

**HOW CHILDREN'S CURIOSITY PREDICTS SCHOOL READINESS:
EXAMINING MODERATION BY SOCIOECONOMIC STATUS AND
PARENTING**

An Undergraduate Research Scholars Thesis

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This project required approval from the Texas A&M University Research Compliance & Biosafety office.

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TABLE OF CONTENTS

	Page
ABSTRACT	1
ACKNOWLEDGEMENTS.....	3
NOMENCLATURE	4
SECTIONS	
INTRODUCTION	5
Literature Review	5
Current Study.....	7
1. METHODS	9
1.1 Participants	9
1.2 Measures.....	10
2. RESULTS	13
2.1 SES	13
2.2 Parenting.....	14
3. DISCUSSION.....	16
3.1 SES	16
3.2 Parenting.....	17
3.3 Limitations.....	17
CONCLUSION.....	19
REFERENCES	20

ABSTRACT

How Children's Curiosity Predicts School Readiness: Examining Moderation by Socioeconomic Status and Parenting

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Curiosity is a natural way to gather more information about the world, making it directly relevant for learning. However, little research has examined the relation between children's curiosity and formal learning. Moreover, even less work has considered this possible association in light of the environmental factors that comprise children's earliest opportunities for investigating and learning. Understanding the nature of this association is important because a better understanding of how to increase curiosity levels in children, if related to children's early academic outcomes, could lead to an efficient and economical way to increase school readiness.

Recognizing the likely importance of curiosity for child outcomes, one goal of this study was to determine whether parents' curiosity-fostering behaviors moderate the connection between curiosity and school-readiness in children. This study examined how parents encourage their children to have more curiosity, as well as how parents respond when their children ask curious questions during normative, everyday interactions. We tested whether greater curiosity in children is related to greater school readiness and whether this association is dependent on

parents' behaviors. Moreover, we tested whether this association is greater for children in low-SES families.

The final sample for this work consisted of 61 children who provided data as part of a longitudinal study between 3 and 5 years of age. When children were 3 years old, family SES was self-reported by parents, and children's curiosity and parents' behaviors were observed during a laboratory episode where children were allowed to investigate a set of novel toys. Behavioral curiosity was defined as exploratory behavior and the number of objects children manipulated; vocal curiosity was defined as the number of questions they asked that demonstrated curiosity. When children were 5 years old, school readiness was assessed via parent report.

Results showed that increased behavioral curiosity predicted decreased school readiness ($\beta = -0.37$, $SE = 0.14$, $p = 0.009$) when accounting for SES. This suggests that, when levels of SES are controlled, greater exploratory behavior and manipulation of novel objects may be just as likely to indicate an absence of knowledge or experience as the presence of curiosity. Consistent with previous work, high levels of SES predicted greater school readiness ($\beta = 0.42$, $SE = 0.14$, $p = 0.002$) when behavioral curiosity was accounted for. Vocal curiosity did not predict school readiness, and neither parent behavior moderated the association between curiosity and school readiness. Thus, this study demonstrated how strong of a predictor SES is for school readiness and that the lack of knowledge or experience may have an important role in predicting school readiness.

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I completed all other work for this thesis independently.

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NOMENCLATURE

SES Socioeconomic status

INTRODUCTION

Literature Review

Curiosity

In the past couple of decades, noncognitive abilities such as grit, self-control, and curiosity have been positively linked with children's success in schools (Tough, 2012). However, relative to other noncognitive abilities, the degree to which curiosity might prepare children to successfully complete more traditionally "cognitive" tasks has not been thoroughly examined. This is unfortunate given that curiosity is likely an integral part of motivation (Kashdan et al., 2004; Kidd & Hayden, 2015), and motivation is an important aspect of academic achievement (Amrai et al., 2011). Curiosity has specifically been linked with intrinsic motivation (Halamish et al., 2019; Ryan & Deci, 2000). Curiosity is also positively associated with greater long-term retention in undergraduate students (Halamish et al., 2019).

Previous work has demonstrated that there is a link between cognitive growth and curiosity (Alberti & Witryol, 1994) and that such an association is pronounced in underprivileged children (Minuchin, 1971). It follows that curiosity in kindergarten students is positively related to academic achievement, specifically in reading and math skills (Shah et al., 2018). In one study with nationally representative sample of 6200 children, Shah and colleagues (2018) assessed the relation between children's curiosity and academic achievement. They examined the moderation of effortful control (i.e., focused attention), sex, and socioeconomic status (SES). They found that neither effortful control nor sex moderated the link between children's curiosity and academic achievement. However, SES was a moderator, and curiosity

benefited children from low SES families the most. Despite this important finding, little research exists on how children's curiosity early in life predicts school readiness.

Parenting

Given that parents are the primary figures of a child's environment prior to formal school entry and also the scaffold for early childhood behavior (Kopp, 1989), it is likely that parenting behaviors for pre-school-aged children have a direct effect on fostering or dampening of children's curiosity. Indeed, children's curiosity has been positively correlated with parental encouragement of curiosity (Endsley et al., 1979) and parental demonstration of curiosity (Saxe & Stollak, 1971). Thus, parents' behaviors likely influence their children on how much they should or should not value curiosity. Furthermore, curiosity is likely important because it leads children to explore and ask questions, which in turn helps them gain more information. If their parents encourage curiosity and give comprehensive answers to their questions, children seemingly have more opportunities to expand their skillset for academic success.

Family Socioeconomic Status

Developmental theory is rooted in the construct that a child's early environment has a strong and lasting impact on nearly every developmental system (Bronfenbrenner & Morris, 2006). Particularly, SES, which typically includes measures of income, education, and/or occupation (White, 1982), seems to be an important factor in a child's early environment. Numerous studies have found SES disparities in early education and later outcomes (for a review, see Bradley & Corwyn, 2002). This includes differences in vocabulary at age 3 (Hart & Risley, 2003) and math abilities prior to kindergarten (Nores & Barnett, 2014). Other influences, such as parents' beliefs, may moderate the association between SES and children's academic

achievement (Elliot & Bachman, 2018). Identifying why such learning differences exist among children with low SES is important to helping children succeed academically.

Moreover, children's traits, such as curiosity, may be changeable factors of children's success. As discussed earlier, the positive association between curiosity and academic achievement is strongest for children from low socioeconomic backgrounds (Shah et al., 2018). Shah and colleagues discuss that children with low family SES may benefit more from curiosity because they do not have the advantages children with high family SES have (e.g., parents who have completed a high level of education). Thus, improving curiosity and motivation may positively influence children's academic achievement and school readiness, particularly for children living in low SES households.

Though this work has yet to be replicated, such findings indicate that enriching curiosity could reduce the socioeconomic achievement gap, which is the disparity in academic achievement between children from families with high SES and low SES (Chmielewski, 2019). That is, if curiosity does boost academic achievement, and parent behaviors can increase curiosity and thus achievement, then parents may be able to help their children be more successful in schools without spending money or needing an advanced education. However, to our knowledge, no additional research has examined the moderation of SES on the relation between curiosity and school readiness.

Current Study

To address the gaps in the current literature regarding the nature of the association between curiosity and school readiness, the present study examined children's curiosity at age 3 as a predictor of academic readiness for entry to formal schooling at age 5. Furthermore, family socioeconomic status (SES) and parental behaviors (i.e., parental encouragement of curiosity and

the thoroughness of their responses to children's questions) were tested as environment-based moderators of the association between early curiosity and school readiness. This study had three hypotheses. First, we predicted that curiosity and school readiness would be positively correlated. Second, family SES was predicted to moderate the association between curiosity and school readiness, such that children from families with low SES would benefit more from curiosity than children from families with high SES. Third, we hypothesized that parent behaviors would moderate the association between curiosity and school readiness, such that children with parents that gave more thorough responses to their questions and encouraged their curiosity would have a higher level of school readiness.

1. METHODS

1.1 Participants

As part of a larger study, children ($N = 121$, 59% female) came to the laboratory three times between Spring 2014 and Winter 2017. Children were screened for developmental disorders, and all participants were typically developing across both waves of data collection. Participants were recruited through flyers posted at local offices, media advertisements, mailings based on local birth records, in-person recruitment at local events, and word-of-mouth. The initial visit occurred when children were 3.5 years old ($n = 108$; $M_{\text{age}} = 3.59$, $SD = 0.15$), the second visit was when children were 4.5 ($n = 98$; $M_{\text{age}} = 4.57$, $SD = 0.15$), and the final visit was when children were 5.5 ($n = 91$; $M_{\text{age}} = 5.52$, $SD = 0.12$). Between the age 3.5 and 4.5 visits, 90.7% of the sample was retained. Between the age 4.5 and 5.5 visits, 92.9% of the sample was retained.

The range of mother ages was 19.75 to 45.85 years ($M_{\text{age}} = 34.53$) at the age 3 visit, and the fathers' ages ranged from 24.28 to 54.43 ($M_{\text{age}} = 36.14$). The majority of mothers identified as White (95.6%) and Non-Hispanic (98.2%), similarly to fathers who identified as white (94.8%) and Non-Hispanic (95.7%). Few mothers identified as Asian (1.8%), American Indian or Alaska Native (1.8%), or biracial as American Indian/Alaska Native and White (0.9%). Similarly, few fathers identified as Asian (2.1%), or biracial as American Indian/Alaska Native and White (3.1%).

The full range of possible values for parents' gross annual incomes were represented, and couple reports were composited. Of those who chose to report annual income, 1.7% reported an income of less than \$15,000, 4.3% reported \$15,001-\$20,000, 7.0% reported \$20,001-\$30,000,

5.2% reported \$30,001-\$40,000, 10.4% reported \$40,001-\$50,000, 17.4% reported \$50,001-\$60,000, 9.6% reported \$60,001-\$70,000, 8.7% reported \$70,001-\$80,000, 9.6% reported \$80,001-\$90,000, and 26.1% reported \$90,001 or more. Twenty-six families reported different income brackets from ages 3 to 4, and twenty-five families reported different income brackets from ages 4 to 5.

Questionnaire packets were sent to each parent two weeks prior to each laboratory visit, and parents returned these packets during the visit. The packets included questions on income, education, mental health, parenting, and child behaviors.

1.2 Measures

1.2.1 Family Socioeconomic Status

When participants were 3 years old, family SES was calculated using the Hollingshead Four Factor Index of Social Status (Hollingshead, 1975). Parents were sent the questionnaire two weeks prior to the laboratory visit. Education level was reported on a 7-point scale, ranging from completing formal education at or before the 7th grade (1) to receiving a graduate/professional degree (7). Occupation level was reported on a nine-point scale, which was based occupation title and responsibilities. Consistent with instrument scoring instructions, education and occupation levels were weighted and summed for each parent. Parent scores were then mean composited to determine family SES.

1.2.2 Curiosity and Parent Behavior

Children's curiosity and parents' behaviors were observed in the laboratory when children were 3 years old. Each child came to the lab accompanied by their primary caregiver and, as part of their visit, participated in a Risk Room episode designed to measure children's reactions to novel contexts developed by Kagan and colleagues (1989).

The child and their caregiver were led to an experimental room that contained six novel objects: a mini trampoline, wooden steps, a balance beam, a tunnel, a box decorated to look like a monster, and a gorilla mask. As an incidental part of room setup, there was also a door stopper and protective foam on the walls surrounding the trampoline; because some children demonstrated curiosity about these objects, they were included in the coding as novel objects.

Children were told by an experimenter that they could play in the room "however you'd like." Parents were instructed to avoid directing their child's behavior, though they could answer their child's questions. Parents and children were left alone in the experimental room for approximately 3.5 minutes. Child and parent behaviors during this period were unobtrusively video recorded from behind a room divider with a one-way mirror for offline coding. At the end of 3.5 minutes, the experimenter returned to the room and ended the free-play period.

Different aspects of curiosity were coded based on the original Risk Room coding developed by Kagan and colleagues (1989) and an adaptation of the coding scheme for exploratory behavior developed by Van Schijndel and colleagues (2010). Behavioral curiosity was defined as the intensity of exploratory behavior and the number of objects that children manipulated during the free play period. The intensity of children's exploratory behavior was assigned a global rating using a five-point scale, ranging from the child not engaging with any of the objects (0) to the child attentively manipulating at least one object with variation to their actions (4). Vocal curiosity was scored as the total number of explanatory-seeking questions (e.g., "How?" and "Why?") and fact-seeking questions (e.g., "What's that?") that children asked, which was based on the description of types of questions by Chouinard and colleagues (2007).

Two aspects of parent behavior were also coded. The quality of parents' responses to questions across the episode was assigned a global rating on a four-point scale, ranging from not

typically responding (1) to answering with information and elaboration (4). Parental encouragement of curiosity was similarly coded on a four-point scale, ranging from parents not exhibiting any curiosity-orienting behavior (0) to parents consistently encouraging their children to explore (3). Parents were considered to be encouraging curiosity when they encouraged their children to try playing with new objects, asked their children about the objects (e.g. “What is that?”), exhibited exploratory behavior themselves, etc. Finally, parent interference of children’s curiosity was noted. Examples of parent interference include the parent separating their child from an object, telling them to stop asking so many questions, or influencing them to stop exploring the room.

1.2.3 *School Readiness*

To evaluate school readiness, parents completed the School Experiences section of the MacArthur Health and Behavior Questionnaire (Essex et al., 2002) when their children were 5 years old. Parents were instructed to only complete this section if their child was in kindergarten or a higher grade level. Given that the questions of this work are centered around school readiness, we focused on the academic competence subscale. This subscale consisted of eight questions that asked parents to rate, on a 1 (much worse than other children / not good at all) to 7 (much better than other children / very good) scale, their child’s math and reading abilities (e.g., “*In comparison to other children, how would you evaluate your child’s performance in math?*” or “*How good is your child in math?*”). Two questions were reverse-coded. Parent ratings were significantly correlated ($r = 0.74, p < 0.001$) and both maternal internal consistencies (mean $\alpha = 0.89$) and paternal internal consistencies (mean $\alpha = 0.87$) were acceptable. Thus, maternal and paternal ratings were mean composited, with higher scores reflecting greater academic competence at age 5.

2. RESULTS

2.1 SES

To test the first two study hypotheses, we used multivariate regression models that predicted age 5 school readiness from curiosity (behavioral or vocal), the putative moderator (family SES), and the interaction between the curiosity and moderator. Full-information maximum likelihood imputation was used to account for missing data. Thus, the final analytic sample consisted of sixty-one participants.

First, we tested family SES as a moderator of the association between age 3 curiosity and age 5 school readiness. In the model that included behavioral curiosity, regression models were used since behavioral curiosity was a continuous variable. We found that greater behavioral curiosity predicted lower levels of school readiness ($\beta = -0.37$, $SE = 0.14$, $p = 0.009$; Figure 2.1).

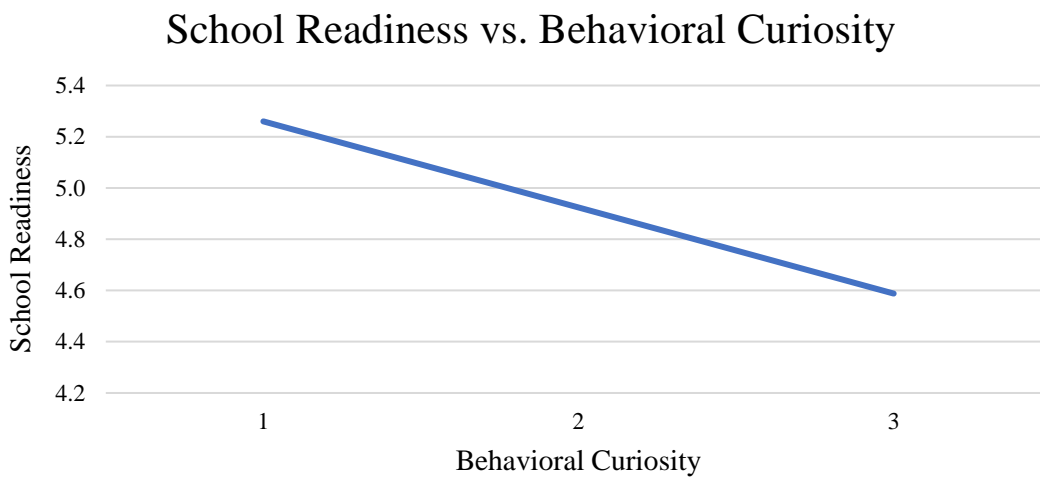


Figure 2.1: Behavioral curiosity at age 3 predicts decreased school readiness at age 5

We also found that higher SES predicted greater school readiness ($\beta = 0.42$, $SE = 0.14$, $p = 0.002$; Figure 2.2). However, contrary to study hypotheses, SES did not moderate the association between behavioral curiosity and school readiness ($\beta = -0.13$, $SE = 0.142$, $p = 0.366$).

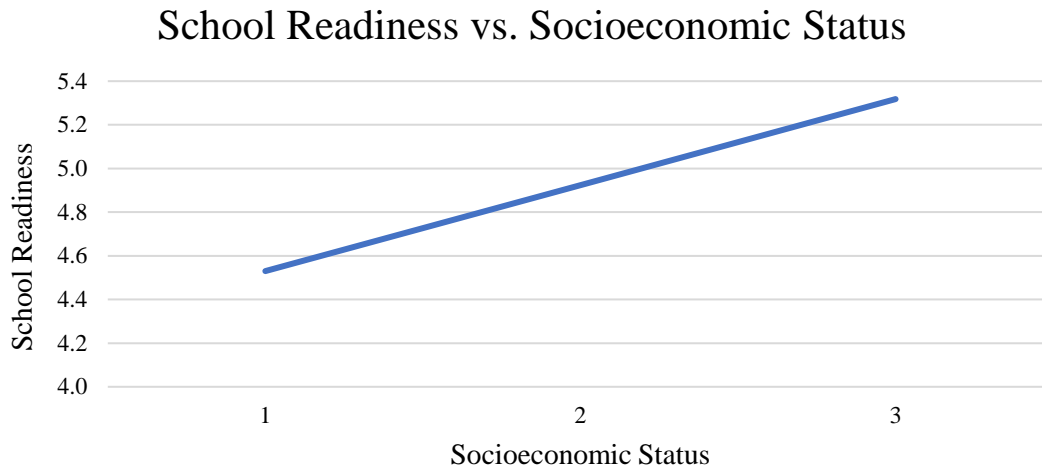


Figure 2.2: Socioeconomic status at age 3 predicts school readiness at age 5

In the model that included vocal curiosity, curiosity was unrelated to school readiness ($\beta = 0.11$, $SE = 0.16$, $p = 0.517$). In addition, school readiness was not predicted by SES ($\beta = 0.40$, $SE = 0.22$, $p = 0.074$) nor by the interaction between vocal curiosity and SES ($\beta = -0.14$, $SE = 0.24$, $p = 0.566$).

2.2 Parenting

Next, parent responses to children's curiosity were tested as moderators of the association between age 3 vocal curiosity and age 5 school readiness using a univariate ANOVA. There was not a difference in school readiness for children whose parents typically did not respond ($M = 5.82$, $SD = 0.59$), responded incompletely ($M = 4.89$, $SD = 0.22$), answered their questions ($M = 4.90$, $SD = 0.25$), or answered with information and elaboration ($M = 5.33$, $SD = 0.49$). Thus, parent responses did not predict school readiness ($F(3, 12) = 0.92$, $p = 0.462$), nor did parent

responses moderate the association between vocal curiosity and school readiness ($F(4, 12) = 1.36, p = 0.305$).

Finally, the degree to which parents encouraged curiosity was tested as a moderator of the relation between age 3 behavioral curiosity and age 5 school readiness using a univariate ANOVA. There was not a difference in school readiness levels for children with parents who did not encourage curiosity ($M = 5.21, SD = 0.25$), encouraged curiosity once or twice ($M = 4.81, SD = 0.25$), often encouraged curiosity ($M = 4.79, SD = 0.36$), or consistently encouraged curiosity ($M = 5.44, SD = 0.56$). To summarize, parental encouragement of curiosity did not predict school readiness ($F(3, 13) = 0.92, p = 0.457$), nor did parental encouragement of curiosity moderate the association between behavioral curiosity and school readiness ($F(5, 13) = 0.87, p = 0.526$).

3. DISCUSSION

We did not find support for the primary hypotheses of this study. Rather, we found a negative association between behavioral curiosity and school readiness and a positive association between family SES and school readiness. Although neither of these findings were included in our hypotheses, some important implications can be taken from them.

3.1 SES

First, this study showed just how strong of a predictor SES is for school readiness, as shown in Figure 2.2. Seemingly because SES is such a robust measure, SES did not moderate the relation between behavioral curiosity and school readiness in this study. There is a substantial amount of literature showing SES disparities in early learning (for a review, see Bradley & Corwyn, 2002), including disparities in early vocabulary (Hart & Risley, 2003) and math ability (Nores & Barnett, 2014). Future research should continue to investigate the relation between SES and school readiness, aimed at creating effective methods to reduce the socioeconomic achievement gap.

This study also found a negative association between behavioral curiosity and school readiness, as shown in Figure 2.1. This could be because heightened children's behavioral curiosity demonstrates a gap in knowledge (Loewenstein, 1994). Behavioral curiosity may also demonstrate a gap in experience and thus, a lack in opportunities for learning experiences. This would also explain why behavioral curiosity was a significant predictor only when accounting for SES. Children with low family SES may not have as many opportunities for learning experiences because parents may not have the time, information, or resources needed to provide these experiences (Hawley, 2000). For example, children with low family SES are less likely to

have learning opportunities such as going on trips or visiting places such as libraries, museums, or theatres (Bradley & Corwyn, 2002). In addition, families with low SES generally have less stimulating home environments, such as not owning many toys intended for learning (Brooks-Gunn et al., 1995). Thus, behavioral curiosity may demonstrate a lack of knowledge and experience, which would explain the negative association between behavioral curiosity and school readiness. Moreover, the negative association was only significant when accounting for SES, which could be due to children with low family SES having fewer learning opportunities. Future research should examine the relation between learning experiences and school readiness, and whether curiosity or SES are moderators.

3.2 Parenting

The findings indicate that parental encouragement of curiosity predict school readiness nor moderate the association between behavioral curiosity and school readiness. Similarly, the findings indicate that vocal curiosity did not predict school readiness, even when including parent responses as a moderator. This could be due to one of the limitations in the study – as data was not initially intended to examine parent behaviors, parents were asked to not direct their children’s behavior. Consequently, parents who usually would encourage their children to be curious may have refrained during this episode, limiting the range of parent behaviors observed in the study.

3.3 Limitations

As mentioned above, there were some limitations to this study. Data was initially intended to evaluate behavioral inhibition and anxiety. Upon further reflection, we realized that this data was well-suited for this study. However, because the data was not initially intended for this project, the sample was relatively small and there were missing data in our dataset.

There were also some limitations regarding the measures. For example, the objects in the laboratory may not all have been novel to every participant, because it would not be feasible for parents to know every object their child had seen or interacted with, given that a child could see these objects at a friend's house, in preschool, or online. Also, vocal curiosity and behavioral curiosity were statistically different concepts, though we initially intended to examine curiosity overall. The difference was likely due to the small amount of time children had during the episode; it seemed they had time either to explore or to ask questions. That is, when children asked questions, they would stop exploring to look at their parent and talk. When children asked several questions, they would not have much time to explore.

Another limitation regarding the measures was that school readiness was only accessed via parent report because that is what suited the needs of the initial study. Although parent report may be an accurate representation of children's school readiness, an even more robust measure would include direct measures of children's academic ability. Furthermore, the parent's questionnaire only asked about children's math and reading competence, so exploratory behavior may benefit children in a different academic domain, such as science. This aligns with one study that found scientific achievement is correlated with curiosity in 4th grade students (Mourad & Hadi, 2006). Having a direct measure of academic competence that includes other subjects can allow for a greater understanding of the association between curiosity and school readiness.

CONCLUSION

Ultimately, this research highlighted how strong of a predictor SES is for school readiness. The findings also showed that curiosity is an important factor in school readiness, as demonstrated by the negative association between children's behavioral curiosity and school readiness when accounting for SES. Because the association is negative, it seems that behavioral curiosity is demonstrating a gap in knowledge or a lack of learning opportunities for children. Future research could examine the impact of children's learning experiences on school readiness, as well as whether children with low family SES have fewer learning opportunities. Additionally, the association between curiosity and different domains of academic achievement (e.g., science ability) should be further examined.

REFERENCES

- Alberti, E. T., & Witryol, S. L. (1994). The relationship between curiosity and cognitive ability in third- and fifth-grade children. *The Journal of Genetic Psychology, 155*(2), 129-145. <https://doi.org/10.1080/00221325.1994.9914767>.
- Amrai, K., Motlagh, S. E., Zalani, H. A., & Parhon, H. (2011). The relationship between academic motivation and academic achievement students. *Procedia Social and Behavioral Sciences, 15*, 399-402. <https://doi.org/10.1016/j.sbspro.2011.03.111>.
- Bradley, R. H., & Corwyn, R. F. (2002). Socioeconomic status and child development. *Annual Review of Psychology, 53*(1), 371-399. <https://doi.org/10.1146/annurev.psych.53.100901.135233>.
- Bronfenbrenner, U., & Morris, P. A. (2006). *The Bioecological Model of Human Development*. In R. M. Lerner & W. Damon (Eds.), *Handbook of child psychology: Theoretical models of human development* (p. 793–828). John Wiley & Sons Inc.
- Brooks-Gunn, J., Klebanov, P. K., & Liaw, F. (1995). The learning, physical, and emotional environment of the home in the context of poverty: The infant health and development program. *Children and Youth Services Review, 17*(1-2), 251-276. [https://doi.org/10.1016/0190-7409\(95\)00011-Z](https://doi.org/10.1016/0190-7409(95)00011-Z).
- Chmielewski, A. K. (2019). The global increase in the socioeconomic achievement gap, 1964 to 2015. *American Sociological Review, 84*(3), 517–544. <https://doi.org/10.1177%2F0003122419847165>.
- Chouinard, M. M., Harris, P. L., & Maratos, M. P. (2007). Children's questions: A mechanism for cognitive development. *Monographs of the Society for Research in Child Development, 72*(1), 1-129. <https://doi.org/10.1111/j.1540-5834.2007.00412.x>.
- Elliot, L., & Bachman, H. J. (2018). SES disparities in early math abilities: The contributions of parents' math cognitions, practices to support math, and math talk. *Developmental Review, 49*, 1-15. <https://doi.org/10.1016/j.dr.2018.08.001>.
- Endsley, R. C., Hutcherson, M. A., Garner, A. P., & Martin, M. J. (1979). Interrelationships among selected maternal behaviors, authoritarianism, and preschool children's verbal and nonverbal curiosity. *Child Development, 50*(2), 331-339. <https://doi.org/10.2307/1129407>.

- Essex, M. J., Boyce, T., Goldstein, L. H., Armstrong, J. M., Kraemer, H. C., Kupfer, D. J., & The MacArthur Assessment Battery Working Group. (2002). The confluence of mental, physical, social, and academic difficulties in middle childhood. II: Developing the MacArthur health and behavior questionnaire. *Journal of the American Academy of Child & Adolescent Psychiatry, 41*(5), 588–603. <https://doi.org/10.1097/00004583-200205000-00017>.
- Halamish, V., Madmon, I., & Moed, A. (2019). Motivation to learn: The long-term mnemonic benefit of curiosity in intentional learning. *Experimental Psychology, 66*(5), 319-330. <https://doi.org/10.1027/1618-3169/a000455>.
- Hart, B., & Risley, T. R. (2003). The early catastrophe. *Education Review, 17*(1) 110-118. Retrieved from http://explore.bl.uk/primo_library/libweb/action/display.do?tabs=detailsTab&gathStatTab=true&ct=display&fn=search&doc=ETOCRN142335813&indx=1&recIds=ETOCRN142335813.
- Hawley, T. (2000). *Starting smart: How early experiences affect brain development*. Chicago, IL: Ounce of Prevention Fund; Washington, DC: Zero to Three.
- Hollingshead, A. B. (1975). Four factor index of social status. Unpublished manuscript. Retrieved from https://sociology.yale.edu/sites/default/files/files/yjs_fall_2011.pdf#page=21.
- Kagan, J., Reznick, J. S., Gibbons, J. (1989). Inhibited and uninhibited types of children. *Child Development, 60*(4), 838-845. <https://doi.org/10.2307/1131025>.
- Kashdan, T. B., Rose, P., & Fincham, F. D. (2004). Curiosity and exploration: Facilitating positive subjective experiences and personal growth opportunities. *Journal of Personality Assessment, 82*(3), 291-305. http://dx.doi.org/10.1207/s15327752jpa8203_05.
- Kidd, C., & Hayden, B. Y. (2015). The psychology and neuroscience of curiosity. *Neuron Perspective, 88*, 449-460. <http://dx.doi.org/10.1016/j.neuron.2015.09.010>.
- Kopp, C. B. (1989). Regulation of distress and negative emotions: A developmental view. *Developmental Psychology, 25*(3), 343-354. <https://doi.org/10.1037/0012-1649.25.3.343>.
- Loewenstein, G. (1994). The psychology of curiosity: A review and reinterpretation. *Psychological Bulletin, 116*(1), 75-98. <https://doi.org/10.1037/0033-2909.116.1.75>.

- Minuchin, P. (1971). Correlates of curiosity and exploratory behavior in preschool disadvantaged children. *Child Development, 42*(3), 939-950. <https://www.jstor.org/stable/1127460>.
- Mourad, S., & Hadi, F. (2006). The effect of directed inquiry in developing curiosity, creative abilities, and science achievement on 4th grade elementary school students in Kuwait. [Abstract]. *Journal of the Social Sciences, 34*(2), 125.
- Nores, M., & Barnett, W. S. (2014). *Access to High Quality Early Care and Education: Readiness and Opportunity Gaps in America. CEELo Policy Report*. New Brunswick, NJ: Center on Enhancing Early Learning Outcomes. Retrieved from http://www.ceelo.org/wp-content/uploads/2014/05/ceelo_policy_report_access_quality_ece.pdf.
- Ryan, R. M., & Deci, E. L. (2000). Intrinsic and extrinsic motivations: Classic definitions and new directions. *Contemporary Educational Psychology, 25*, 54-67. <https://doi.org/10.1006/ceps.1999.1020>.
- Saxe, R. M., & Stollak, G. E. (1971). Curiosity and the parent-child relationship. *Child Development, 42*(2), 373-384. <https://doi.org/10.2307/1127473>.
- Shah, P. E., Weeks, H. M., Richards, B., & Kaciroti, N. (2018). Early childhood curiosity and kindergarten reading and math academic achievement. *Pediatric Research, 84*, 380-386. <https://doi.org/10.1038/s41390-018-0039-3>.
- Tough, P. (2012). *How children succeed: Grit, curiosity, and the hidden power of character*. Houghton Mifflin Harcourt.
- Van Schijndel, T. J. P., Franse, R. K., & Raijmakers, M. J. (2010). The exploratory behavior scale: Assessing young visitors' hands-on behavior in science museums. *Science Learning in Everyday Life, 94*(5), 794-809. <https://doi.org/10.1002/sce.20394>.
- White, K. R. (1982). The relation between socioeconomic status and academic achievement. *Psychological Bulletin, 91*(3), 461-481. <https://doi.org/10.1037/0033-2909.91.3.461>.