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# Absenteeism in Appalachian preschool classrooms and children's academic achievement☆

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ABSTRACT

This study examined preschool absenteeism for children ($N = 451$) in classrooms in rural areas of Appalachia. A substantial portion of children (47.5%) were chronically absent (missing 10% of more of the school year). The current study focuses on preschool children's developing language and literacy skills that are foundational for future reading and school success. Findings revealed that children who were frequently absent, particularly those who were chronically absent, exhibited fewer gains in literacy over the academic year. No effect of absenteeism was uncovered for language growth. Instructional quality was examined as a moderator of absenteeism and achievement. The effects of absenteeism on children's language and literacy outcomes did not vary as a function of instructional quality. Implications and future directions are discussed.

## Introduction

Though several studies have examined elementary absenteeism, few studies have explored the consequences of preschool absences (Ansari & Purtell, 2017). However, the competencies developed in preschool are critical for success in elementary school, with academic skills at kindergarten entry associated with future academic achievement (Duncan et al., 2007). Given that patterns of absenteeism form in the early years of schooling (Romero & Lee, 2007), examining preschool attendance may also be beneficial in efforts to reduce absenteeism in the later years of schooling. A recent study of preschool children attending Head Start classrooms found that greater absences are associated with limited academic growth in early childhood classrooms (Ansari & Purtell, 2017). Among the nationally representative sample of children enrolled in Head Start classrooms, children in Head Start missed 5.5% of the school year on average. Twelve percent of Head Start children were chronically absent and missed an average of 22 days of the school year. To our knowledge, no studies have examined preschool attendance in rural regions. However, given that children in rural settings often require transportation over length distances to get to school, relative to urban and suburban children who more frequently can walk or bike to school (McDonald, 2007), we might expect absenteeism to be an issue in these settings. For instance, lack of reliable transportation in rural settings might increase absenteeism among preschool-aged children whose parents must transport them to school.

### *Effects of absenteeism*

Research on absenteeism in the elementary grades suggests that children who are frequently absent are more likely to perform poorly on measures of academic achievement than their peers with consistent school attendance (Attridge, 2016; Chang & Romero, 2008; Romero & Lee, 2007). In addition to the academic consequences, increased absences are linked to poorer socioemotional outcomes. Teacher ratings indicate that children who are chronically absent, namely those who miss 10% or more of the school year (two days per month), demonstrate more negative approaches to learning, greater internalizing problems, and less eagerness to learn (Gottfried, 2014). Absenteeism is particularly detrimental for children who enter the school year with fewer academic skills and for children living in poverty (Chang & Romero, 2008). The families of low-income children are more likely to lack the resources to make up for losses in instructional time.

Attendance in the first years of schooling may be particularly important given that patterns of absenteeism develop in the early elementary school years. Data indicate that the frequency of absences in elementary school years is associated with attendance in future grades

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(Attridge, 2016; Romero & Lee, 2007). Further, children who miss greater numbers of school days throughout their academic careers are more likely to eventually drop out of school (Schoeneberger, 2012). In addition to the negative effects of absenteeism on the individuals' missing school, children's absenteeism may be detrimental to their classmates' learning experiences. As teachers help children frequently returning from absences, the pace of classroom instruction might be impacted and negatively influence the learning experiences of the other students. Previous research suggests children with chronically absent classmates exhibit poorer reading and math outcomes (Gottfried, 2015).

Children who were frequently absent in preschool made fewer gains in literacy and math during the preschool year. Studies by Logan, Piasta, Justice, Schatschneider, and Petrill (2011) and Hubbs-Tait et al. (2002) found no general association between attendance and language. However, Logan et al. (2011) found that instructional quality moderated the relationship between attendance and children's language growth. These results suggest that the effects of absenteeism vary as a function of instructional quality with greater attendance associated with larger language gains for preschool children attending high quality classrooms. Previous research suggests children enrolled in high-quality preschool programs were more likely to show greater gains in language and literacy skills than children who attended low-quality programs (Loeb, Fuller, Kagan, & Carrol, 2004; Magnuson, Ruhm, & Waldfogel, 2007). Thus, children who are frequently absent are exposed to fewer teacher interactions that promote growth in language and literacy and have limited opportunities to benefit from high-quality preschool education programs.

### *Preschool attendance in urban areas*

Recent studies indicate preschool absenteeism is especially problematic in large, urban districts. A substantial portion of children attending preschool in urban settings are considered to be chronically absent, defined as missing 10% or more of the school year (Dubay & Holla, 2016). Chronic absenteeism rates in preschool have been documented across several cities with chronic absenteeism rates ranging from 36%–45% in Chicago, 20%–27% in Baltimore, and 35%–37% in the District of Columbia (Connolly & Olson, 2012; Dubay & Holla, 2016; Ehrlich, Gwynne, Pareja, & Allensworth, 2014). Multiple factors, including race, income, and English Language Learner status are associated with preschool attendance. For example, African American children were more likely to be chronically absent than white or Latino children in Chicago (Ehrlich et al., 2014). Additionally, children of all races/ethnicities living in neighborhoods with high poverty levels were at an elevated risk of chronic absenteeism in preschool. English Language Learners were less likely to be chronically absent.

### *Preschool attendance in rural areas*

Though there have been some studies of absenteeism among young children living in urban areas, there are several important distinctions between urban and rural settings that might limit the generalizability of research findings on preschool attendance to the millions of children in rural areas. Children and families in rural areas face a distinct set of stressors as compared to families residing in urban contexts. Rural settings are characterized by high levels of poverty and limited employment opportunities (Vernon-Feagans, Burchinal, & Mokrova, 2015). Due to geographic isolation, rural families have less access to social support networks and resources outside the family (Tine, 2017). In rural areas, families living in poverty face also higher infant mortality, lower quality housing, and limited access to healthcare than impoverished families in urban areas. Further, many industries, such as steel manufacturing, that provided stable employment opportunities in rural communities have largely left (Vernon-Feagans et al., 2015). The remaining jobs are mainly in service industries and offer low wages along with nonstandard hours. The loss of stable, skilled jobs has contributed to higher child poverty rates in rural areas, where a substantial portion of students (41%) live in poverty (Strange, Johnson, Showalter, & Klein, 2012; Vernon-Feagans et al., 2015). Finally, access to educational resources is more limited in rural contexts relative to urban and suburban settings. Educational attainment differs among settings, with 30% of urban adults obtaining a college degree compared to 17.5% of rural adults earning college degrees (USDA Economic Research Service, 2012).

The current study examines the preschool attendance of children living in rural communities in the Appalachian region, located in the southeastern United States. The mountainous region in the southeastern United States encompasses 13 states and consists of 25 million individuals (Pollard & Jacobsen, 2012). The challenging terrain restricts the development of infrastructure and job growth. Geographic isolation coupled with limited public transportation, low parental educational attainment, and fewer skilled jobs suggest young children living in poverty experience a unique set of challenges. The children reflected in this study attended center-based preschool classrooms enrolling low-income families in Appalachia across three states.

We addressed four research aims. The first aim was to describe the extent to which children are absent in preschool classroom in Appalachia, and the second aim was to explore the child, family, and classroom factors that were associated with children's preschool attendance. Similar to studies of preschool attendance in urban settings, we expected to find variability in attendance based on child, family, and classroom characteristics. The third aim was to examine whether attendance was related to children's language and literacy development over the preschool year, whereas the fourth aim was to assess whether any observed relations between absenteeism and children's achievement was conditional on instructional quality. We focus on language and literacy skills, which are developing during the preschool years, and lay the foundation for future reading achievement and school success (Bierman et al., 2008). Language skills also facilitate children's classroom engagement by helping them regulate emotions, follow rules, and interact with pees and teachers. We hypothesized that children more frequently absent would exhibit less gain in language and literacy skill over the academic year, due to less exposure to learning opportunities provided in preschool, but also that increased absences would diminish the effects of high-quality classroom instruction on children's gains in these areas.

## Method

The sample consisted of 451 children (53.4% female, 46.6% male) in center-based preschool programs (state-funded Pre-K or Head Start) with attendance information available. The sample included 100 classrooms and teachers. Data come from a larger literacy curriculum intervention study. Programs were invited to participate via a range of recruitment strategies and were not randomly selected from a larger set of programs. Teachers were randomly assigned to either an intervention or control condition. In the control condition, teachers implemented the curriculum of their choice. Teachers in the intervention group received training on the *Read It Again*! curriculum in a one-day 12-h workshop. Teachers were provided a manual consisting of 60 lesson plans and instructional supplies. Half of the intervention group teachers were also assigned to complete self-study videos on the curriculum (15 20-min videos on professional development). Classrooms that prioritized enrollment to low-income children where the majority of children were old enough to begin kindergarten in the following year were eligible to participate. After obtaining permission from program administrators, research staff conducted information sessions for interested teachers to enroll into the study. Recruited classrooms were located within rural areas of Appalachia counties in three states (Ohio, West Virginia, and Virginia). Five children from each classroom were randomly selected among consented children to participate in the study. Children were

required to meet three criteria: the child was expected to enroll in kindergarten in the next academic year, had no known disability, and spoke English as a primary language. The overall consent rate was high (77%) with approximately 14 children consented per classroom (Justice, Jiang, Khan, & Dynia, 2017).

The average age of children at the entry to preschool was 53.4 months ($SD$ = 3.2) and 2% of the children had disabilities, as indicated by the presence of an Individualized Education Plan. The majority of the children were white (90%), with 4% African American, 1% Hispanic, and 5.0% multiracial/other races. In terms of representativeness of our data, minorities are 17.5% of the population in Appalachia suggesting our sample (10% minorities) is less racially diverse (Pollard & Jacobsen, 2017). The majority of the children came from families earning less than $40,000 a year (77%), with 50% of the families earning $20,000 or less each year. The education background of mothers varied. Nine percent of mothers did not complete a high school degree, 30% obtained a high school diploma, 26% completed some college but not did earn a degree, 14% completed technical training beyond higher school, 9% earned a AA, AS, or 2-year degree, and 11% obtained a bachelor's degree or higher. In the Appalachia region, on average 85.5% of adults had earned a high school diploma and 22.6% received a bachelor's degree (Pollard & Jacobsen, 2017). In our sample, a greater proportion held at least a high school diploma (91%), but a smaller proportion held a bachelor's degree (11%).On average, children attended classrooms that met for 4.26 days a week ($SD$ = 0.70) with 36% of the children in classrooms with 5 days of instruction. Classroom size ranged from 8 to 40 ($M$ = 17.3, $SD$ = 4.3). The school day was approximately 5.3 h a day ($SD$ = 1.8). Additional descriptive information on children and their classroom experiences is presented in Table 1. Bivariate correlations of study variables and children's absenteeism are displayed in Table 2.

**Table 1**
Descriptive statistics for children by chronic absence status.

| | Overall M (SD) or proportion | Chronic Absence M (SD) or proportion | Non-Chronic Absence M (SD) or proportion |
|---|---|---|---|
| Child/family characteristics | | | |
| Percent of days absent | 13.1 (12.8) | 21.9 (13.9) | 5.3 (2.7) |
| Chronically absent | 0.47 | – | – |
| Male | 0.53 | 0.52 | 0.55 |
| Presence of IEP | 0.02 | 0.03 | 0.02 |
| Child race | | | |
| White | 0.90 | 0.92 | 0.88 |
| African American | 0.04 | 0.01 | 0.06 |
| Other/multiple races | 0.05 | 0.06 | 0.05 |
| Hispanic | 0.01 | 0.02 | 0.01 |
| Child age (months) | 53.40 (3.23) | 53.37 (3.17) | 53.43 (3.31) |
| Mothers' years of education | 12.91 (1.71) | 12.54 (1.44) | 13.25 (1.86) |
| Household size | 4.38 (1.32) | 4.36 (1.43) | 4.40 (1.22) |
| Income $20,000 or less | 0.50 | 0.61 | 0.40 |
| Classroom/teacher characteristics | | | |
| Class size | 17.32 (4.31) | 17.39 (3.35) | 17.26 (5.03) |
| Hours of school per week | 22.93 (9.61) | 23.76 (9.87) | 22.15 (9.31) |
| Program meets 5 days a week | 0.36 | 0.44 | 0.29 |
| Instructional quality (CLASS) | 2.69 (0.66) | 2.62 (0.61) | 2.74 (0.71) |
| Teacher years of education | 15.69 (1.63) | 15.26 (1.49) | 16.08 (1.66) |

Note: Children are considered to be chronically absent if they miss 10% or more of the days in the school year.

**Table 2**
Bivariate correlations of study variables and children's absentee status.

| | Absenteeism | Chronic absenteeism |
|---|---|---|
| Child/family characteristics | | |
| Male | −0.02 | −0.03 |
| Presence of IEP | 0.09 | 0.04 |
| Child race (White/ non-white) | 0.08 | 0.07 |
| Child age (months) | −0.04 | 0.01 |
| Mothers' years of education | −0.21*** | −0.21*** |
| Household size | 0.02 | −0.02 |
| Income | −0.23*** | −0.25*** |
| Classroom/teacher characteristics | | |
| Class size | −0.01 | 0.01 |
| Hours of school per week | 0.01 | 0.08 |
| Program meets 5 days a week | 0.09 | 0.15** |
| Instructional quality (CLASS) | −0.12* | 0.09 |
| Teacher years of education | −0.31*** | −0.25*** |
| Children's outcomes | | |
| Language (fall) | −0.10* | −0.09 |
| Language (spring) | −0.10* | −0.06 |
| Literacy (fall) | −0.15** | −0.11* |
| Literacy (spring) | −0.23** | −0.18*** |

* $p < .05$.
** $p < .01$.
*** $p < .001$.

### *Measures*

Information on family and teacher backgrounds was gathered via questionnaires. Teachers responded to questions on their educational backgrounds and experiences, school day hours, and classroom composition. Caregivers self-reported on their household characteristics and educational backgrounds.

#### *Absenteeism*

Teachers provided administrative attendance records for each child in the spring of the school year. These records included a count of the number of days children were absent during the school year. Absences ranged from 0 to 104 days.

#### *Academic achievement*

Children's language and literacy skills were evaluated through a battery of assessments the fall and spring of the academic year. We selected two assessments to represent these domains. Raw scores from the *Clinical Evaluation of Language Fundamentals Preschool – Second Edition* Expressive Vocabulary subtest were used to measure children's language skills (Wiig, Secord, & Semel, 2004). The Expressive Vocabulary subtest evaluates children's ability to identify objects, people, or actions portrayed in pictures. Internal consistency of Expressive Vocabulary scores was 0.92 and inter-scorer reliability was 0.97. Scores are moderately correlated with other standardized language measures. Literacy skills were assessed by the Uppercase and Lowercase Letter Naming tasks from the *Phonological Awareness Literacy Screening* (PALS; Invernizzi, Meier, & Sullivan, 2001). Children are provided a sheet with all letters presented in a random order. To complete the task, children point to and name each of the 26 letters. One point is awarded for each current uppercase (0 to 26) and lowercase letter (0 to 26). A composite score is generated by summing the uppercase and lowercase scores (0 to 52). Scores are significantly associated with concurrent literacy assessments and are highly predictive of future alphabet knowledge. PALS scores display adequate reliability with split-half coefficients ranging from 0.71 to 0.94 and inter-rater reliability of 0.99. Means and standard deviations for the two measures in fall and spring by chronic absence status are presented in Table 3. The effect sizes ($d$) for language and literacy gains from fall to spring in the preschool year were 0.70 and 1.10, respectively.

**Table 3**
Children's scores in the fall and spring and effect size (d) of gains from fall to spring by chronic absence status.

| Measure | Fall | Spring | *d* |
|---|---|---|---|
| Overall | | | |
| Language | 19.67 (6.90) | 24.35 (6.58) | 0.70 |
| Literacy | 12.83 (14.65) | 30.14 (16.85) | 1.10 |
| Chronic Absence | | | |
| Language | 19.03 (6.71) | 23.90 (6.49) | 0.74 |
| Literacy | 11.11 (13.27) | 26.93 (16.83) | 1.05 |
| Non-Chronic Absence | | | |
| Language | 20.25 (7.03) | 24.74 (6.65) | 0.66 |
| Literacy | 14.40 (15.67) | 32.98 (16.40) | 1.16 |

Note: Values in parenthesis are standard deviates. Language was measured by the Expressive Vocabulary subtest on the CELF-2. Literacy was measured by a composite score summed from the Uppercase and Lowercase Letter Naming Tasks from the PALS.

*Instructional quality*

Independent observers assessed the effectiveness of teacher and student interactions using the *Class Assessment Scoring System* (CLASS; Pianta, La Paro, & Hamre, 2008). The CLASS consists of 10 instructional dimensions that are rated on a 7-point Likert scale, with high scores indicating greater quality. Dimensions are averaged to calculate domain scores. In the current study we used the instructional support domain score, an average score determined from concept development, quality of feedback, and language modeling dimensions. Internal consistency was adequate with $\alpha = 0.84$.

*Analysis*

Multilevel modeling via the SAS mixed procedure was considered to account for the nested nature (children within preschool classrooms) of the data. Initial two-level unconditional hierarchical (HLM) models were conducted for each outcome of interest (chronic absence status, language achievement, literacy achievement) to examine whether there was appreciable score variance between classrooms. Level 1 reflected variance between children within classrooms and Level 2 represented variance between preschool classrooms. The unconditional HLM models were used to evaluate whether a statistically significant amount of variation existed between classrooms to use multilevel analyses. The estimate of between classroom variance in the number of days children attended school was statistically significant, indicating classroom clustering effects. Thus, multilevel modeling was used for the second research aim regarding the predictors of the number of days children attended school. Estimates of between-classroom variance in children's language and literacy achievement were also statistically significant. To answer the research aims focused on children's language and literacy skills (aims 3 and 4), multilevel modeling was applied. Missing values were estimated using twenty multiple imputations via the fully conditional specification (van Buuren, 2007). The fully conditional method uses a separate conditional distribution for each variable and is able to impute variables that must take on specific values (such as dichotomous or categorical variables). Following recommendations by von Hippel (2007), we did not impute missing outcome data. The amount of missing data ranged from 0% to 10% in predictor variables. Examination of the missing data patterns revealed no systematic patterns of missing data. We plotted model residuals from multilevel models to examine normality. Residuals appeared to be normally distributed. However, Gelman and Hill (2007) describe that the normality of residuals does not influence the parameter estimates in multilevel models and normality tests of multilevel regression residuals are not recommended.

To address the second research aim, we examined the association between child, family, and classroom factors and absenteeism by creating a model to predict the number of days children attended school (Model 1). Continuous variables were centered at $M = 0$. To explore the association between absenteeism and preschool achievement, we estimated four models predicting children's language and literacy at the end of preschool from absence rates (Model 2-Model 5). The number of days attended is the predictor of interest in Model 2. In Models 3–5, we explored the association between levels of absenteeism and achievement by replacing the continuous days attended variable with a dichotomous absenteeism variable indicating whether the child was absent for > 5% (Model 3), 7.5% (Model 4), or 10% of the school year (Model 5). In addition to child, family, and classroom factors, we controlled for children's initial performance at the beginning of preschool. Child control factors included age in months and gender. Household income, household size, and maternal education (years) served as family control factors. Classroom factors consisted of instructional quality, classroom size, teacher education (years), classroom meets 5 or fewer days a week, and intervention status (classroom participated in the control group = 0, classroom participated in the intervention conditions = 1). To answer our fourth research aim and examine moderation effects, we tested the interaction between absenteeism rates and instructional quality (Model 6). In Models 2–6, all continuous variables were standardized ($M = 0$, $SD = 1$). This approach allowed us to examine how many standard deviations children's preschool skills changed for each standard deviation increase in absenteeism rates. Standardization of continuous variables facilitated comparison of our results to the nationally representative study of Head Start preschool attendance and early learning skills by Ansari and Purtell (2017).

## Results

*Descriptives and predictors of absences*

Our first aim was to understand the extent to which children were absent in rural preschool classrooms situated in Appalachia. On average, children were absent for 13.1% of the school year ($SD$ = 12.8%; range = 0.0% to 85.5%). In terms of days, children were absent approximately 18 days (SD = 18, range = 0 to 104). A substantial portion of the children were considered to be chronically absent (47.5%) and missed 30 days ($SD$ = 19) on average.

To address aim 2, we predicted the number of days children attended school from several child, family, and classroom characteristics. Results are displayed in Table 4. Children's age, gender and race, were not significantly associated with children's attendance. However, we observed a relationship between family income and absenteeism rates, with children from families with higher incomes more likely to attend

**Table 4**
Results of Multilevel-Effects Models to Predict Children's School Attendance.

| Predictor | Number of School Days Attended | *p* |
|---|---|---|
| | Estimate | |
| Intercept | 113.12 | < 0.001 |
| Age in months | −0.13 | 0.62 |
| Gender (female = 1) | −1.54 | 0.36 |
| Race (White = 1, Nonwhite = 0) | −3.35 | 0.29 |
| Income | 0.77 | 0.001 |
| Household size | −0.12 | 0.86 |
| Maternal education (years) | −0.30 | 0.62 |
| Classroom size | −0.51 | 0.38 |
| Classroom quality | −2.69 | 0.46 |
| Teacher education (years) | 4.40 | 0.006 |
| Class meets 5 days a week | 28.79 | < 0.001 |
| Intervention status | −6.42 | 0.24 |

Note: All continuous predictors were grand-mean centered. Income was reported in $5000 increments. Coefficients in bold were statistically significant at $p < .05$.

more school days. For each $5000 increase in family income, the number of days attended increased by 0.77. Attendance was not linked to household size and maternal education.

In terms of teacher and classroom factors, teacher education and enrollment in a classroom that met five days a week were related to attendance. Children in classrooms with more highly educated teachers were more likely to attend school frequently, with each year of teacher education associated with 4.40 additional days of attendance. Children enrolled in classrooms that met for five days a week attended on average 28.79 school days than children who attended preschool classrooms with less than five days of classroom instruction. Other classroom features, such as quality and size, did not appear to influence children's absenteeism rates. Attending an intervention classroom was not associated with children's school attendance.

### *Absences and children's preschool learning*

Table 3 displays descriptive information on the language and literacy skills of children who were and were not chronically absent. On average, children who were chronically absent had significantly lower scores on the fall measure of literacy, $t(435) = 2.36$, $p = .02$, $d = -0.22$, as compared to children who attended school regularly. The difference in skills persisted throughout the school year, with children who were chronically absent exhibiting significantly lower scores on the spring measure of literacy, $t(422) = 3.74$, $p < .001$, $d = -0.37$. We did not find differences in fall, $t(435) = 1.86$, $p = .06$ and spring language skills, $t(422) = 1.31$, $p = .19$, for children who were and were not chronically absent. In terms of gains, children who were chronically absent displayed similar growth in language skills over the school year to their peers who regularly attended school, $t(411) = -0.27$, $p = .79$, but experienced less growth in literacy skills, $t(411) = 2.86$, $p = .005$, $d = -0.28$.

After controlling for children's skills at the beginning of the preschool year and a rich set of covariates in our multilevel models, the number of days attended was not was not associated with children's language skills in the spring of the preschool year (see Table 5). In terms of control variables, greater language skills in the fall and higher household income were related to greater language achievement. However, attending a greater number of school days was significantly associated with greater spring literacy skills, effect size = 16% of a SD. Children's literacy skills and age in the fall were positively associated with literacy skills. Household size, rather than income, was significantly related to literacy skills.

**Table 5**
Results of multilevel-effects models days attended to predict children's academic skills.

| Predictor | Language | | Literacy | |
|---|---|---|---|---|
| | Estimate | *p* | Estimate | *p* |
| Model 2 | | | | |
| Days attended | −0.03 | 0.48 | 0.17 | < 0.001 |
| Fall skills | 0.69 | < 0.001 | 0.62 | < 0.001 |
| Instructional quality | 0.03 | 0.34 | 0.01 | 0.75 |
| Age in months | 0.02 | 0.50 | 0.04 | 0.26 |
| Gender (female = 1) | −0.06 | 0.34 | 0.09 | 0.22 |
| Race (White = 1, Nonwhite = 0) | 0.17 | 0.13 | 0.06 | 0.63 |
| Income | 0.09 | 0.02 | 0.04 | 0.38 |
| Household size | −0.04 | 0.29 | −0.12 | 0.002 |
| Maternal education (years) | 0.00 | 0.94 | 0.01 | 0.73 |
| Classroom size | −0.01 | 0.88 | −0.02 | 0.62 |
| Teacher education (years) | 0.02 | 0.58 | 0.05 | 0.32 |
| Class meets 5 days a week | 0.02 | 0.85 | −0.12 | 0.27 |
| Intervention status | −0.14 | 0.08 | 0.22 | 0.04 |

Note: Coefficients in bold were statistically significant at $p < .05$. Continuous variables were standardized ($M = 0$, $SD = 1$), thus the unstandardized regression coefficients in this table represent effect sizes.

**Table 6**
Results of multilevel-effects models missing 5% of school year to predict children's academic skills.

| Predictor | Language | | Literacy | |
|---|---|---|---|---|
| | Estimate | *p* | Estimate | *p* |
| Model 3 | | | | |
| Missed at least 5% of school year | −0.02 | 0.82 | −0.10 | 0.26 |
| Fall skills | 0.69 | < 0.001 | 0.62 | < 0.001 |
| Instructional quality | 0.04 | 0.33 | 0.00 | 0.93 |
| Age in months | 0.02 | 0.49 | 0.04 | 0.31 |
| Gender (female = 1) | −0.06 | 0.37 | 0.08 | 0.28 |
| Race (White = 1, Nonwhite = 0) | 0.18 | 0.12 | 0.02 | 0.85 |
| Income | 0.09 | 0.03 | 0.04 | 0.33 |
| Household size | −0.04 | 0.27 | −0.11 | 0.002 |
| Maternal education (years) | 0.00 | 0.97 | 0.00 | 0.97 |
| Classroom size | 0.00 | 0.93 | −0.04 | 0.68 |
| Teacher education (years) | 0.01 | 0.70 | 0.08 | 0.12 |
| Class meets 5 days a week | −0.01 | 0.89 | 0.05 | 0.64 |
| Intervention status | −0.14 | 0.08 | 0.20 | 0.07 |

Note: Coefficients in bold were statistically significant at $p < .05$. Continuous variables were standardized ($M = 0$, $SD = 1$), thus the unstandardized regression coefficients in this table represent effect sizes.

**Table 7**
Results of multilevel-effects models missing 7.5% of school year to predict children's academic skills.

| Predictor | Language | | Literacy | |
|---|---|---|---|---|
| | Estimate | *p* | Estimate | *p* |
| Model 4 | | | | |
| Missed at least 7.5% of school year | 0.00 | 0.97 | −0.14 | 0.08 |
| Fall skills | 0.69 | < 0.001 | 0.62 | < 0.001 |
| Instructional quality | 0.03 | 0.35 | 0.00 | 0.95 |
| Age in months | 0.02 | 0.49 | 0.04 | 0.28 |
| Gender (female = 1) | −0.06 | 0.37 | 0.07 | 0.32 |
| Race (White = 1, Nonwhite = 0) | 0.18 | 0.12 | 0.03 | 0.83 |
| Income | 0.09 | 0.03 | 0.04 | 0.36 |
| Household size | −0.04 | 0.27 | −0.12 | 0.002 |
| Maternal education (years) | 0.00 | 0.99 | 0.00 | 0.98 |
| Classroom size | 0.00 | 0.94 | −0.04 | 0.38 |
| Teacher education (years) | 0.02 | 0.69 | 0.07 | 0.16 |
| Class meets 5 days a week | −0.01 | 0.87 | 0.06 | 0.57 |
| Intervention status | −0.14 | 0.09 | 0.20 | 0.07 |

Note: Coefficients in bold were statistically significant at $p < .05$. Continuous variables were standardized ($M = 0$, $SD = 1$), thus the unstandardized regression coefficients in this table represent effect sizes.

We also examined at which point absenteeism becomes detrimental to children's performance in a series of models (see Tables 6-9). Missing 5%, 7.5%, or 10% of the academic year was not associated with poorer language performance. Absenteeism was not detrimental to children's literacy when children missed 5% or 7.5% of the academic year. However, when absenteeism reached 10% of the academic year negative effects were evident. Children who were chronically absent displayed smaller growth in literacy during the school year, with the effect size of chronic absenteeism = 20% of a *SD*.

To address aim 4, we examined instructional quality as a moderator of absenteeism and children's skills. The relationship between absenteeism and children's language and literacy skills did not differ as a function of instructional quality.

## Discussion

The purpose of this study was to explore the association between children's absenteeism and preschool achievement in Appalachian classrooms in rural areas. On average, children missed 18 days of the preschool year. Almost half of the children in the study (47.5%) were

**Table 8**
Results of multilevel-effects models missing 10% of school year to predict children's academic skills.

| Predictor | Language | | Literacy | |
|---|---|---|---|---|
| | Estimate | *p* | Estimate | *p* |
| Model 5 | | | | |
| Missed at least 10% of school year | 0.01 | 0.90 | −0.19 | 0.01 |
| Fall skills | 0.69 | < 0.001 | 0.62 | < 0.001 |
| Instructional quality | 0.04 | 0.32 | 0.00 | 0.94 |
| Age in months | 0.02 | 0.49 | 0.04 | 0.27 |
| Gender (female = 1) | −0.06 | 0.37 | 0.07 | 0.32 |
| Race (White = 1, Nonwhite = 0) | 0.18 | 0.12 | 0.04 | 0.76 |
| Income | 0.09 | 0.03 | 0.03 | 0.44 |
| Household size | −0.04 | 0.28 | −0.12 | 0.002 |
| Maternal education (years) | 0.00 | 0.99 | 0.00 | 0.98 |
| Classroom size | 0.00 | 0.74 | −0.04 | 0.39 |
| Teacher education (years) | 0.02 | 0.67 | 0.07 | 0.18 |
| Class meets 5 days a week | −0.01 | 0.86 | 0.07 | 0.52 |
| Intervention status | −0.13 | 0.09 | 0.20 | 0.07 |

Note: Coefficients in bold were statistically significant at $p < .05$. Continuous variables were standardized ($M = 0$, $SD = 1$), thus the unstandardized regression coefficients in this table represent effect sizes.

**Table 9**
Results of multilevel-effects models days attended by instructional quality to predict children's academic skills.

| Predictor | Language | | Literacy | |
|---|---|---|---|---|
| | Estimate | *p* | Estimate | *p* |
| Model 6 | | | | |
| Days attended x instructional quality | −0.03 | 0.46 | 0.02 | 0.68 |
| Days attended | −0.03 | 0.47 | 0.17 | < 0.001 |
| Fall skills | 0.69 | < 0.001 | 0.62 | < 0.001 |
| Instructional quality | 0.04 | 0.29 | 0.02 | 0.80 |
| Age in months | 0.02 | 0.55 | 0.04 | 0.26 |
| Gender (female = 1) | −0.07 | 0.34 | 0.09 | 0.22 |
| Race (White = 1, Nonwhite = 0) | 0.17 | 0.14 | 0.06 | 0.62 |
| Income | 0.09 | 0.27 | 0.04 | 0.37 |
| Household size | −0.04 | 0.26 | −0.11 | 0.002 |
| Maternal education (years) | 0.00 | 0.89 | 0.02 | 0.71 |
| Classroom size | −0.01 | 0.79 | −0.02 | 0.67 |
| Teacher education (years) | 0.02 | 0.66 | 0.05 | 0.30 |
| Class meets 5 days a week | 0.02 | 0.84 | −0.12 | 0.26 |
| Intervention status | −0.13 | 0.10 | 0.22 | 0.04 |

Note: Coefficients in bold were statistically significant at $p < .05$. Continuous variables were standardized ($M = 0$, $SD = 1$), thus the unstandardized regression coefficients in this table represent effect sizes.

chronically absent and missed 30 days on average. The prevalence of chronic absenteeism in our sample differs from a national Head Start study of attendance (12%), but is comparable to estimates from studies of urban preschool attendance (Ansari & Purtell, 2017; Connolly & Olson, 2012; Dubay & Holla, 2016; Ehrlich et al., 2014). The discrepancy between the absenteeism estimates in the Head Start study and the estimates captured in other studies could be attributed to differences in data sources. In the Head Start study, parents were asked to report their child's attendance and may have underreported absences due to social desirability (Ansari & Purtell, 2017). The current study relied on attendance records rather than parent report.

Our analysis revealed a few correlates of the number of days children attended school. A limitation of our study is that the number of days attended is related to the opportunity to attend preschool. The number of instructional days per week varies by preschool program with some children having the opportunity to attend more days than others do. In the current study, we attempt to control for differences in access to instruction by including a dichotomous variable denoting whether the program meets five days a week. We opted to operationalize instructional access as a dichotomous variable, instead of a series of categorical variables, because the majority of children had access to 4 (58%) or 5 (36%) days of instruction with few children experiencing 2 (5%) or 3 days (1%).

Within our predominately low-income sample, children from families with the lowest incomes were more likely to attend fewer schools days. Families with lower incomes may have limited access to resources, such as reliable transportation, necessary for regular school attendance. Teacher education was also significantly associated with children's attendance rates. Children with more highly educated teachers were more likely to attend school. One potential explanation for this finding is that teacher preparation programs that require more years of schooling may cover strategies for increasing parent engagement and ultimately lead to lower absences rates in the classrooms of highly educated teachers.

Children who attended preschools that met for five days a week were also more likely to attend school than children enrolled in classrooms with fewer instructional days. We hypothesize that having more instructional days in the week allowed parents to develop a more consistent daily schedule, helping them to regularly get their children to school. In the later years of school, five days of instructional is typical and having five days of preschool instructional per week may signal to parents that preschool is just as important as other years of schooling. Prior research suggests a link between parental beliefs about the importance of preschool and children's attendance. Parents who conveyed stronger beliefs about the importance of preschool in interviews had children who missed fewer days of school. Whereas children with parents who expressed that attendance in the preschool years mattered less than later years of schooling were more frequently absent in Chicago preschools (Ehrlich et al., 2014). No other child or classroom factors were associated with absenteeism in our sample. We were unable to include children's health status in analyses because detailed information on children's health was not available. An additional limitation of our study is that selection criteria restricted our sample to children with no known disabilities. Thus, generalizability of our findings are limited given that our sample may not be representative of the population of children that attend preschool in rural areas. Future research should include both typically developing children and children with disabilities to examine how preschool absenteeism influences these two groups.

Similar to the nationally representative study of Head Start preschool children (Ansari & Purtell, 2017), we find a negative relationship between absenteeism and literacy gains, with children attending fewer days of school experiencing smaller growth in literacy skills. The detrimental effects of absenteeism on literacy skills were greater for children that were chronically absent. In the current study, the effect size of chronic absenteeism was 0.19 whereas the effect size of instructional quality was not statistically significant. We found no effect of absenteeism on children's language skills. This result comports with previous research findings on preschool children attending Head Start programs where no effect of preschool programs on language growth was uncovered (Ansari & Purtell, 2017). Further the association between absenteeism and children's achievement did not differ as a function of instructional quality. This result suggests that the effects of high-quality classroom instruction did not vary based on the amount of time children attended school. One explanation for this finding is that our measure of classroom quality may not capture the aspects of instruction that influence children's language and literacy skills. It is important to note that our study did not include other areas of school readiness, such as mathematics competencies or social-emotional skills, which may be related to absenteeism. Future research should include a greater range of skills to explore the influence absenteeism across the different domains of children's school readiness.

A range of obstacles and health challenges are associated with children's absenteeism rates in preschool. In a study of Chicago preschool children, teachers asked parents to report reasons for children's

absences in attendance logs (Ehrlich et al., 2014). Half of children's absences (54%) were for health-related reasons. Children also missed school for a range of logistical obstacles (18% of absences), including transportation, childcare, and other family-related reasons. The lack of information about the reasons why children are absent in rural classrooms is a limitation of the current study. We were unable to include contextual factors, such as distance to school and availability of reliable transportation, that may influence rural parents' abilities to regularly take their children to school. Though children in urban and rural areas are likely to face a common set of barriers to school attendance, families living in rural areas may encounter additional challenges related to picking up and dropping children off on at school. For example, the nonstandard work hours for many parents and the lack of public transportation might it especially difficult for low-income children to regularly attend preschool (Vernon-Feagans et al., 2015). Additionally, the low educational attainment in rural areas could influence parents' beliefs about the importance of school attendance. Compared to parents in urban areas, parents in rural areas may have lower educational aspirations for their children lessening focus on their children's academic performance (Tine, 2017).

Recent efforts have been undertaken to reduce preschool absenteeism in urban areas. For example, Sommer et al. (2017) evaluated a low-cost intervention designed to increase parents' social capital and reduce children's absenteeism in urban Head Start centers. Children randomly assigned to the treatment group were placed in classrooms based on their neighborhood of residence. Parents were also provided the opportunity to form partnerships with other parents to facilitate children's regular school attendance. The intervention reduced the average distance between children's homes to enable parents to rely on each other to support attendance. Parents were also encouraged to communicate with their partners about their child's absences and invited to attend monthly center meetings designed to build connections with parents and center staff. The intervention did not impact children's overall attendance rates, but was associated with greater winter attendance, the time of year where attendance was lowest. Given the distinct challenges associated with living in rural areas, reducing absences in rural contexts may require a different approach. For instance, the lower population density in rural areas might make it infeasible to assign classrooms close to children's residences. Further, the distance between homes could make it difficult for parents to form partnerships to support their children's classroom attendance.

A qualitative study of four public schools in Washington D.C. with lower levels of preschool absenteeism uncovered several school factors associated with fewer absences (Katz, Johnson, & Adams, 2016). In each of the schools, family engagement was a priority. Staff worked to facilitate positive interactions with families in the beginning of the school year to develop a foundation for working with families to support children's attendance. Schools communicated clear attendance policies to establish expectations for attendance and regularly monitored absenteeism. Community partners and events were used to emphasis attendance throughout the year and help families get children regularly to school. Similar approaches may prove successful in rural areas. However, future qualitative work on preschool attendance is needed to explore the unique set of barriers to attendance families' encounter in rural areas. Parent surveys, along with interviews and attendance logs, will be helpful in understanding the circumstances that limit children's preschool attendance in Appalachian regions. This contextual information will aid in the development of effective attendance interventions.

In conclusion, our study suggests that chronic absenteeism is a problem in preschool classrooms located in rural areas, with 47.5% of the children in our sample missing 10% or more days in the school year. Children from families with the lowest incomes that were enrolled in classrooms with less educated teachers and with fewer than five days of instruction each week attended fewer days of school. The results of our study demonstrate that preschool absenteeism is associated with fewer literacy gains in Appalachian classrooms in rural areas. Chronic absenteeism is especially detrimental to children's literacy growth. Similar to the nationally representative study of Head Start classrooms, we find no effect of absenteeism on children's language skills (Ansari & Purtell, 2017). The results of our study support the finding that impact of absenteeism varies across skill domain. The detrimental effects of absenteeism on children's literacy skill necessitate future intervention work to support children's regular school attendance in preschool classrooms in the rural areas of Appalachia.

## References


Ansari, A., & Purtell, K. M. (2017). Absenteeism in Head Start and Children's Academic Learning. *Child Development*. https://doi.org/10.1111/cdev.12800.

Attridge, J. (2016). *Chronic Absenteeism in Tennessee's Early Grades.* Nashville, TN: Tennessee Department of Education.

Bierman, K. L., Domitrovich, C. E., Nix, R. L., Gest, S. D., Welsh, J. A., Greenberg, M. T., ... Gill, S. (2008). Promoting academic and social-emotional school readiness: The head start REDI program. *Child Development, 79*, 1802–1817. https://doi.org/10.1111/j.1467-8624.2008.01227.x.

van Buuren (2007). Multiple imputation of discrete and continuous data by fully conditional specification. *Statistical Methods in Medical Research, 16*, 219–242.

Chang, H. N., & Romero, M. (2008). *Present, engaged, and accounted for: The critical importance of addressing chronic absence in the early grades.* New York, NY: National Center for Children in Poverty.

Connolly, F., & Olson, L. S. (2012). *Early elementary school performance and attendance in Baltimore City Schools' pre-kindergarten and kindergarten.* Baltimore, MD: Baltimore Education Research Consortium.

Dubay, N., & Holla, N. (2016). *Does attendance in early education predict attendance in elementary school? An analysis of DCPS's early education program.* Washington, DC: Urban Institute.

Duncan, G. J., Dowsett, C. J., Claessens, A., Magnuson, K., Huston, A. C., Klebanov, P., ... Sexton, H. (2007). School readiness and later achievement. *Developmental Psychology, 43*, 1428–1446. https://doi.org/10.1037/0012-1649.43.6.1428.

Ehrlich, S. B., Gwynne, J. A., Pareja, A. S., & Allensworth, E. M. (2014). *Preschool attendance in Chicago public schools: Relationships with learning outcomes and reasons for absences.* Chicago, IL: University of Chicago Consortium on Chicago School Research.

Gelman, A., & Hill, J. (2007). Data analysis using regression and multilevel/hierarchical models. *New York, NY*. Cambridge University: Press.

Gottfried, M. A. (2014). Chronic absenteeism and its effects on students' academic and socioemotional outcomes. *Journal of Education for Students Placed at Risk, 19*, 53–75. https://doi.org/10.1080/10824669.2014.962696.

Gottfried, M. A. (2015). Chronic absenteeism in the classroom context: Effects on achievement. *Urban Education,* 1–32. https://doi.org/10.1177/0042085915618709.

von Hippel, P. T. (2007). Regression with missing Ys: An improved strategy for analyzing multiply imputed data. *Sociological Methodology, 37*, 83–117. https://doi.org/10.1111/j.1467-9531.2007.00180.x.

Hubbs-Tait, L., Culp, A. M., Huey, E., Culp, R., Starost, H. J., & Hare, C. (2002). Relation of head start attendance to children's cognitive and social outcomes: Moderation by family risk. *Early Childhood Research Quarterly, 17*, 539–558. https://doi.org/10.1016/S0885-2006(02)00189-8.

Invernizzi, M., Meier, J., & Sullivan, A. (2001). *Phonological awareness literacy screening.* Charlottesville: University of Virginia.

Justice, L. M., Jiang, H., Khan, K. S., & Dynia, J. M. (2017). Kindergarten readiness profiles of rural, Appalachian children from low-income households. *Journal of Applied Developmental Psychology, 50*, 1–14. https://doi.org/10.1016/j.appdev.2017.02.004.

Katz, M., Johnson, M., & Adams, G. (2016). Improving prekindergarten attendance. Washington, D.C.: Urban Institute.

Loeb, S., Fuller, B., Kagan, S. L., & Carrol, B. (2004). Child care in poor communities. *Child Development, 75*, 47–65. https://doi.org/10.1111/j.1467-8624.2004.00653.x.

Logan, J. A., Piasta, S. B., Justice, L. M., Schatschneider, C., & Petrill, S. (2011). Children's attendance rates and quality of teacher-child interactions in at-risk preschool classrooms: Contribution to children's expressive language growth. Child & Youth Care Forum, 40, 457–477. doi:https://doi.org/10.1007/s10566-011-9142-x

Magnuson, K. A., Ruhm, C., & Waldfogel, J. (2007). The persistence of preschool effects: Do subsequent classroom experiences matter? *Early Childhood Research Quarterly, 22*, 18–38. https://doi.org/10.1016/j.ecresq.2006.10.002.

McDonald, N. C. (2007). Active transportation to school: trends among US schoolchildren, 1969–2001. *American Journal of Preventive Medicine, 32*, 509–516. https://doi.org/10.1016/j.amepre.2007.02.022.

Pianta, R. C., La Paro, K. M., & Hamre, B. K. (2008). *Classroom Assessment Scoring System (CLASS).* Baltimore, MD: Paul H. Brookes.

Pollard, K., & Jacobsen, L. A. (2012). *The Appalachian region: A data overview from the 2006–2010 American community survey: Chartbook.* Washington, DC: Appalachian Regional Commission.

Pollard, K., & Jacobsen, L. A. (2017). *The Appalachian region: A data overview from the 2011–2015 American community survey: Chartbook.* Washington, DC: Appalachian Regional Commission.

Romero, M., & Lee, Y. S. (2007). *A national portrait of chronic absenteeism in the early grades.* New York, NY: National Center for Children in Poverty.

Schoeneberger, J. A. (2012). Longitudinal attendance patterns: Developing high school

dropouts. *The Clearing House: A Journal of Educational Strategies, Issues and Ideas, 85*, 7–14. https://doi.org/10.1080/00098655.2011.603766.

Sommer, T. E., Sabol, T. J., Chase-Lansdale, P. L., Small, M., Wilde, H., Brown, S., & Huang, Z. Y. (2017). Promoting parents' social capital to increase children's attendance in Head Start: Evidence from an experimental intervention. *Journal of Research on Educational Effectiveness*. https://doi.org/10.1080/19345747.2016.1258099.

Strange, M., Johnson, J., Showalter, D., & Klein, R. (2012). *Why rural matters 2011–12: The condition of rural education in the 50 states. A report of the rural school and community trust policy program.* Rural School and Community Trust.

Tine, M. (2017). Growing up in rural vs. urban poverty: Contextual, academic, and cognitive differences. In G. I. Staicu (Ed.). *Poverty, Inequality and Policy* (pp. 9–22). Rijeka, Croatia: InTech.

USDA Economic Research Service (2012). *Rural education.* Washington, DC: ERS. Retrieved from: http://www.ers.usda.gov/topics/rural-economy-population/employment-education/ruraleducation.aspx.

Vernon-Feagans, L., Burchinal, M., & Mokrova, I. (2015). Diverging destinies in rural America: Families in an era of increasing inequality. *Springer,* 35–49.

Wiig, E. H., Secord, W., & Semel, E. M. (2004). *CELF Preschool 2: Clinical Evaluation of Language Fundamentals Preschool.* Pearson/PsychCorp.Young.