

# Association of Behavior in Boys From Low Socioeconomic Neighborhoods With Employment Earnings in Adulthood

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**IMPORTANCE** Identifying early childhood behavioral problems associated with economic success/failure is essential for the development of targeted interventions that enhance economic prosperity through improved educational attainment and social integration.

**OBJECTIVE** To test the association between kindergarten teacher-rated assessments of inattention, hyperactivity, opposition, aggression, and prosociality in boys with their employment earnings at age 35 to 36 years as measured by government tax return data.

**DESIGN, SETTING, AND PARTICIPANTS** A 30-year prospective follow-up study analyzing low socioeconomic neighborhoods in Montreal, Quebec, Canada. Boys aged 5 to 6 years attending kindergarten in low socioeconomic neighborhoods were recruited. Teacher-rated behavioral assessments were obtained for 1040 boys. Data were collected from April 1984 to December 2015. Analysis began January 2017.

**MAIN OUTCOMES AND MEASURES** Mixed-effects linear regression models were used to examine the association between teacher ratings of inattention, hyperactivity, opposition, aggression, and prosociality at age 6 years and individual earnings obtained from government tax returns at age 35 to 36 years. The IQ of the child and family adversity were adjusted for in the analysis.

**RESULTS** Complete data were available for 920 study participants (mean age at follow-up was 36.3 years). Mean (SD) personal earnings at follow-up were \$28 865.53 (\$24 103.45) (range, \$0-\$142 267.84). A 1-unit increase in inattention (mean [SD], 2.66 [2.34]; range, 0-8) at age 6 years was associated with decrease in earnings at age 35 to 36 years of \$1295.13 (95% CI, -\$2051.65 to -\$538.62), while a unit increase in prosociality (mean [SD], 8.0 [4.96]; range, 0-20) was associated with an increase in earnings of \$406.15 (95% CI, \$172.54-\$639.77). Hyperactivity, opposition, and aggression were not significantly associated with earnings. Child IQ was associated with higher earnings and family adversity with lower earnings in all models. A 1-SD reduction in inattention at age 6 years was associated with a theoretical increase in annual earnings of \$3040.41, a similar magnitude to an equivalent increase in IQ.

**CONCLUSIONS AND RELEVANCE** Teacher ratings of inattention and prosociality in kindergarten boys from low socioeconomic neighborhoods are associated with earnings in adulthood after adjustment for hyperactivity, aggression, and opposition, which were not associated with earnings. Interventions beginning in kindergarten that target boys' inattention and enhance prosociality could positively impact workforce integration and earnings.

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Childhood disruptive behaviors are among the most prevalent and costly mental health problems in industrialized countries and are associated with significant negative long-term outcomes for individuals and society.<sup>1-4</sup> Recent evidence suggests that the presence of disruptive behavioral problems in the first years of life is an important early predictor of lower employment earnings in adulthood.<sup>5-8</sup> Low earnings can harm individual and family well-being for many years and are associated with increased risk of financial dependence, stress, psychopathology, and early mortality.<sup>9-13</sup> It is therefore essential to determine which individual behaviors contribute specifically to low earnings so that policy and preventive interventions can be used to target at-risk children with interventions and support.<sup>14-16</sup>

The longitudinal association between childhood traits and employment earnings is well documented,<sup>5-8,17-19</sup> and both cognitive and noncognitive traits are believed to contribute to future earnings. The most frequently examined cognitive trait is intelligence, usually measured in terms of academic performance or IQ, which is strongly associated with occupational attainment, performance, and earnings.<sup>17,20-23</sup> However, so-called noncognitive traits, such as self-control, self-esteem, and personality, are also known to be important.<sup>24</sup> Interest in the role of noncognitive behavioral determinants of later earnings has grown recently on the back of evidence demonstrating that they are modifiable, perhaps more so than cognitive abilities, and therefore important targets for intervention.<sup>24-26</sup>

The longitudinal association between childhood disruptive behaviors and earnings in early adulthood is documented in a small but growing literature.<sup>5-8</sup> Most studies have focused on the traits of aggression, opposition, hyperactivity, and inattention, as well as the related concept of self-control. Their findings are relatively consistent: higher levels of disruptive behaviors and lower levels of self-control, assessed when children are aged between 3 and 11 years, are associated with lower earnings and less wealth in early adulthood (age 26 to 36 years) after adjustment for the child's intelligence and family socioeconomic status (SES).<sup>5-8,18,27</sup> These disruptive behavioral traits are highly relevant from a research and policy point of view because they underpin some of the most prevalent<sup>1,2</sup> and costly<sup>3,4</sup> childhood psychiatric disorders, including conduct disorder, oppositional defiant disorder, and attention-deficit/hyperactivity disorder. Early interventions targeting clinical or subclinical disruptive behavioral problems therefore have the potential to yield wide-ranging social and economic benefits for individuals and society.<sup>26</sup>

The body of research documenting longitudinal associations between childhood disruptive behaviors and later earnings has important limitations. First, previous studies have used self-reported income. This methodology is subject to limitations including selective dropout (eg, individuals from low SES backgrounds), refusal to report income, social desirability bias (eg, overreporting or underreporting value of earnings), nondeliberate missreporting (eg, lack of knowledge about income or the value of welfare/insurance/childcare entitlements), and deliberate falsification. The use of government tax records is therefore preferable: they account for all sources of income (eg, salaries/wages, tax reductions, welfare credits),

## Key Points

**Question** Which disruptive behaviors in kindergarten are associated with employment earnings in adulthood for boys from low socioeconomic backgrounds?

**Findings** This 30-year follow-up study of 920 boys found that kindergarten teachers' ratings of inattention were associated with lower earnings at age 35 to 36 years and prosocial behavior with higher earnings after adjustment for child IQ and family adversity. Hyperactivity, opposition, and aggression were not associated with earnings.

**Meaning** Preventive interventions targeting children's inattention and/or limited prosocial behavior could have positive impacts on future employment earnings.

provide almost complete population coverage, and are usually reported by impartial third parties (eg, employers) and are consequently more accurate than self-reports, particularly for male individuals.<sup>28</sup> Second, previous studies of childhood self-control<sup>18,27,29</sup> and antisocial behavior<sup>5-7</sup> have typically combined multiple behavioral dimensions (eg, inattention/hyperactivity, aggression/opposition) to create composite indices. The use of composite measures does not allow quantification of the cumulative or interactive contributions of behaviors, making it difficult to identify behaviors that can be targeted with preventive interventions. Identifying specific behaviors is important because it helps to specify causal pathways (ie, mediators) that can be used in targeted intervention programs, which are more effective and efficient than nontargeted generalized interventions.<sup>14</sup> Third, several studies have averaged behavioral assessment across multiple years (eg, age 3 to 11 years),<sup>18,27</sup> used assessments made in middle childhood (eg, age 10 years),<sup>5,6,8</sup> or used parents' rather than teachers' ratings. Ideally, from the point of view of the development of preventive interventions, assessments should be made by teachers (they have a sense of normative behavior that parents often lack) at a single time point and as early as possible when children are most likely to benefit (ie, in kindergarten).<sup>30,31</sup> These early assessments also provide the first opportunity for populationwide assessment that include children from low SES backgrounds who are less likely to attend daycare. Fourth, few previous studies have considered the effects of positive traits, such as prosociality, which could counteract the negative effects of disruptive behaviors and enhance earnings. Finally, previous studies have not examined effects in samples of male individuals from low SES neighborhoods. This group is at risk of both early behavioral problems and lower lifetime earnings, so early identification and intervention should yield high returns for individuals and society.

The aim of this study was to examine the association between 5 prevalent behaviors assessed in kindergarten—inattention, hyperactivity, aggression, opposition, and prosociality—and earnings averaged across age 35 and 36 years in a sample of boys from low SES neighborhoods. Behavioral assessments were based on teacher ratings at age 5 to 6 years, and earnings data were obtained from government tax return records. To test the possibility that some behaviors operate interactively rather than additively, 2-way interactions between all behaviors were examined.

## Methods

### Participants and Behavior Assessment

Teacher-rated behavioral assessments were obtained for boys aged 6 years ( $n = 1040$ ) attending 53 schools in the poorest neighborhoods of Montreal, Quebec, Canada, using data from 1984.<sup>32</sup> The study was approved by the University of Montreal ethics board. Informed written consent was obtained from children's parents prior to participation. Data were collected from April 1984 to December 2015 and analyzed from January 2017 to May 2018.

Behavioral ratings were made by the child's teacher using the well-validated Social Behavior Questionnaire.<sup>33-35</sup> Inattention was assessed with 4 items: poor concentration, distracted, head in the clouds, and lack of persistence. Hyperactivity was assessed with 2 items: agitated/fidgety and moves constantly. Opposition was assessed with 5 items: disobeys, does not share materials, blames others, inconsiderate, and irritable. Physical aggression was assessed with 3 items: fights with other children, bullies/intimidates other children, and kicks/bites. Prosociality, defined as behaviors intended to benefit others or society including helping, sharing, and cooperating,<sup>36</sup> was assessed with 10 items; examples of prosociality are tries to stop quarrels or disputes, will invite bystanders to join in a game, and will try to help someone who has been hurt. Items were rated on a 3-point scale with 0 indicating never/not true; 1, sometimes/somewhat true; and 2, often/very true. These scores were summed for each behavior.  $\alpha$  Scores for inattention, hyperactivity, opposition, aggression, and prosociality were .81, .89, .84, .87, and .92, respectively.

### Outcomes and Control Variables

Outcome data were obtained from government tax return records (Statistics Canada) and linked to participants' study data (a description of the methods of linking administrative tax information with child-focused survey data has been previously published<sup>37</sup>). The successful linkage rate for participants with at least 1 tax return for 2014 or 2015 was 87.53%; there were no significant differences in baseline characteristics for cases with and without successful linkages (eTable 1 in the Supplement). Tax return data for each year included personal pretax earnings, marital status, and the number of children in the household. Earnings were defined as all pretax wages, salaries, and commissions, not including income from capital gains, and averaged for the 2 most recent years (2014 and 2015;  $r = 0.93$ ). Currency data were collected as Canadian dollars but are reported as 2019 US dollars (CaD \$1 = US \$0.75) throughout this article.

Child IQ was assessed at age 13 years using the Sentence Completion Task.<sup>38</sup> IQ is generally stable between childhood and adolescence<sup>39</sup> so the assessment at age 13 years provides a good estimate of the child's cognitive abilities at age 6 years. The correlation between the Sentence Completion Task at age 13 years and the vocabulary and block design subtest of the Wechsler Intelligence Scale for Children-Revised at age 10 years was 0.67 when conducted on a subsample of 80.

Family adversity was calculated by combining the following variables assessed at age 6 years: parents' educational level,

family structure (intact vs nonintact), parents' age at birth of the first child, and parents' occupational status based on the criteria described by Blishen et al.<sup>40</sup> Families at or below the 30th percentile for each of these indices (or a nonintact family) were coded as having 1 adversity point. Scores were standardized on a scale of 0 to 1.

### Statistical Analyses

After confirming the missing at random assumption, missing data were managed using multiple imputations by chained equations. Models were estimated across 50 data sets, and the results were pooled. Mixed-effects linear regression models were used to control for clustering effects in predictors at the school ( $n = 53$ ) and classroom ( $n = 152$ ) levels with fixed-effects estimates reported. Five multivariable partially adjusted models were estimated (1 for each behavior) controlling for child IQ and family adversity in each model. Next, a fully adjusted model including all behaviors, IQ, and adversity was estimated. Robust SEs were used to account for heteroskedasticity. Tests for 2-way continuous interactions between the 5 childhood behaviors were conducted in a single model. Behaviors and their interaction terms were centered prior to analysis. Effect sizes were calculated as the ratio of the coefficient estimate to the variable's SD. Standardized effect sizes were calculated for the overall models from  $R^2$  values<sup>41</sup> and interpreted using Cohen  $f^2$ , where  $f^2 \geq 0.02$ ,  $f^2 \geq 0.15$ , and  $f^2 \geq 0.35$  represent small, medium, and large effect sizes, respectively.<sup>42</sup> Finally, to estimate lost earnings over the course of a career, a financial effect was calculated:

$$\text{Financial Effect} = \sum_{t=0}^{39} \frac{(\beta_j \times std_j)}{1.03^t} = 23.8 \times (\beta_j \times std_j)$$

in which  $\beta_j$  is the estimate effect of variable  $j$  (eg, inattention) on earnings and  $std_j$  is the SD of variable  $j$ . The financial effect measures the present value over a 40-year work career of a 1-SD improvement in variable  $j$  assuming the commonly used discount rate of 3%. Thus, for inattention, financial effect measures the earnings gain from a 1-SD reduction, whereas for prosociality, it measures the earnings gain from a 1-SD increase.

### Sensitivity Analyses

First, a variance inflation factor test of multicollinearity revealed that aggression and opposition were highly correlated; they approached but did not exceed the recommended threshold (variance inflation factor scores  $>5$ ). As a precaution, these variables were standardized then summed to create a single item that was entered into the fully adjusted model. Second, a number of participants reported 0 earnings for the 2014 to 2015 tax years. To confirm that the results were not influenced by the presence of these zeros, a tobit regression with left censoring was used. Tobit regression simultaneously considers the likelihood of having data (any earnings greater than 0) and the value score for cases that have earnings greater than 0. Third, to test the robustness of associations between childhood behavior and earnings, we repeated the analysis using data from 2011 to 2012. Analyses were conducted using Stata version 14 (StataCorp). Significance was set at .05, and tests were 2 tailed.

**Table 1. Personal and Family Characteristics of the Overall Sample vs Study Sample at Age 6 Years**

Characteristic <sup>a</sup>	Mean (SD) [Range]
Child IQ	9.0 (2.13) [0-13]
Education, y	
Mother	10.5 (2.79) [2-24]
Father	10.6 (2.31) [1-24]
Occupational prestige	
Mother	38.6 (12.10) [19.92-85.75]
Father	39.4 (12.86) [21.24-78.34]
Age at birth of first child, y	
Mother	25.3 (4.66) [11.81-40.65]
Father	28.4 (5.58) [13.75-50.95]
Intact family, No. (%)	550 (80.0)
Overall family adversity index	0.3 (0.25) [0-1]
Siblings, No. (%)	
0	240 (26.8)
1-2	600 (67.4)
≥3	50 (5.8)
Behavior at age 6 y	
Inattention	2.66 (2.34) [0-8]
Hyperactivity	1.36 (1.46) [0-4]
Opposition	2.47 (2.58) [0-10]
Aggression	1.29 (1.74) [0-6]
Prosociality	8.0 (4.96) [0-20]

<sup>a</sup> Up to 13.2% missing data, except for intact family, which had 26.0% missing data. In accordance with Statistics Canada data protection requirements, percentages are rounded to 1 decimal point, and counts are rounded to base 10.

## Results

### Participant Characteristics

Participants with complete outcome data were retained for analysis (N = 920). Child and family characteristics at age 6 years are shown in **Table 1**. There were no significant differences between participants with and without outcome data (eTable 1 in the **Supplement**).

Participant earnings and family circumstances at follow-up are presented in **Table 2**. The mean (SD) earnings at age 35 to 36 years was \$28 865.53 (\$24 103.45) (range, \$0-\$142 129.75). Earnings for each behavior, split by quartile, are shown in the **Figure**.

In partially adjusted models, which controlled for child IQ and family adversity only, all behaviors at age 6 years were associated with earnings at age 35 to 36 years at the  $P < .001$  level. (**Table 3**). The fully adjusted model is shown in **Table 4**. A 1-unit increase in inattention at age 6 years was associated with decrease in earnings of \$1295.13 (95% CI, -\$2051.65 to -\$538.62), while a unit increase in prosociality was associated with an increase in earnings of \$406.15 (95% CI, \$172.54-\$639.77), holding all other variables constant. Hyperactivity did not pass the significance threshold, although it had an effect size equivalent to that of prosociality. In all models, IQ was associated with higher earnings and family adversity with lower earnings.

**Table 2. Earnings and Family Characteristics at Follow-up**

Characteristic <sup>a</sup>	Data
Age, y, mean (SD)	36.29 (0.45)
Employment earnings, \$	
Mean (SD)	28 865.53 (24 103.45)
Median (IQR)	27 180.48 (6959.96-44 397.23)
Range	0-142 129.75
Relationship status, No. (%)	
Married/cohabiting	520 (57.7)
Divorced/separated/single	380 (42.3)
No. of children in household, No. (%)	
0	330 (36.1)
1-2	430 (48.6)
>3	140 (15.3)

Abbreviation: IQR, interquartile range.

<sup>a</sup> Up to 3% missing data. In accordance with Statistics Canada data protection requirements, displayed counts are rounded to base 10 and percentages to 1 decimal point; earnings are rounded to the nearest hundred, and ranges represent the mean of the 5 lowest and 5 highest scores, respectively, and therefore represent a conservative estimate of the upper limit.

No 2-way interactions were found. Bivariate correlations are presented in eTable 2 in the **Supplement**.

Standardized effect sizes were largest for inattention followed by hyperactivity and prosociality. Viewed in monetary terms, a 1-SD reduction in inattention (SD, 2.34) was associated with an increase in annual earnings of \$3040.41. Calculation of the financial effect for inattention over a 40-year career amounts to \$70 532.97.

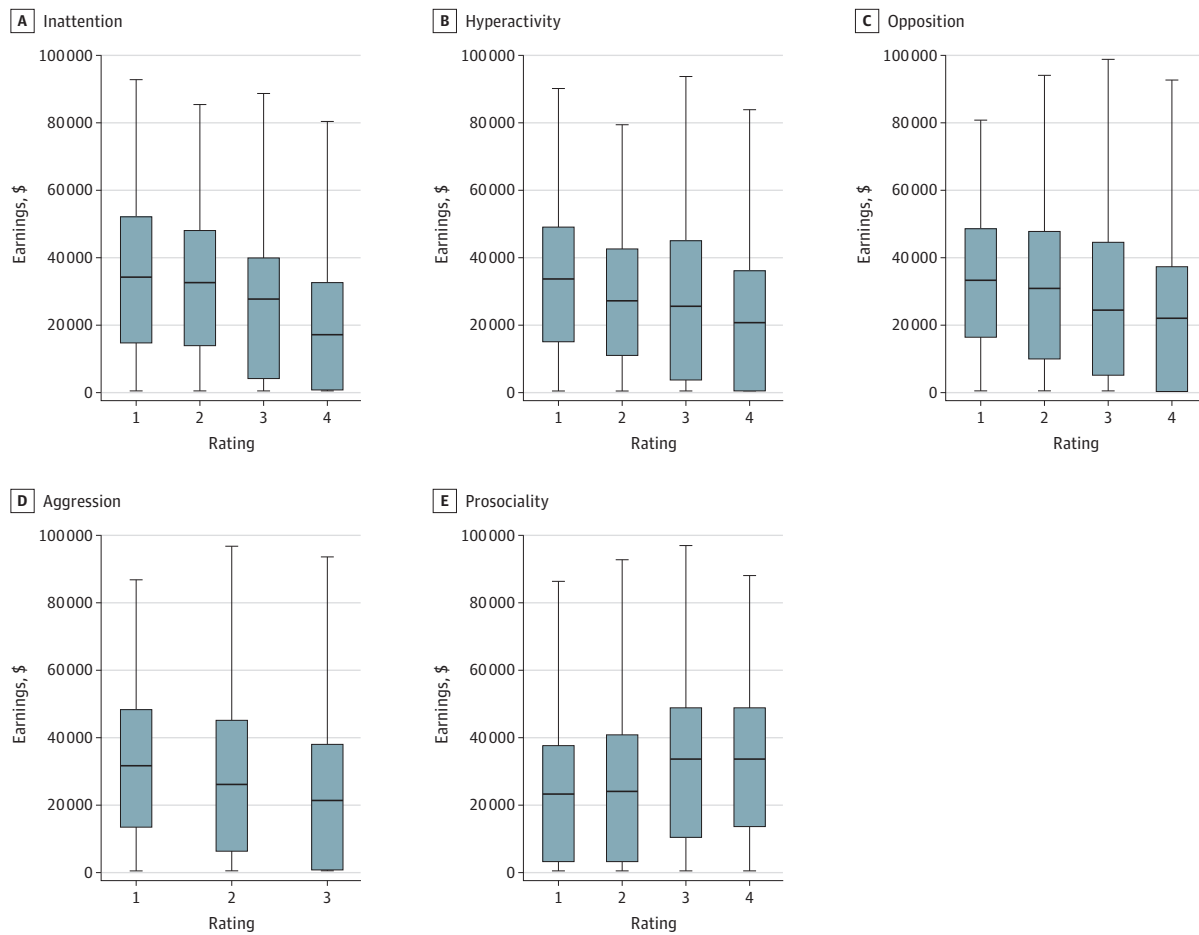
In the first sensitivity analysis, the merged opposition-aggression variable was nonsignificant ( $\beta = -162.17$ ;  $P = .69$ ; 95% CI, -633.96 to 958.31) and did not alter the overall model. Participants reporting no earnings in 2014 and 2015 (140 [15.2%]) had lower IQs, higher family adversity, and more behavioral problems (eTable 3 in the **Supplement**). Results from the tobit sensitivity analysis, which censored cases with no earnings, confirmed the results of the main analysis (eTable 4 in the **Supplement**). Replication of the analysis using 2011 to 2012 income data supported the robustness of the findings (eTable 5 in the **Supplement**).

## Discussion

This study found that in a sample of boys living in low socioeconomic neighborhoods of a large North American city, behavioral assessments made by kindergarten teachers were associated with employment earnings 30 years later, as measured by government tax returns. Inattention was associated with lower earnings, while prosociality was associated with higher earnings after adjustment for the child's IQ and family background. Hyperactivity, opposition, and aggression were not independently associated with earnings.

Our results are consistent with several previous studies showing that lower earnings are longitudinally associated with ratings of childhood attention,<sup>5,8,43</sup> hyperactivity,<sup>7</sup> and prosocial traits.<sup>19</sup> Previous studies of the association between childhood

Figure. Teacher-Rated Behaviors at Age 6 Years and Earnings at Age 35 to 36 Years



Behavior scores at age 6 split by quartile with group 1 having the lowest score and group 4 the highest. Aggression displayed as tertiles owing to insufficient variance in the data. Boxes represent the interquartile range, where the central horizontal line represents the median and the lower and upper horizontal lines

represent the 25th and 75th percentiles respectively. Whiskers represent 1.5 times the interquartile range. Outliers suppressed in accordance with Statistics Canada data protection requirements. Earnings are in US dollars.

Table 3. Partially Adjusted Mixed-Effects Linear Regression Models of Association Between Behaviors at Age 6 Years and Earnings at Age 35 to 36 Years

Variable	$\beta$ (Robust SE), \$ <sup>a</sup>	95% CI, \$	P Value	Effect Size	Cohen $f^2$
Inattention	-1838.31 (331.53)	-2488.11 to -1188.53	.001	5718	0.105
IQ	1474.37 (369.09)	750.65 to 2198.09	.001	4175	
Family adversity	-17 720.00 (3673.98)	-24 921.03 to -10 518.96	.001	5889	
Hyperactivity	-2367.20 (509.45)	-3365.72 to -1368.68	.001	4594	0.095
IQ	1857.27 (335.38)	1199.64 to 2514.91	.001	5259	
Family adversity	-17 181.61 (3520.16)	-24 075.28 to -10 287.94	.001	5710	
Opposition	-1097.64 (249.97)	-1587.56 to -607.70	.001	3764	0.086
IQ	1964.46 (334.64)	1308.35 to 2620.70	.001	5562	
Family adversity	-18 333.19 (3615.26)	-25 419.16 to -11 253.98	.001	6093	
Aggression	-1255.27 (361.73)	-1964.25 to -546.29	.001	2903	0.078
IQ	1967.90 (330.40)	1319.97 to 3292.89	.001	5572	
Family adversity	-18 291.22 (3735.79)	-25 613.41 to -10 969.05	.001	6079	
Prosociality	560.02 (126.00)	313.05 to 806.98	.001	3692	0.091
IQ	1848.26 (337.75)	1185.96 to 2510.56	.001	5233	
Family adversity	-18 181.67 (3645.25)	-25 326.50 to -11 036.83	.001	6042	

<sup>a</sup> Unstandardized  $\beta$  coefficient for mixed-effects linear regression model, where a 1-unit change in the predictor (eg, inattention) is associated with a corresponding change in  $\beta$ , holding all other variables constant. Mean, SD, and range of behavioral and family characteristics at baseline are presented in Table 1.

**Table 4. Mixed-Effects Linear Regression Models of Association Between Behaviors at Age 6 Years and Employment Earnings at Age 35 to 36 Years**

Variable	$\beta$ (Robust SE), \$ <sup>a</sup>	95% CI, \$	P Value	Effect Size
Inattention	-1295.13 (385.98)	-2051.65 to -538.62	.001	4029
Hyperactivity	-1437.80 (764.52)	-2936.24 to 60.63	.06	2790
Opposition	-204.35 (560.02)	-1301.96 to 893.26	.72	701
Aggression	408.36 (761.80)	-1084.74 to 1901.48	.59	945
Prosociality	406.15 (119.19)	172.54 to 639.77	.001	2678
Child IQ	1360.67 (371.28)	632.54 to 2088.79	.001	3853
Family adversity	-15 687.57 (3742.60)	-23 023.04 to -8352.10	.001	5213

<sup>a</sup> Unstandardized  $\beta$  coefficient for mixed effects linear regression model, where a 1-unit change in the predictor (eg, inattention) is associated with a corresponding change in  $\beta$ , holding all other variables constant. Mean, SD, and range of behavioral and family characteristics at baseline are presented in Table 1. Effect size for full model:  $f^2 = 0.124$ .

opposition/aggression and earnings have produced mixed results. For instance, childhood aggression has been associated with lower SES in early adulthood,<sup>7</sup> while antisocial behavior has been linked with lower earnings<sup>5,6</sup> due largely to reduced rates of labor force participation. When only economically active men have been considered, however, 1 study<sup>6</sup> found that childhood antisocial behavior/conduct problems were not associated with earnings, while another found that these men actually earned more.<sup>5</sup> Our results help to clarify the contribution of distinct disruptive behaviors in early childhood by showing that while hyperactivity, opposition, and aggression are associated with later earnings on their own, these associations disappear once inattention and prosociality are adjusted for. They also highlight, for the first time to our knowledge, the positive association between childhood prosocial behaviors and later earnings. The failure to find significant interactions between behaviors is consistent with at least 1 previous study.<sup>5</sup>

Standardized effect sizes for individual behaviors and the overall model were in the small range. This was expected given that behavioral ratings were obtained from a single assessment rather than multiple assessments over multiple years, they were highly specific rather than composite scores of multiple behavioral dimensions, and the long duration of follow-up (30 years). The observed associations are therefore likely to represent an underestimation of the effect. Nevertheless, the effect size of individual behaviors (eg, inattention) on future earnings was of similar magnitude to that of IQ.

In monetary terms, the loss of employment earnings was nontrivial. A 1-SD reduction in inattention would be associated with an increase in annual earnings of \$2963.18. Over a 40-year career, this would amount to \$70 532.97. Since prosociality was associated with earnings after adjustment for inattention, a change in this behavior could further affect earnings. It is also highly likely that the harmful effects of childhood disruptive behaviors on earnings increase over time. This could occur through the accumulation of negative life events (eg, school failure, criminal convictions) that compound lost earnings, as well as through sectorial effects whereby people with low education and skills become trapped in job sectors with little or no wage growth.

Several plausible mechanisms may account for the associations observed in this study. There is already a well-established literature documenting the association between childhood disruptive behaviors and poor academic and educational attainment,<sup>44-46</sup> and both are likely to mediate the association with employment earnings. Peer rejection,

which is strongly associated with childhood symptoms of inattention-hyperactivity and low prosociality,<sup>47,48</sup> could also function as an important mediator by lowering academic achievement and opportunities to learn and practice social skills.<sup>49</sup> Other consequences of childhood disruptive behaviors, such as comorbid psychiatric problems in adulthood (eg, personality disorder, depression) or executive function deficits, which frequently cooccur with disruptive behaviors,<sup>50,51</sup> could disrupt the ability to find and retain paid work and compromise workplace functioning, further diminishing earnings. Lower earnings could also be influenced by higher rates of substance use in adolescence and criminal convictions in early adulthood.<sup>52</sup>

Childhood inattention (which frequent cooccurs with hyperactivity) has been repeatedly linked with a wide range of negative long-term outcomes including higher rates of substance misuse, criminal conviction, educational failure, and unemployment,<sup>53</sup> so targeting these behaviors could yield large returns across multiple life domains, including earnings. There are numerous interventions designed to target inattention-hyperactivity and low prosociality in children aged 5 to 8 years. The majority have been evaluated in terms of their impact on putative intermediary mechanisms, for example, education attainment, peer relationships, and executive function, described above, rather than on employment outcomes per se. Beyond the standard interventions, targeting inattention and hyperactivity symptoms (eg, pharmacologic and nonpharmacologic)<sup>54-58</sup> and prosocial behaviors,<sup>59,60</sup> educational interventions that improve academic outcomes should also be considered.

### Strengths and Limitations

The strengths of this study were its long duration of follow-up (30 years), its use of objective measures of earnings (ie, government tax returns), its focus on a wider range of disruptive behaviors than previous studies, the use of teacher-rated behavioral assessments, the early age at which assessments were obtained (school entry), and the focus on male individuals from low SES backgrounds. However, this was an observational association study, and causal mechanisms underpinning the associations were not assessed. Future studies should investigate the causal pathways through which these associations occur to identify milestones that are important in the process linking early behavior problems to later earnings, such as educational attainment and social integration. This study examined earning as

measured by government tax returns; it did not account for earnings obtained through the informal economy. Finally, this study focused on male individuals recruited from low-income neighborhoods of Montreal, which limits its generalizability. Future studies should examine these associations using low- and high-income neighborhood schools in other cultures and in larger population samples of female and male individuals.

## Conclusions

Kindergarten teachers can identify boys from low socioeconomic backgrounds at risk of lower employment earnings 3 decades later. Monitoring of inattention and low prosocial behavior should begin in kindergarten so that at-risk boys can be identified and targeted with early intervention and support.

### ARTICLE INFORMATION

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**Acquisition, analysis, or interpretation of data:** Vergunst, Tremblay, Beasley, Park, Galera, Vitaro, Côté.

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