to 0.07)	-0.05	0.35	***
Approaches to Learning	3.14	(3.12 to 3.16)	3.08	3.37	***
Internalizing Problem Behaviors	1.56	(1.54 to 1.58)	1.58	1.47	***
Concerted Cultivation					
Home Involvement	12.83	(12.72 to 12.94)	12.89	12.56	**
Extracurricular Activities	3.10	(2.97 to 3.23)	2.76	4.62	***
Trips	2.35	(2.30 to 2.40)	2.28	2.72	***
School Involvement	6.15	(6.04 to 6.26)	5.93	7.09	***

*** p<.001; ** p<.01; *p<.05

Note: Results are weighted by PSU (W9C29P_9T29PSU), stratum (W9C29P_9T29STR), and pweights (W9C29P_9B0).

Table 3: OLS Regression Predicting the Association Between Child Self-Reported Loneliness and Standardized Math and Reading Scores, ECLS-K 2010-2011.

	Standardized Math Score			Standardized Reading Score		
	Model 1	Model 2 ^t	Model 3	Model 4 ^t		
Worry about School (self-reported)	-0.40 (-0.51 to -0.29) ***	-0.27 (-0.37 to -0.18) ***	-0.34 (-0.46 to -0.23) ***	-0.26 (-0.37 to -0.16) ***		
Socioeconomic Status						
Lowest Quintile	--	--	--	--	--	--
2nd Quintile	0.39 (0.28 to 0.51) ***	0.28 (0.19 to 0.37) ***	0.38 (0.29 to 0.48) ***	0.27 (0.18 to 0.36) ***		
3rd Quintile	0.53 (0.43 to 0.64) ***	0.29 (0.20 to 0.38) ***	0.58 (0.48 to 0.67) ***	0.37 (0.27 to 0.47) ***		
4th Quintile	0.85 (0.76 to 0.94) ***	0.45 (0.36 to 0.54) ***	0.88 (0.79 to 0.96) ***	0.54 (0.44 to 0.64) ***		
Highest Quintile	1.11 (1.02 to 1.21) ***	0.56 (0.47 to 0.66) ***	1.09 (1.01 to 1.18) ***	0.61 (0.51 to 0.71) ***		
Socioeconomic Status X Worry						
Lowest Quintile	--	--	--	--	--	--
2nd Quintile	0.11 (-0.03 to 0.26)	0.12 (0.01 to 0.24) *	0.10 (-0.06 to 0.25)	0.13 (-0.01 to 0.26)		
3rd Quintile	0.14 (0.00 to 0.28) *	0.12 (-0.01 to 0.26)	0.15 (-0.01 to 0.31)	0.16 (0.00 to 0.31) *		
4th Quintile	0.26 (0.12 to 0.39) ***	0.24 (0.13 to 0.35) ***	0.24 (0.10 to 0.38) **	0.26 (0.13 to 0.38) ***		
Highest Quintile	0.25 (0.13 to 0.37) ***	0.22 (0.12 to 0.32) ***	0.24 (0.12 to 0.36) ***	0.23 (0.12 to 0.34) ***		

*** p<.001; ** p<.01; * p<.05

^tControls include gender, race/ethnicity, family structure, child poor health, school belonging, homework effort, child grit (teacher assessment), approaches to learning, concerted cultivation, and internalizing problem behaviors.

Note: Results are weighted by PSU (W9C29P_9T29PSU), stratum (W9C29P_9T29STR), and pweights (W9C29P_9B0).

Table 4: OLS Regression Predicting the Association Between Child Self-Reported Loneliness and Standardized Math and Reading Scores, ECLS-K 2010-2011.

	Standardized Math Score			Standardized Reading Score		
	Model 1	Model 2 ^t	Model 3	Model 4 ^t	Model 3	Model 4 ^t
Child Feels Lonely (self-reported)	-0.23 (-0.34 to -0.12) ***	-0.13 (-0.21 to -0.04) **	-0.21 (-0.32 to -0.09) **	-0.15 (-0.25 to -0.06) **		
Socioeconomic Status						
Lowest Quintile	--	--	--	--	--	--
2nd Quintile	0.40 (0.29 to 0.52) ***	0.29 (0.19 to 0.38) ***	0.39 (0.29 to 0.50) ***	0.27 (0.18 to 0.37) ***		
3rd Quintile	0.59 (0.47 to 0.70) ***	0.31 (0.21 to 0.41) ***	0.62 (0.52 to 0.72) ***	0.38 (0.28 to 0.49) ***		
4th Quintile	0.90 (0.80 to 1.01) ***	0.46 (0.36 to 0.56) ***	0.92 (0.83 to 1.01) ***	0.54 (0.44 to 0.65) ***		
Highest Quintile	1.18 (1.07 to 1.29) ***	0.57 (0.47 to 0.68) ***	1.14 (1.05 to 1.23) ***	0.61 (0.51 to 0.72) ***		
Socioeconomic Status X Loneliness						
Lowest Quintile	--	--	--	--	--	--
2nd Quintile	0.13 (0.00 to 0.27)	0.09 (-0.02 to 0.19)	0.11 (-0.03 to 0.25)	0.09 (-0.03 to 0.22)		
3rd Quintile	0.15 (0.00 to 0.31)	0.12 (-0.00 to 0.25)	0.14 (-0.01 to 0.29) *	0.14 (0.01 to 0.27) *		
4th Quintile	0.18 (0.04 to 0.31) **	0.17 (0.06 to 0.27) **	0.18 (0.05 to 0.32) **	0.19 (0.08 to 0.30) **		
Highest Quintile	0.21 (0.09 to 0.33) **	0.17 (0.08 to 0.27) ***	0.18 (0.05 to 0.32) **	0.18 (0.07 to 0.29) **		

*** p<.001; ** p<.01; * p<.05

^tAnalyses include controls for gender, race/ethnicity, family structure, child poor health, school belonging, homework effort, child grit (teacher assessment), approaches to learning, concerted cultivation, and internalizing problem behaviors.

Note: Results are weighted by PSU (W9C29P_9T29PSU), stratum (W9C29P_9T29STR), and pweights (W9C29P_9B0).

Table 5: OLS Regression Predicting the Association Between Child Self-Reported Worry and Standardized Math and Reading Scores, ECLS-K 2010-2011. (n=5750)

Standardized Math Scores	Worry Submeasures					
	Worry about Tests	Hard to Finish Work	Ashamed about Mistakes	Worry about Doing Well	Worry about Finishing Work	
Submeasure	-0.22 (-0.31 to -0.14) ***	-0.45 (-0.57 to -0.33) ***	-0.27 (-0.38 to -0.16) ***	-0.16 (-0.26 to -0.06) **	-0.15 (-0.23 to -0.07) ***	
Highest SES (ref=lowest)	1.00 (0.71 to 1.30) ***	0.72 (0.46 to 0.98) ***	0.71 (0.44 to 0.98) ***	0.87 (0.58 to 1.17) ***	0.91 (0.64 to 1.17) ***	
Interaction	0.05 (-0.05 to 0.51)	0.17 (0.04 to 0.31) *	0.21 (0.11 to 0.32) ***	0.12 (0.02 to 0.23) *	0.12 (0.03 to 0.21) **	
Standardized Reading Scores						
Submeasure	-0.21 (-0.31 to -0.11) ***	-0.40 (-0.51 to -0.29) ***	-0.25 (-0.35 to -0.15) ***	-0.12 (-0.23 to -0.01) *	-0.12 (-0.19 to -0.05) **	
Highest SES (ref=lowest)	0.88 (0.59 to 1.16) ***	0.74 (0.48 to 0.99) ***	0.67 (0.42 to 0.91) ***	0.90 (0.58 to 1.21) ***	0.93 (0.70 to 1.15) ***	
Interaction	0.09 (-0.01 to 0.19)	0.15 (0.02 to 0.29) *	0.22 (0.12 to 0.32) ***	0.10 (-0.01 to 0.22)	0.10 (0.01 to 0.18) *	

*** p<.001; ** p<.01; *p<.05

Note: Results are weighted by PSU (W9C29P_9T29PSU), stratum (W9C29P_9T29STR), and pweights (W9C29P_980).

Table 6: OLS Regression Predicting the Association Between Child Self-Reported Loneliness and Standardized Math and Reading Scores, ECLS-K 2010-2011. (n=5750)

Standardized Math Scores	Loneliness Submeasures		
	Have Felt Lonely	Have Felt Left Out	I feel Alone
Submeasure	-0.17 (-0.26 to -0.09) ***	-0.18 (-0.27 to -0.09) ***	-0.18 (-0.28 to -0.08) ***
Highest SES (ref=lowest)	0.91 (0.75 to 1.08) ***	0.93 (0.76 to 1.10) ***	0.90 (0.73 to 1.07) ***
Interaction	0.16 (0.06 to 0.26) **	0.15 (0.04 to 0.25) **	0.18 (0.07 to 0.29) **
Standardized Reading Scores			
Submeasure	-0.14 (-0.23 to -0.05) **	-0.18 (-0.28 to -0.08) ***	-0.17 (-0.26 to -0.08) ***
Highest SES (ref=lowest)	0.92 (0.73 to 1.12) ***	0.89 (0.69 to 1.09) ***	0.92 (0.75 to 1.09) ***
Interaction	0.13 (0.02 to 0.24) *	0.15 (0.03 to 0.27) *	0.14 (0.04 to 0.25) **

*** p<.001; ** p<.01; *p<.05

Note: Controls include gender, race/ethnicity, family structure, child health, school belonging, homework effort, child grit (teacher assessment), approaches to learning, concerted cultivation, and internalizing problem behaviors. Results are weighted by PSU (W9C29P_9T29PSU), stratum (W9C29P_9T29STR), and pweights (W9C29P_9B0).

Figure 1: Predicted Math and Reading Score Change when Child-Reported Worry Increases by One Standard Deviation, Comparing Estimates for Children in the Highest and Lowest Socioeconomic Households. ECLS-K 2010-2011. (n=5,750)

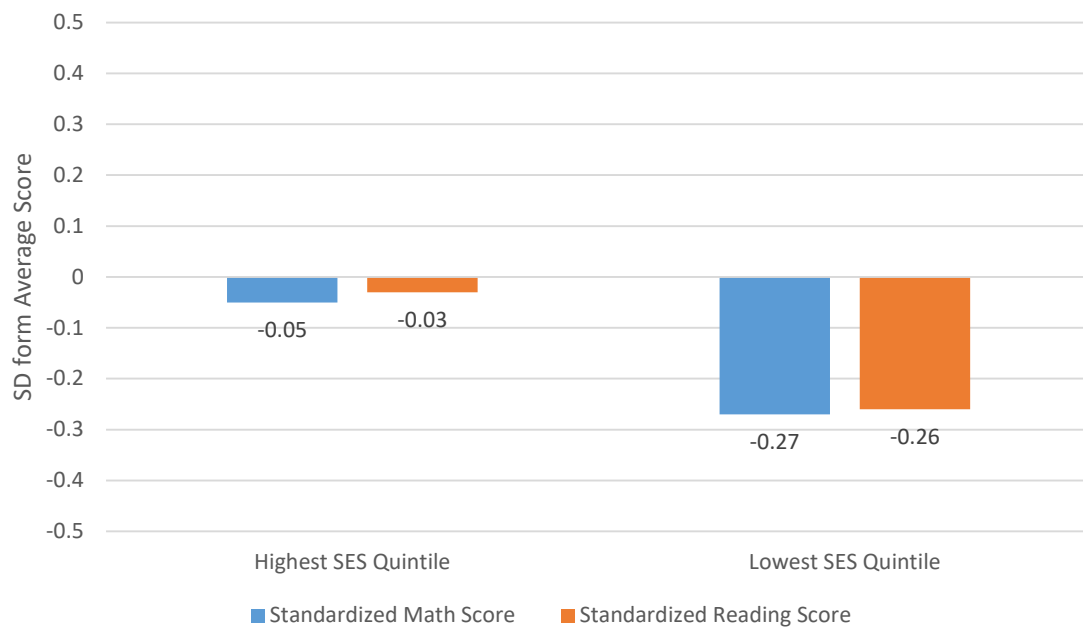


Figure 2: Predicted Math and Reading Score Change when Child-Reported Loneliness Increases by One Standard Deviation, Comparing Estimates for Children in the Highest and Lowest Socioeconomic Households. ECLS-K 2010-2011. (n=5,750)

