Parental Involvement and Child's Behavior at School:

Time Spent with Child for Cultural Activities

Ellen Hsieh

University of Chicago

Abstract

Parental involvement is essential for child's social, cognitive development and it can divided into two parts: involvement at school and outside school. This study focuses on how parental involvement outside school, especially the time parent spent with child for outdoor cultural activities such as going to museum and galleries, influence child's behavior and school performance. In order to find out the relation between the time parent spent with child for cultural activities and child's behavior at school, we implemented an ordinary least square regression to analyze their relation. The way we choose our control variables is by conducting two feature selections. To find out top ten important features to be included in our regression model, we first selected 84 variables that are related to child's behavior and development by reviewing literatures. Those variables include child characteristics, parent and family characteristics and parental involvement. Then, we conducted another feature selection by using a tuned random forest regression model and obtained top ten important features: grade, second parent/guardian age, first parent/guardian age, times participated in school meetings, expectations for child future education, first parent/guardian hours worked per week, total income, second parent/guardian highest grade level completed, days eaten the evening meal together in the past week, second parent/guardian hours worked per week. From the result of regression analysis, we found that when parents spend more time with their child for cultural activities, child tends to behave better at school.

Introduction

Parents play an important roles in child's development. Izzo et al. (1999) suggested that better parental involvement may lead to a better school performance. Many previous studies focus on the relation between parental involvement and child's academic achievement (Fan & Chen, 2001; Lee & Brown, 2006; Jeynes, 2007). However, parental involvement also has a great impact on child's social, emotional cognitive and physical well-being. Hill et al. (2004) point out that parent academic involvement are associated with child's behavior problem, which influence might change according to different grades. Apart from academics involvement, parent-child leisure activities are crucial for child's behavior and development as well, which can not only create a stronger bonds between parents and child but also enhance social skills and life chances (Bianchi et al., 2006; Craig and Mullan, 2012). For example, out-of-home cultural activities such as going to museums and libraries can help socialized child cultural status and improve child's cognitive development (Gracia, 2015). The purpose of this study is to find out how the time that parents spent with their child for cultural activities would affect child's behavior at school.

To study the relation between parental time with child for cultural activities and child's behavior at school, we used the data provided by Parent and Family Involvement (PFI) in Education Survey of the National Household Education Surveys Program of 2016. First, we selected 84 variables that might influence child's behavior from literatures review as following. One important factor that may influence child development and behavior is parents' socioeconomic status. McLoyd (1998) contends that low socioeconomic status (SES) can negatively affect child socioemotional problems, and poor family income may influence child

cognitive development and school achievement. Furthermore, social status is associated with child behavioral problems. With limited resources, the parents in disadvantaged families tend to be less capable of maintaining a good parenting style to reduce their child disruptive behavior (Leijten, Raaijmakers, de Castro & Matthys, 2013), given that they have same opportunity to attain a good parent training program as other parents in advantaged families.

One of the components in SES is education level. Parents education level is a critical attribute in child behavior because it influences not only directly but also indirectly on child performance at school (Davis-Kean, 2005). The indirect impact in the literature refers to the influence on belief and behavior of parents. For example, the expectation towards child from parents would be more appropriate. Having a more accurate knowledge regarding to their child performance at school, parents can have better idea how to adjust their involvement and create a better educational environment for their child, thereby improving child school performance (Alexander, Entwisle & Bedinger, 1994). Even though higher-educated parents are busier with their work and usually have longer work hours, they tend to spend more time with their children (Sayer, Gauthier & Furstenberg, 2004; Guryan, Hurst & Kearney, 2008). This illustrates that high-educated parents values parenting time more and appreciate its value than low-educated parents. Based on high-educated parents' perspectives, it seems that quality time with child might also have positive effects on child.

Moreover, when we take a closer look to parents characteristic according to their socioeconomics status, race and ethnicity often come to a play. For instance, in the U.S. African American is more likely to have a lower socioeconomic status (McLoyd, 1998). Apart from

considering socioeconomic status and race, parents' marital status can also contribute to the outcome of child behavior at school. In prior studies, they identified that parents' divorce is strongly associated with children behavioral problem, either for biological or adopted children (Peterson & Zill, 1986; Amato, 2000; Amato & Cheadle, 2008). Moreover, divorce as a life event might cause maternal depression which might lead to an increase in child behavior problems (Fergusson, Horwood, Gretton & Shannon, 1985).

Another feature that may be associated with child behavior is family structure. In two-parent biological families, parents tend to spend more time on monitoring their children than stepmother or stepfather families (Fisher, Leve, O'Leary & Leve, 2003), which is believed that authoritative parenting has a positive association with children's behavioral outcome. The gap is especially significant when it compares two-parent biological families and stepfather families. Another research also points out that stepparents put more emphasis on their own marriage other than parenting (Lansford, Ceballo, Abbey & Stewart, 2004). Moreover, a good parent-child relationship can lead to less disruptive behavior (Peterson & Zill, 1986). This parent-child relationship is also influenced by the family structure. Adoptive families struggle more about the the relationship and tend to have a poorer relationship quality (Lansford, Ceballo, Abbey & Stewart, 2001).

Besides parents characteristics family structure, the degree of parent involvement in child development and education can yield different child behavior outcomes. El Nokali, Bachman & Votruba-Drzal (2010) find that high parent involvement can enhance child social skills and reduce behavioral problems. Parent involvement includes attending a teacher-parent meeting,

volunteering at school, and attending school events. Through interacting with teachers, parents can know better about their child performance at school. Furthermore, they can implement proper adjustment for their parenting style and help their child behave appropriately at school.

Teacher-parent communication can be one important factor when discussing parent involvement. However, an extremely high frequency of teacher-parent contact may lead to a worse child behavioral problems (Izzo, Weissberg, Kasprow & Fendrich, 1999). This is because Izzo et al. indicate that the reason for teachers to contact parents frequently is mostly due to child behavior problems. Overall, Izzo et al. contend that parental involvement over time and teacher-parent collaboration can enhance child school performance and social functioning.

Moreover, the quality and composition of a neighborhood can have noticeable impact on child and adolescent development (Brooks-Gunn, Duncan, Klebanov & Sealand, 1993; Attar, Guerra & Tolan, 1994; Brooks-Gunn, 1997; Beyers, Bates, Pettit & Dodge, 2003). A poor and unsafe neighborhood can harm child well-being. On the contrary, living in an affluent neighborhood implies better living and learning environment, most of the times also including better schools. The choice of school can also contribute to child development and behavior. First, the quality of teacher and teacher-child interaction can affect child behavior outcome (Birch & Ladd, 1997; Hamre & Pianta, 2001). Furthermore, as the child grow up, the influence of the peer at school also becomes more significant (Gaviria & Raphael, 2001).

Child physical and mental health should also considered as important factors in child behavior and development. Currie & Stabile (2006) indicate that child with mental or physical health problems might impede child education attainment. Another study also shows that child

with mental health problem or who is deaf express more anxiety and stress which may lead to behavioral problems (Van Eldik, Treffers, Veerman & Verhulst, 2004).

Therefore, according to the literatures, 84 variables selected are related to 1) child's basic information such as race, grade, native language, health condition, 2) parents' characteristics such as socioeconomic status, race, marital status, educational level, 3) family characteristics including family structure and neighborhood they lived, 4) parental involvement at school and outside school.

After selecting variables using literature review, we conducted another feature selection to obtain ten most important features out of those 84 variables, other than our variable of interest, as control variable in our analysis using a tuned random forest regression model. Then, we used an OLS model to analyze the relation between our independent variable of interest, time parents spent with child for cultural activities, and the dependent variable, child's behavior at school. It turned out that the time that parents spent with their child has a positive and significant effect on child's behavior. That is, when parents spend more time with their child for cultural activities, child's tends to behave better at school. In the next part, we will talk about our data and method, then the result, and conclusion as followed.

Method

Data

To measure how parent and family involvements, especially time spent with child for cultural activities, influence child's behavior school, the dependent and independent variables in this study are based on data from Parent and Family Involvement (PFI) in Education Survey of the National Household Education Surveys Program of 2016. This PFI survey file contains data regarding to 14,075 children age 20 or younger in kindergarten through 12th grade, including 13,523 students enrolled in public or private school and 552 homeschooled students. The data includes the characteristics of child, parent/guardian and household and other data including school choice, parent and family involvement at school, the child's behavior at school, grade retention, parents' satisfaction with the child's school, family's involvement in school work and activities outside of school, factors affecting family involvement. The survey is completed by the parents or knowledgable adults.

As for this study, we would only focus on the students enrolled in public or private school. Therefore, we conducted data preprocessing to obtain the specific data we need for this study. First, we excluded 552 homeschooled students from the dataset. Then, we kept only the students who has two guardians in the survey. In order to build a appropriate feature selection model, we first selected 84 predictors from 823 variables according to the literature reviews, which are related to child basic information such as race, grade, health condition, native language, school behavior, and parents and family characteristics including socioeconomic status, race, marital status, family structure, and parental involvement at school and outside

school. All binary variables are converted to 0 and 1. In addition, the missing values are imputed using the mean of given variable. The dependent variable is a combination of time contacted by teachers about good behavior and behavior problems as formula (1), which is the proportion of time contacted about good behavior over the total time contacted by teachers about child's behavior at school.

$$y = \frac{Time\ contaced\ about\ good\ behavior}{Time\ contacted\ about\ good\ behavior\ +\ behavior\ problems} \times 100 \qquad (1)$$

Besides, the independent variable of interest in this study, time spent with child for cultural activities, is the accumulation of seven different related variables in the dataset including visited a library in the past month, visited a bookstore in the past month, gone to a play in the past month, visited art gallery in the past month, visited a zoo in the past month, attended a religious event in the past month, attended a sporting event in the past month. Therefore, the range of the independent variable of interest is from 0 to 7.

Procedure

The purpose of this study is gain a deeper insight on how spending time with child for cultural activities would influence child's behavior at school. However, the number of remaining independent variables that would affect child's behavior at school is still large after the selection according to previous literature reviews. Therefore, in order to conduct a more effective analysis,

we performed a feature selection to obtain ten most important independent variables without including the independent variable that we are interested in, that is times spent with child for cultural activities.

For features selection, we chose the random forest regressor model to select the important features because tree-based models are more appropriate when confronting mixed types of data. To get the best random forest regressor model with lowest mean square error, we conducted a model selection. We first split the data into train and test set with test set size = 0.3 with random state=42, to make sure the result will be consistent. Then, we used randomized search on hyper parameters, including the number of trees in the forest, minimum number of samples to split an internal node, the minimum number of samples required to be at a leaf node, the number of features to consider when looking for the best split, the maximum depth of the tree, and whether bootstrap samples are used, with 5-fold cross validation to select the best random forest regressor model with lowest mean square error. It turned out that the best random forest regression model is tuned with 600 trees in the forest, 2 samples as minimum to split the node, 4 samples as minimum number required to be at a lead node, the square root of features number as maximum number, 80 as deepest depth, and not using bootstrap. Finally, we fit the best model with the whole dataset to increase the opportunity to select important features more accurately.

After fitting the best random forest regression model, we obtained the top ten important features and their importance scores based on Gini coefficient regarding to the dependent variable as in figure 1: grade attending (0.059666), second parent/guardian age (0.058565), first parent/guardian age (0.057489), times participated in school meetings (0.044090), expectations

for child future education (0.041483), first parent/guardian hours worked per week (0.035303), total income (0.035180), second parent/guardian highest grade level completed (0.034403), days eaten the evening meal together in the past week (0.034088), second parent/guardian hours worked per week (0.033953). The statistics summary of those ten selected feature and independent variable of interest, time spent with child for cultural activities, are shown in figure 2. The distribution of dependent variable is shown in figure 3. The details for the distribution and statistics of those variables are included in the table 1 in appendix.

Figure 1. The Result of Feature Selection Using Random Forest Regression Model

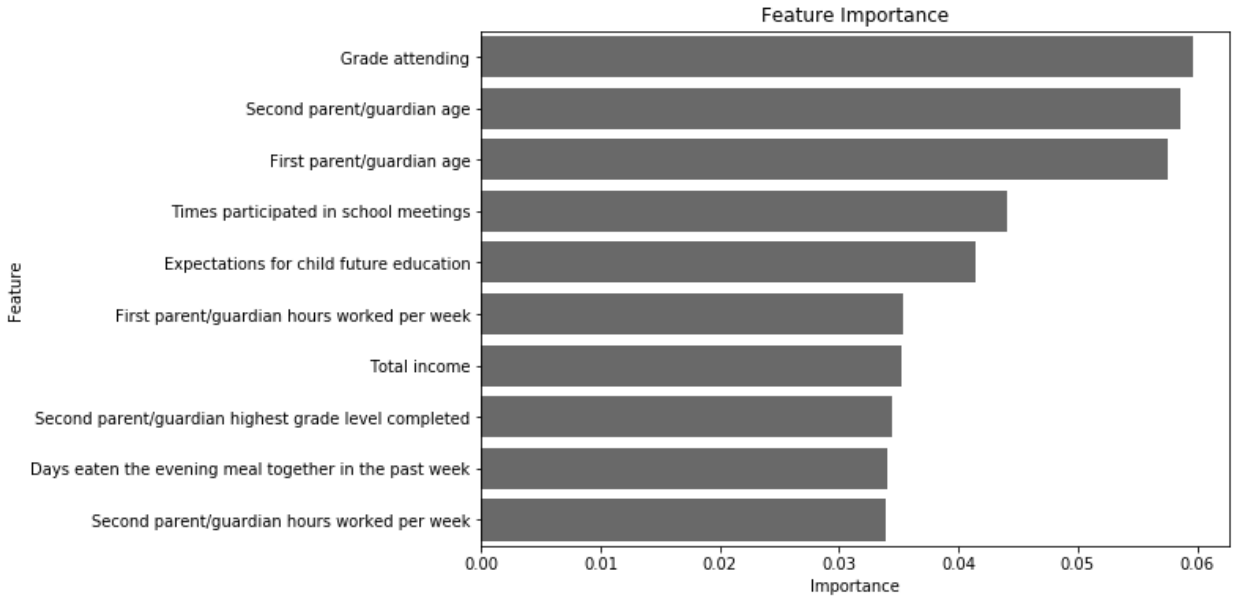
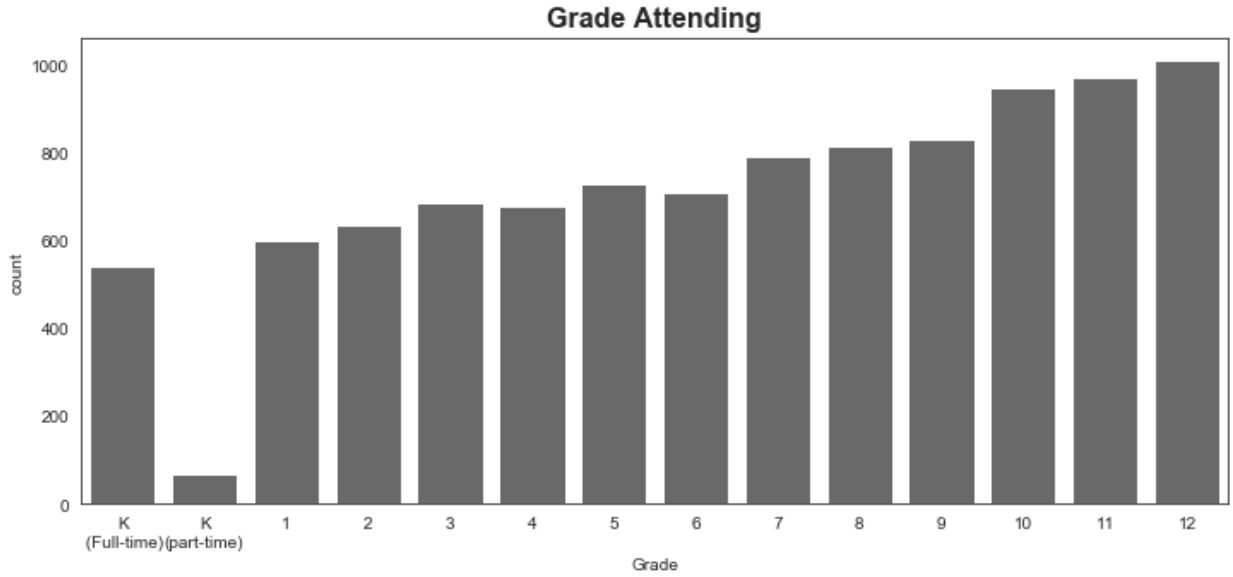
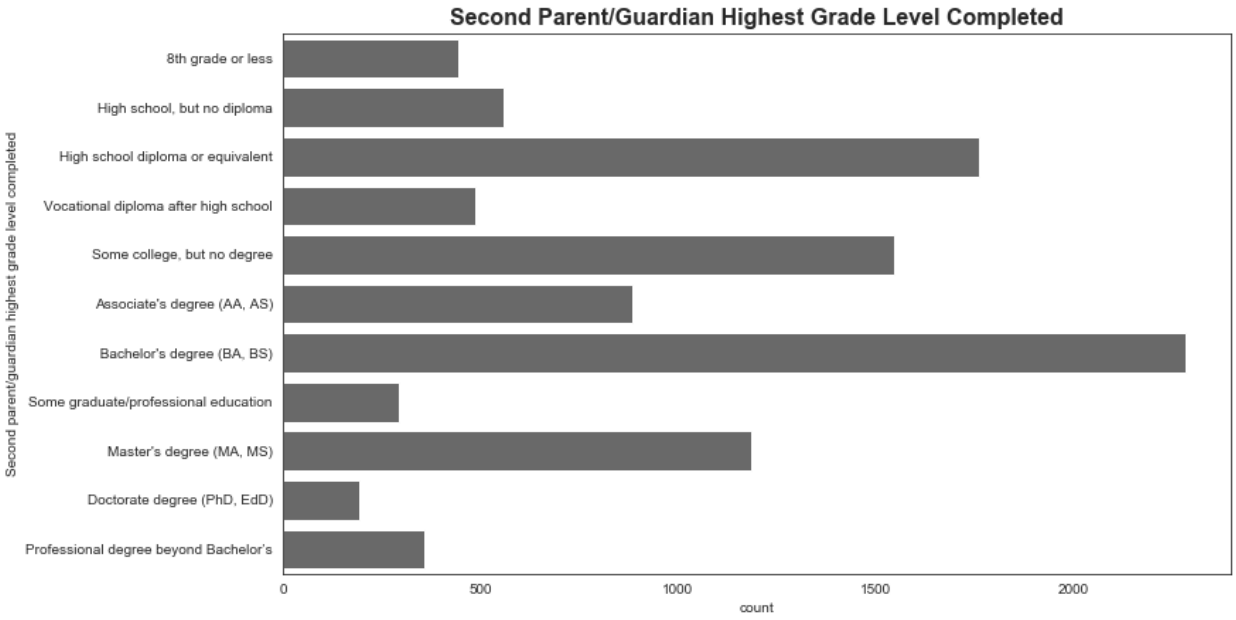
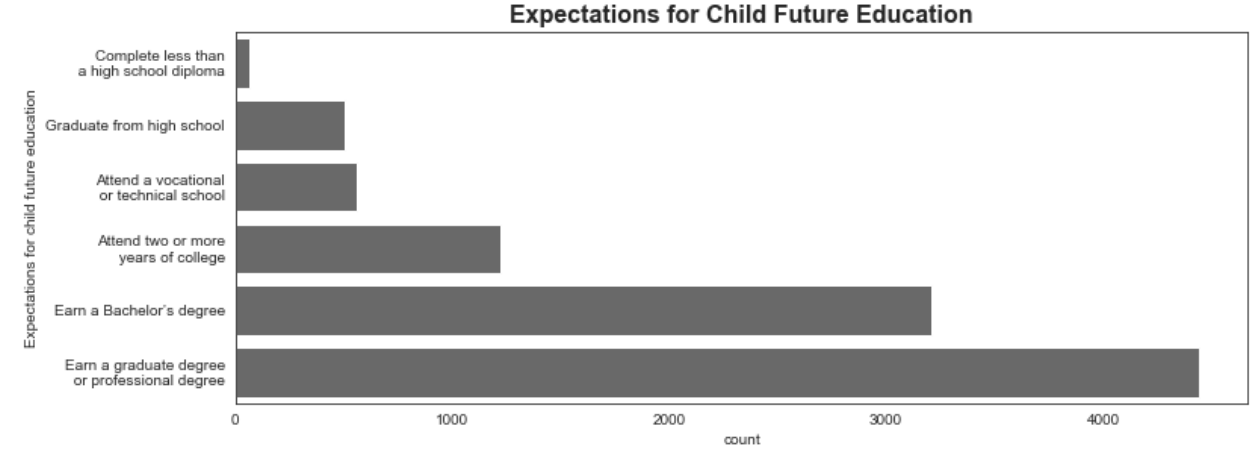
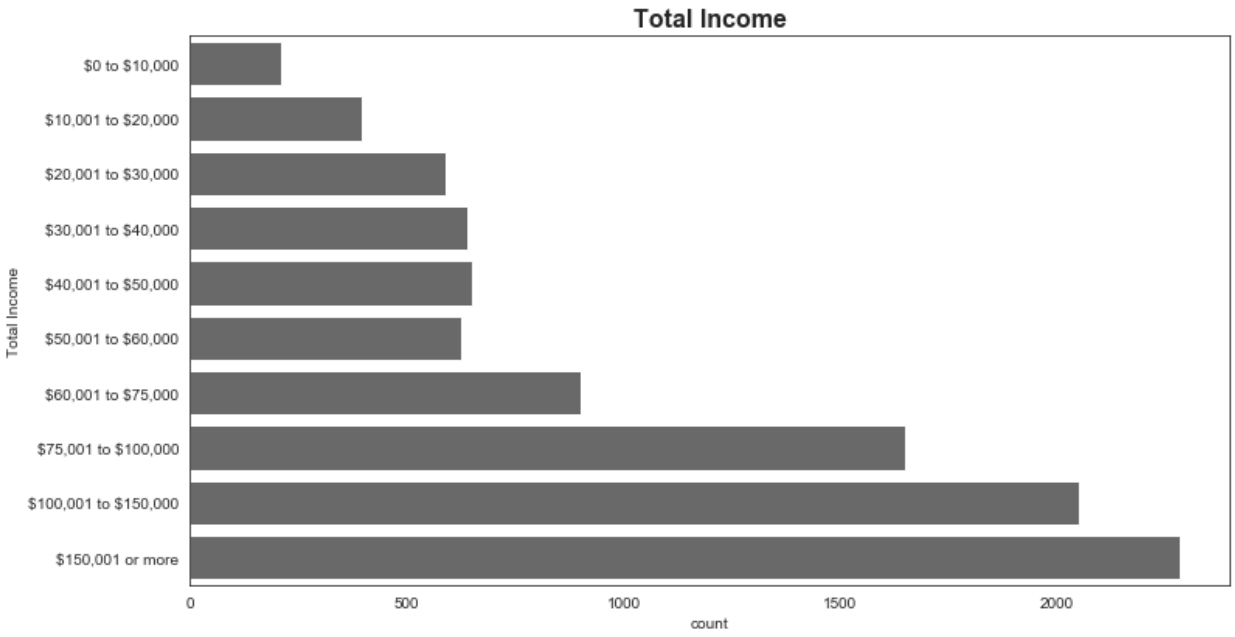


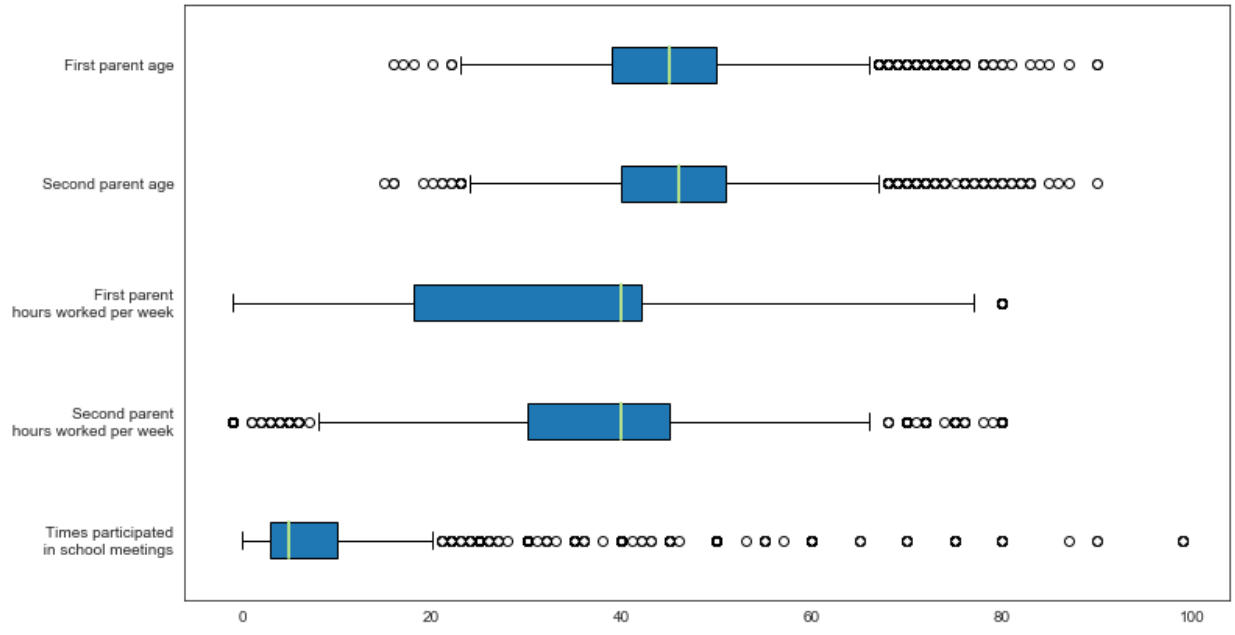
Figure 2. Statistics Summary for Selected Variables and Variable of Interest








Total Income
$0 to $10,000
$10,001 to $20,000
$20,001 to $30,000
$30,001 to $40,000
$40,001 to $50,000
$50,001 to $60,000
$60,001 to $75,000
$75,001 to $100,000
$100,001 to $150,000
$150,001 or more
Total Income
0
500
1000
1500
2000
count


First parent age
Second parent age
First parent
hours worked per week
Second parent
hours worked per week
Times participated
in school meetings
0
20
40
60
80
100

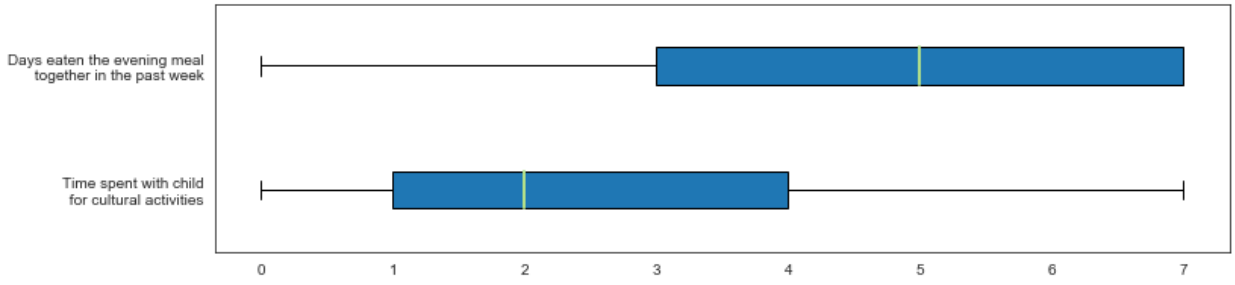
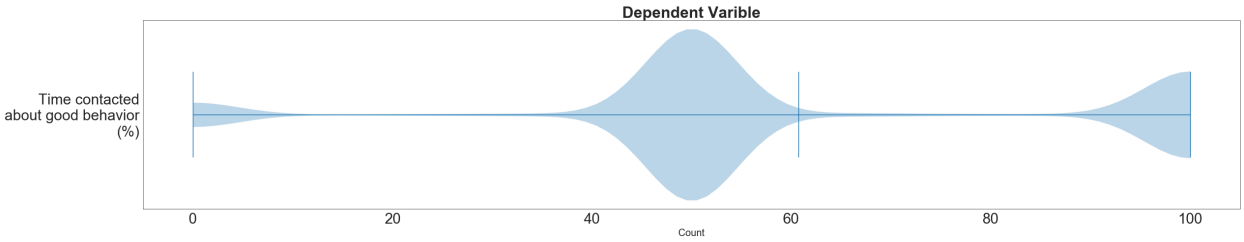

Days eaten the evening meal
together in the past week
Time spent with child
for cultural activities
0
1
2
3
4
5
6
7

Figure 3. The distribution of Dependent Variable



After obtaining the ten most importance features, we subsequently analyzed the selected variables and our independent variable of interest with dependent variable using ordinary least squares regression. From the regression, we found out the significant variables for our OLS model and studied how our interest variable affect our dependent variable, child's behavior at school. However, this regression analysis includes all grades of students from kindergarten, which including full-time and part-time, to twelfth grade to generate a more generalized model, the result might be influenced by the child grade. As a result, we also looked for how grade influence child behavior and its relationship with time spent for cultural activities for child.

Result

After selecting ten most important independent variables in the dataset using random forest regressor model and using an ordinary least square regression model to study the relation between the independent variables and dependent variable, the variable coefficient and standard errors of the variables are shown in Table 1. The significant variables are grade attending (β = 0.7639, $p < 0.001$), time participated in school meetings ($\beta = 0.1407$, $p < 0.001$), expectation for

child future education (β = 3.2217, p < 0.001), times spent with child for cultural activities (β = 1.5724, p < 0.001), days eaten the evening meal together in the past week (β = 0.4378, p < 0.01) and total income (β =-0.2953, p < 0.05).

From this result, we can see that child's grade, parents' expectation towards child, parental involvement in school and parental time with child, either having dinner together or having outdoor activities together, play critical roles in child's development. Obviously, besides child's grade, other significant variable are all related to parents' attitude toward their own child. If parents value their relationship with their child, they will spend more time with their child, thereby creating a positive impact on their child's behavior at school. Our variable of interest, time spent with child for cultural activities, has a positive and significant effect on child's school behavior. That is, if parents spend more time with their child for cultural activities such as go to a play or visit a museum, child have a higher probability of behaving in a good way at school.

Table 1. Regression Result for Child Behavior at School

Grade attending	-0.7639 ***
	(0.086)
Second parent/guardian age	-0.0342
	(0.045)
First parent/guardian age	0.0382
	(0.047)
Times participated in school meetings	0.1407***
	(0.031)
Expectations for child future education	3.2217***
	(0.264)

First parent/guardian hours worked per week	0.0295 (0.015)
Total income	-0.2953* (0.145)
Second parent/guardian highest grade level completed	-0.1089 (0.138)
Days eaten the evening meal together in the past week	0.4378** (0.145)
Second parent/guardian hours worked per week	0.0082 (0.0016)
Times spent with child for cultural activities	1.5724*** (0.180)

Standard errors are reported in parentheses.

*, **, *** indicates significance at the 90%, 95%, and 99% level, respectively.

As we mentioned before, we included all grades of students in the model. We are also interested in the influence of grade on child's behavior at school. In order to gain a deeper insight for the effect of grade on our dependent variable, child behavior performance at school, we studied how child's behavior outcome differs according to different grades. From the result of OLS model, it seems that as grade become higher, the behavior performance start to decline. However, from data distribution we can know that as grade become higher, time contacted about behavior problems or good behavior become less as well. Therefore, simply interpreting the relationship between grade and behavior outcome using regression result might not be comprehensive enough. More careful considerations should be included here.

To take a closer look at our variable of interest, time spent with child for cultural activities, we studied on how this variable' values change with regard to grade that child attends. From the dataset, we learned that the number of time spent with child in the past month from kindergarten to sixth grade are similar except for part-time kindergarten, which is about three times. However, the mean of the number decline after seventh grade and the upper and lower bounds for the range of number also tend to become lower. It seems that parents tends to spend less time with their child for cultural activities as child grows up.

It is surprise that parents' expectation for child future education has a significant effect on child's behavior at school. It seems that not only parental involvement such as participating in school meeting or bring child to experience cultural events will have great impact on child's behavior at school, parents' attitude towards their child also have critical influence on child's behavior outcome at school. Another surprising outcome from this OLS model is that family income has a negative effect on child's behavior at school. One possible reason would be that parents who earn a lot of money might have less time to spend with their child and their child might have more behavior problems at school if the influence of parental time has larger effect than other possible critical factors that rich parents can provide.

Conclusion

Parental involvement plays an important role in child's behavior and school performance as Izzo et al. (1999) mentioned. This study focus on how parent spend time with child for cultural actives influences child's behavior at school. From the OLS result, we learned that time

spent with child for cultural activities has a positive impact on child's behavior. If parents are willing to spend more time with their child for cultural experiences, there would be a higher potential for child to behave well at school. From the data, we also noticed that parents tend to spend less time with child for cultural activities as the grade that child attends becomes higher.

Although the independent variable of interest showed that it has a significant effect on our dependent variable, child's behavior at school, there are still some concerns about this result. First, the data are collected from a survey so numerous variables are binary such as yes and no. Our independent variable of interest, time spend with child for cultural activities, are also a outcome from seven related binary variables. Therefore, when conducting feature selection, lasso regression might not be a good way to deal with various data type, especially mixing with ordinal, binary, and categorical data. This is because lasso calculate the distance to select the most important features. Besides, while analyzing the data, OLS model might have some limitations to truly present the relationship between independent and dependent variable since some variables are not distributed linearly. Another issue about this dataset is that our dependent variable is not equally distributed. Therefore, the result of OLS regression might have some biases or problems that should be considered while trying to interpret the relationships among variables.

To better investigate the relation between child's behavior at school and the time parents spent with child for cultural activities, it would be nice if we can design the survey and ask not just about the times or frequency that parents spend with their child for experiencing culture in the past month but for a longer period, maybe a year. Since the time and frequency for parents to

bring their child experiencing cultural events might not be strong enough to infer the relationship between these two. Another possible extend topic could be to study how those cultural activities influence child's behavior in a long term not just during school years and how those cultural experiences help child to develop their social skills and perform a higher achievement in the future.

Although there are some limitations about this study, we still learned that parental time with child is important for child's behavior and development and cultural activities such as visit library or gallery could have a significant impact on child's development and their behavior at school. Therefore, if parents can spend more time with their child for outdoor cultural activities, child would have a higher chance to behave better at school.

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Appendix

Table 1. Statistic Summary for variables selected

Variables	Mean (Standard Deviation)
Dependent Variable	
Time contact about good behavior (%)	0.607 (0.291)
Independent Variable	
Grade attending (%)	
Full-time kindergarten	0.006
Part-time kindergarten	0.054
First grade	0.059
Second grade	0.063
Third grade	0.068
Fourth grade	0.068
Fifth grade	0.070
Sixth grade	0.073
Seventh grade	0.079
Eighth grade	0.081
Ninth grade	0.083
Tenth grade	0.094
Eleventh grade	0.097
Twelfth grade	0.101
Second parent/guardian age	45.70 (8.5)
First parent/guardian age	44.95 (8.25)
Times participated in school meetings	8.45 (9.45)
Expectations for child future education (%)	
Complete less than a high school diploma	0.006

Graduate from high school	0.05
Attend a vocational or technical school	0.056
Attend two or more years of college	0.122
Earn a Bachelor’s degree	0.32
Earn a graduate degree or professional degree	0.44
First parent/guardian hours worked per week	31.45 (19.69)
Total income (%)	
$0 to $10,000	0.021
$10,001 to $20,000	0.04
$20,001 to $30,000	0.059
$30,001 to $40,000	0.063
$40,001 to $50,000	0.064
$50,001 to $60,000	0.065
$60,001 to $75,000	0.09
$75,001 to $100,000	0.165
$100,001 to $150,000	0.205
$150,001 or more	0.228
Second parent/guardian highest grade level completed (%)	
8th grade or less	0.044
High school, but no diploma	0.06
High school diploma or equivalent	0.176
Vocational diploma after high school	0.049
Some college, but no degree	0.155
Associate's degree (AA, AS)	0.088
Bachelor's degree (BA, BS)	0.228
Some graduate/professional education	0.029

Master's degree (MA, MS)	0.118
Doctorate degree (PhD, EdD)	0.019
Professional degree beyond Bachelor’s	0.036
Days eaten the evening meal together in the past week	4.8 (2.03)
Second parent/guardian hours worked per week	35.34 (18.87)
Times spent with child for cultural activities	2.48 (1.69)
N	10003