SRDC Working Paper Series 04-06

Out-of-School Time-Use During Middle Childhood in a Low-Income Sample: Do Combinations of Activities Affect Achievement and Behaviour?

The Self-Sufficiency Project

Pamela Morris
MDRC

Ariel Kalil
University of Chicago

July 2004

SOCIAL RESEARCH AND DEMONSTRATION CORPORATION

This paper is part of the Social Research and Demonstration Corporation's program of analysis for the Self-Sufficiency Project (SSP) sponsored by the federal Department of Human Resources and Skills Development Canada (HRSDC). The Self-Sufficiency Project is sponsored by HRSDC. This paper was produced for the Social Research and Demonstration Corporation (SRDC). The opinions expressed herein are the author's and do not necessarily reflect those of SRDC or HRSDC.

Table of Contents

Tables and Figures

Acknowledgements

This paper was funded in part by the Social Research and Demonstration Corporation (SRDC). Special thanks go to Reuben Ford at SRDC. We also thank Aletha Huston, Marika Ripke, and two anonymous reviewers for helpful comments on earlier drafts of this paper.

Introduction

The middle childhood years are characterized by numerous biological, psychological, and social changes (Eccles, 1999). At this time, children master fundamental academic skills such as reading and arithmetic, and they also become more self-aware, reflective, and planful. Erikson (1968) characterized this phase of life as a time of "industry," with attention directed at gaining competencies in a variety of tasks and learning how to cooperate with peers and adults. Importantly, in contrast to children's very early years, when the influence of proximal family contexts is paramount, the middle childhood years represent a time of increasing influences of out-of-home environments. Although the family remains important for children's well-being, children at this age increasingly participate in organized programs and interact with peers in their community or neighbourhood; they are also more influenced by teachers, school environments, and peer groups.

Low-income children face several challenges to successful development during this stage of life, and some of these challenges stem from the limitations or outright dangers inherent in their out-of-home environments. For example, physically dangerous neighbourhoods (i.e. those in which children experience high levels of victimization) may force children to be isolated in their homes, restricting opportunities for interactions with peers and adults. Less-advantaged neighbourhoods also provide fewer enriching opportunities such as parks, libraries, and children's programs.

Just as high-quality childcare opportunities can boost the development of young children in poverty, researchers have suggested that high-quality out-of-school programs can augment the development of children during middle childhood. For low-income children in particular, structured opportunities for learning, sport, or recreation can provide a supervised safe alternative to time spent unsupervised with peers in potentially dangerous environments. These safe havens can benefit children's cognitive and emotional well-being, as well as their physical safety, and thus can represent an important source of resilience during the potentially risky period of development during middle childhood. Although these opportunities are often thought to be especially critical for adolescents, for whom the prevention of delinquency is critical, fewer have recognized, or examined, the value of such activities during middle childhood.

This study examines the association of out-of-school time-use with the cognitive and emotional well being of a large sample of low-income children. Our data come from the Canadian Self-Sufficiency Project (SSP), an experimental anti-poverty demonstration program in which parents were offered generous earnings supplements if they worked full time and left the welfare system. The intervention had substantial effects on the employment, earnings, and income of single-parent welfare recipients (Michalopoulos et al., 2002). Moreover, SSP produced benefits for elementary-school-age children's academic achievement in both early and late middle childhood (Morris & Michalopoulos, 2000; Morris & Michalopoulos, 2003; Michalopoulos et al., 2002). And notably, for the analysis in this paper, small increases in structured activity involvement were found for this middle childhood age group as well (Morris & Michalopoulos, 2003).

We use these data to conduct non-experimental analyses designed to understand the relations of patterns of time use out of school with children's cognitive and behavioural adjustment. We employ cluster analysis to understand the patterns of children's participation in activities, then examine whether patterns of participation in activities are related to children's cognitive outcomes and behavioural adjustment. This method adopts the individual child as the unit of analysis rather than the more common variable-based approach of correlating single activity participation with child development outcomes. Using children's patterns of activity involvement more accurately reflects the "bundles" of activities available to and utilized by children and families in the real world.

BACKGROUND

Children's experiences outside the home represent important influences on their development. For example, a large literature on child-care environments has found evidence of effects of both type and quality of care, with the quality of care being especially important for low-income children's cognitive development (Lamb, 1998; Shonkoff & Philips, 2000). The need for supervised care continues in middle childhood, during after-school, weekend, and vacation hours when parents are away from home. Indeed, supervised after-school programs are reported to be the fastest-growing segment of child-care services (Pierce, Hamm, & Vandell, 1999). In 1990, 15 per cent of children ages 5 to 12 with employed mothers were regularly in lessons or activities after school, and an additional 14 per cent were in after-school centers (Vandell & Shumow, 1999). Not only are out-of-school activities often necessary for children's supervision and monitoring, but these activities can also provide valuable opportunities for the development of skills and social relationships. Structured non-school programs can be designed to meet many of the developmental needs of children in middle childhood (Eccles, 1999). Conversely, unsupervised peer contact in the out-of-school hours is associated with increases in problem behaviour among school-age children, especially for those in low-income environments (Jarett, 1999; Pettit, Bates, Dodge, & Meece, 1999; Posner & Vandell, 1994; Vandell & Shumow, 1999).

Of particular relevance to the present study, the New Hope program, a random assignment anti-poverty program similar in nature to SSP, had a significant impact on 9 to 12 year old children's participation in organized activities (but did not affect activity participation for children 6 to 8 years of age). Most likely this was due to parents' need for such programs in the face of increased employment, but it was also potentially related to parents having more money to pay for costs associated with participation (Huston et al., 2001). The authors of the report suggested that the positive impacts of the program on children's development might be explained by their increased participation in organized activities. In New Hope, there were no program effects on frequency of engaging in unorganized activities (reading, homework, TV viewing, or playing sports without a coach). As noted above, similar increases in structured activities were found in SSP as well (Morris & Michalopoulos, 2003).

A larger body of non-experimental research has examined the components of formal after-school programs as well as structured non-school related lessons and activities that correlate with children's development. Posner and Vandell (1994), who studied the after-school experiences of low-income Grade 3 children, found that the time spent on academics and in enrichment lessons, such as art, music, and drama, was positively correlated with

children's adjustment at school. In contrast, spending time in unstructured outdoor activities was negatively associated with adjustment. Moreover, children who spent time in academic and enrichment activities were less likely to spend time watching TV or engaging in unstructured outdoor activities. Rosenthal and Vandell (1996) further suggested that children in the Grades 3 to 5 reported more positive experiences in structured programs that offered a larger variety of activities. Mahoney and Stattin's (2000) analysis of leisure time activities of 14-year olds similarly suggested that participation in highly structured leisure activities (e.g. school and community-sponsored athletics, music organizations, and church groups) is correlated with low levels of antisocial behaviour, whereas participation in low-structure activities, such as hanging out at a youth recreation centre, is correlated with high levels of antisocial behaviour. This particular analysis also suggested that the patterning of activity participation is relevant: the combination of involvement in unstructured activities with no participation in structured activities showed a stronger association with high antisocial behaviour for boys in particular.

Prior research has found that participation in structured activities can benefit the development of children during the middle school years. In general, however, this research has not examined how different patterns of activities are associated with different outcomes for children. Yet, some research suggests the types and combinations of activities may be important, as extensive time spent in unstructured activities appears not to confer the same benefits as time spent in one (or perhaps more) structured activities.

THE PRESENT STUDY

Our analysis plan is as follows: first we present a detailed examination of activity participation among the children in this sample, employing cluster analytic techniques to identify patterns of activity participation. Next we link these patterns of activity participation to measures of children's academic and behavioural adjustment, and test whether any observed linkages persist in the face of an array of important control variables. We examine these relations separately for boys and girls. Finally, we examine whether these relations persist in the context of sibling fixed-effect estimates that allow us to control for unobserved family-level characteristics.

Method

SAMPLE

Our sample consists of 2,127 children (6 to 12 years of age at the time of assessment) of single-parent welfare recipients in British Columbia and New Brunswick, Canada. These are a subset of the children in the larger evaluation of the Self-Sufficiency Project (SSP). Data on children were collected three years after parents entered the study.

SSP was a demonstration project designed to make work a viable alternative to welfare for low-income parents, whose skills and experience would likely relegate them to low-paying jobs. A group of about 6,000 single parents in British Columbia and New Brunswick who had been on welfare for at least a year were selected at random from the welfare rolls between November 1992 and March 1995. Families who agreed to participate in the study were randomly assigned to the program group that was offered the SSP supplement, or a control group that was not offered the supplement but whose members could continue to receive welfare as usual. SSP's financial supplement paid parents who left welfare and worked at least 30 hours per week half the difference between their actual earnings and a target level of earnings. Supplement payments were available to program group members for a maximum of three years, and only to sample members who initiated SSP payments by finding full-time work within 12 months of entering the study.

PROCEDURES

A baseline survey administered at the time of random assignment provides background information on the families. A follow-up survey at 36 months after random assignment provides information on children's well-being and participation in structured and unstructured out-of-school activities, as well as their parents' employment, earnings, income, material hardship, and expenditures. The 36-month survey was completed by approximately 77 per cent of the research sample. In addition, at the 36-month assessment point, math tests were given directly to children between the ages of 7 and 12, with response rates at 67 per cent (Morris & Michalopoulos, 2000; Morris & Michalopoulos, 2003).

MEASURES

Out-of-school activities. At the 36-month follow-up assessment, parents were asked about their children's participation in eight different activities outside of regular school classes in the past year. These activities might have taken place on either weekdays or on weekends. Three different structured activities were addressed: (1) sports involving teaching or instruction (apart from physical education in school), (2) lessons in music, art, or other non-sport activities (outside of school), and (3) clubs, groups, or community programs with adult leadership. In addition, unstructured time was also addressed: (1) trips to the library,

(2) reading for pleasure, (3) doing homework, (4) playing video or computer games, and (5) watching television.[1]

Math score. A math skills test was administered to 7-to-12-year-old children in Grades 2 to 7. The test, which varied by the child's grade level, consisted of 26 math problems for those in Grade 2 and 34 items for those in Grades 3 and higher. The test included a subset of items from the Canadian Achievement Tests, Second Edition (CAT/2), a mathematics test developed by the Canadian Test Centre that is administered annually in all provinces to approximately 300,000 students from Grade 2 to the end of secondary school and college. The proportion of correct items completed out of the total number of test items was computed for each child.

Academic achievement. Parents were asked about their children's performance in reading, writing, and math. More specifically, parents were asked: "Based on your knowledge of [your child's] school work, including report cards, how did he/she do in the following areas of school in this school year [or in the past year if the interview took place in the summer months]?" For each subject academic functioning was ranked on a five-point scale ranging from "not very well at all" to "very well." A measure of children's average achievement was computed as the average score across the three academic subjects.

Behaviour problems. Parents reported on children's behaviour using a scale developed for use in the National Longitudinal Survey of Children and Youth in Canada (NLSCY). The NLSCY is a unique survey of Canadians from birth to adulthood, and the measure of Behaviour Problems has items similar to those in the Behaviour Problems Index (a 28-item scale; Peterson & Zill, 1986) used in many U.S. studies of the effects of welfare reform programs (Morris, Huston, Duncan, Crosby, & Bos, 2001). An average score was computed across the items (which were coded on a three-point scale ranging from "never/not true" to "often/very true"). Items included both internalizing and externalizing aspects of children's behaviour. Sample items included, "my child is too fearful or anxious," "my child cries a lot," "my child steals at home," and "my child gets into many fights" ($\alpha = 0.92$ for 27 items).

Pro-social behaviour. Parents reported on children's pro-social behaviour using a five-item scale developed for the NLSCY; items are similar to those in the Positive Behaviour Scale used in other welfare demonstration studies (Polit, 1996). Sample items include: "my child tries to help someone who is hurt" and "my child comforts a crying child." Scores on the total positive social behaviour scale were averages across the five items and ranged from "1" ("never") to "3" ("often") ($\alpha = 0.80$).

School behaviour problems. Parents were asked how often in the past school year they were contacted by the school about children's behaviour problems in school. This item has been used in a number of recent welfare and work demonstration studies (e.g. Gennetian & Miller, 2002) and ranged from "1" (never or once) to "3" (four or more times).

Control variables. A series of baseline child and family background variables that might confound the relation between participation in out-of-school activities and outcomes for children were considered, including: demographic characteristics (child gender, parent and child age, and parent race/ethnicity), family composition (the number of children in the household, the presence of a preschool child, and the presence of a spouse or partner),

[1]Children's unsupervised "sport" time was also assessed (running and riding bikes included), but this item was excluded from consideration in the analysis because almost all children participated in some physical activity.

socio-economic characteristics (the number of months of welfare receipt in the past year, the number of months of employment in the past year, whether the parent has a high school diploma or GED (General Educational Development) certification), the total respondent income in the past year (from welfare, earnings and any program supplements), and study-level variables (the province in which the family lived and research group status (program or control group assignment)).

Analysis Strategy

Our first step was to examine out-of-school activity time in greater detail to determine the patterning of activities. Our cluster analysis relies on both hierarchical and iterative methods. As a first step, we employed hierarchical clustering using Ward's minimum-variance clustering method (in SAS, the PROC CLUSTER procedure). Ward's method, like most other clustering methods, is based on an agglomerative hierarchical clustering procedure. In this method, each observation begins in a cluster by itself. The two closest clusters are merged to form a new cluster that replaces the two old clusters. Merging of the two closest clusters is repeated until only one cluster is left. In a cluster analysis, variables with large variances tend to have a greater effect on the resulting clusters than those with small variances. Therefore, in this step of the analysis, we standardize each of the eight time-use variables by its range. See Milligan (1996) for a discussion of various standardization techniques.

Results from the hierarchical cluster method provide the start values (or "cluster centres") for the iterative approach (in SAS, the FASTCLUS procedure), using a k-means algorithm for determining cluster membership. The goal of the iterative cluster analysis is to minimize the distance within clusters while maximizing the distance between clusters. Theoretically meaningful clusters of children are identified with this technique.

We then conduct a series of ordinary least squares (OLS) regressions to test the association of assignment in the clusters to outcomes for children with and without a series of child and family background characteristics that might underlie relations between particular activity groups and outcomes for children.

Finally, we conduct family fixed-effects models to control for unobserved characteristics by estimating the difference in the effects of cluster membership for two (or more) children in the same family. This model estimates the difference between siblings' outcomes as the dependent variable and the difference between siblings in their activity membership as the independent variable. Because the unobserved family effects are assumed to be the same across siblings they can be "subtracted out" of the difference equation.

More formally, assuming our equation of interest is: $Y_{ij} = \alpha + Xj_i\beta + \varepsilon_{ij} + \delta_j$,

where *i* represents the child in a family and *j* represents the family, or the same mother; Y_{ij} is the dependent variable of interest (e.g. child achievement or behavioural outcome); X_{ij} represents the independent variable of interest (e.g. activity participation); ε_{ij} represents the error associated with the child in the family, and δ_j represents the error associated with the family.

In this case, $\hat{\beta} = \beta + \dfrac{\sum X_i(\varepsilon_{ij} + \delta_j)}{\sum X_{ij}^2}$.

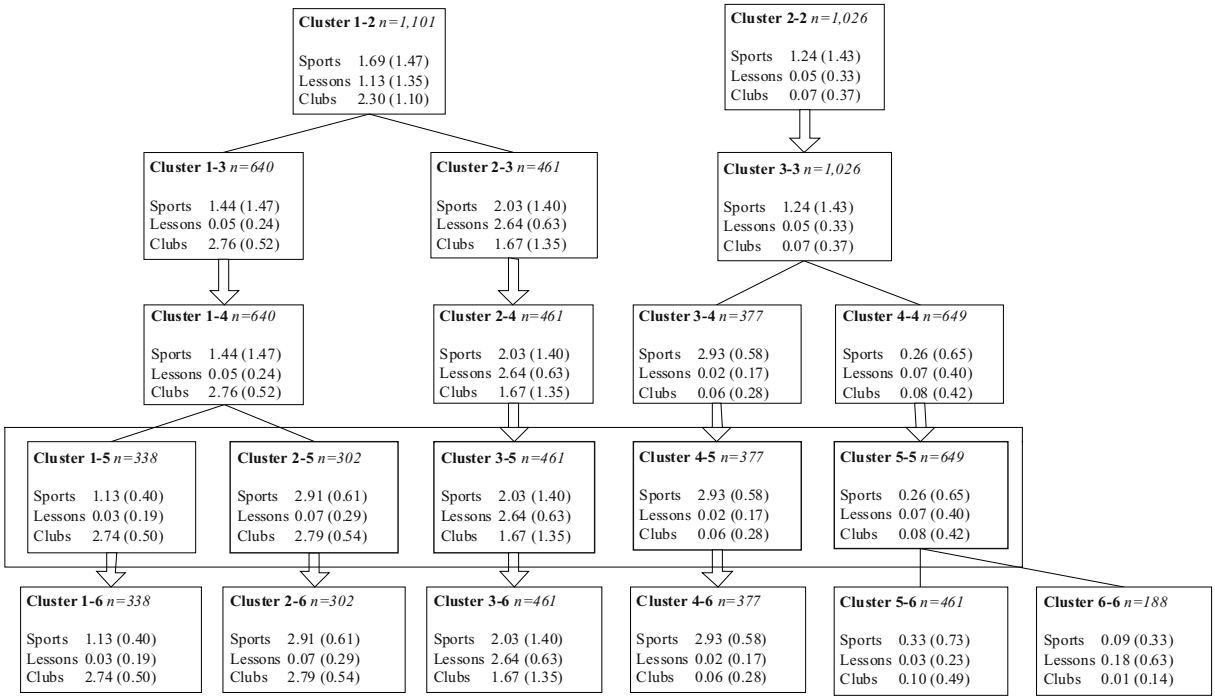
Unless $E(\sum X_i\delta_j) = 0$, the least-squares estimator will be biased. The fixed effects technique estimates the previous model by taking differences across siblings, or "subtracting out" the common unobserved family effect: $Y_{ij} - Y_{i-1,j} = (X_{ij} - X_{i-1,j})\beta + (\varepsilon_{ij} - \varepsilon_{i-1,j})$.

Notably, fixed-effects models provide unbiased estimates *only* under the assumption that the unobserved effect is static across siblings. If this assumption is violated, then the unobserved family-level effect cannot be "subtracted out" of the equation. Furthermore, fixed effects estimates of activity participation may only be identified if and only if siblings within a family experience different patterns of activity participation.

Results

Identification of the clusters. The hierarchical analysis was conducted to determine the cluster solution that would provide theoretically distinct groups of children. The results of the 2-6 cluster solution resulting from the hierarchical analysis are shown in Figure 1. Only the means for the structured activities are presented because nearly all of these solutions produced clusters that were differentiated by their participation in structured (rather than unstructured) activities.

Figure 1: Results of Hierarchical Cluster Analysis — Means of Structured Activities for Each Cluster by Cluster Solution



Note: Standard deviation is indicated in parentheses.

In the two-cluster solution, children were differentiated by their scores in participation in lessons and clubs, with one group of children (Cluster 1-2) with high levels of participation in all three structured activities, and the other (Cluster 2-2) high in only sports activities. In the three-cluster solution, Cluster 1-2 is divided into those children who participate in sports and clubs, but not lessons (Cluster 1-3), as distinct from those who participate in all three structured activities (Cluster 2-3). In the four-cluster solution, the children with high participation in sports (Cluster 3-3) are divided into non-participants with low values on all three structured activities (Cluster 4-4) and those with high participation in only sports (Cluster 3-4). In the five-cluster solution, the sports and clubs group (Cluster 1-4) is divided into a clubs group with low levels of participation in sports (Cluster 1-5) and a clubs and high sports group (Cluster 2-5). Given prior literature indicating a risk to children who participate

only in club or group activities (Mahoney & Stattin, 2000), it seemed critical to allow for this differentiation that was highlighted in this five-cluster solution. The six-cluster solution added little additional explanatory information, dividing the low-participating group into two clusters with very similar levels on the three structured activities. Further inspection of the unstructured activities revealed that this cluster solution parsed this last cluster into children with low scores on the measure of time spent reading (Cluster 6-6, reading mean of 0.60) as separate from children with high scores on the reading measure (Cluster 5-5, reading mean of 3.15).

The iterative solution used the values generated in the hierarchical analysis as start values for the cluster centres. The final five-cluster solution generated a set of clusters that were differentiated primarily by differences in participation in the three structured activities, but not by participation in the five unstructured activities. The only three activities with sizeable R-square values for predicting the variable from the cluster were clubs (0.81), sports with a coach (0.81) and lessons (0.73). All other R-square values were less than 0.02. The overall R-square from this analysis was 0.41.

In Table 1 we present the mean levels of participation for all eight activities in each of the five clusters, resulting from the final, iterative, cluster analysis. Consistent with the results of the hierarchical analysis, the five groups of children can be defined primarily by their participation in structured activities: (a) high participation in clubs (but low in sports and lessons; $n = 384$); (b) high participation in sports (but low in clubs and lessons; $n = 424$); (c) low participation in all three structured activities (clubs, sports and lessons; $n = 675$); (d) high participation in sports and clubs (but low in lessons; $n = 293$); and (e) high participation in all three structured activities (clubs, sports, and lessons; $n = 351$).

Background characteristics of children in different clusters. As indicated earlier, we considered a series of child, family, and background characteristics as potential descriptors of groups of children in each cluster and as covariates in our models. Means on all of these variables are presented in Table 2, first for the full sample, and then separately by cluster membership. Pairwise comparisons between clusters were conducted on all background variables, with significance tests adjusted using the Bonferonni correction for multiple tests. Effects statistically significant at least at the $p < 0.05$ level are reported.

Table 1: Means of Activity Participation Variables by Cluster

	Structured Activities			Unstructured Activities				
	Structured Sports	Lessons	Clubs/Groups	Reading	Library	Homework	TV	Video Games
Cluster 1: High clubs (*n*=384)	0.181	0.229	2.743	2.399	1.493	1.654	0.857	0.198
Cluster 2: High sports (*n*=424)	2.965	0.135	0.079	2.516	1.393	1.491	0.866	0.245
Cluster 3: Low sports, lessons, and clubs (*n*=675)	0.148	0.231	0.028	2.426	1.399	1.479	0.990	0.276
Cluster 4: High sports and clubs (*n*=293)	2.935	0.073	2.835	2.294	1.438	1.713	0.925	0.280
Cluster 5: High sports, lessons, and clubs (*n*=351)	2.401	2.788	1.926	2.891	1.709	1.806	0.724	0.248
Sample size: 2,127								

Note: All scales range from 0 to 4 with higher scores indicating higher participation in the activity.

Table 2: Covariate Means, Overall and by Cluster

	Full Sample		Cluster 1: High Clubs	Cluster 2: High Sports	Cluster 3: Low Sports, Lessons, and Clubs	Cluster 4: High Sports and Clubs	Cluster 5: High Sports, Lessons, and Clubs	Significant Differences Between Clusters
	Mean	St. Dev.	Mean	Mean	Mean	Mean	Mean	
Child is a male	48.9		38.0	56.6	51.3	56.7	40.5	1&5<2,3,4
Child's age	8.8	1.9	8.5	9.1	8.6	9.2	8.9	1&3<2,4
Parent's age	33.8	5.7	33.4	34.4	33.5	34.1	34.0	
Parent's ethnicity is not white	19.6	39.7	18.5	16.7	21.5	19.2	20.8	
Number of children in the household	2.0	0.9	2.1	2.0	2.1	2.0	1.9	5<1,3
Household's youngest child is five or younger	18.9		19.5	16.0	20.4	15.0	22.2	
Parent is married or cohabiting	19.1		20.8	16.5	19.1	22.5	17.4	
Total number of months on IA[a], year 3	8.1	5.1	8.5	7.7	8.4	7.9	8.0	
Total number of months employed, year 3	4.4	5.1	4.1	4.9	3.8	5.3	4.7	1<4; 3<2,4
Parent has a high school degree or GED[b]	54.3		54.9	56.6	51.1	54.6	56.7	
Total income, year 3	12,308	7,127	2,071	13,413	11,610	12,660	12,283	2>3
Family lives in New Brunswick	52.9		64.1	42.9	51.1	67.6	44.2	1&4>2,3,5
In experimental group	50.6		51.8	52.6	50.2	49.5	48.7	
Sample size	2,127		384	424	675	293	351	

Notes: [a]IA indicates income assistance.

[b]GED indicates General Educational Development certification.

Boys were more likely to be in the high sports, high sports and clubs, or the low participation groups and less likely to be in the high clubs and high participation in all three activities groups. Older children were more likely to be in the high sports and high sports and clubs groups than in the three other groups. Children from smaller families were more likely to be in the high participation group than in the low participation or clubs only groups, and those whose parents had a history of more employment were least likely to be in the low participation group and most likely to be in the groups characterized by high sports or high sports and clubs. Children in the low participation group had parents with less income than the high sports group. Finally, more children from New Brunswick were in clusters representing high clubs and high sports and clubs.

These findings provide important information about the individual characteristics, family and economic variables, and social contexts that differentiate among children with different patterns of participation. They also suggest that controlling for these background family and child characteristics may indeed be important in examining the effects of cluster membership on outcomes for children.

OLS estimates of cluster membership on children's achievement and behaviour. In our ordinary least squares (OLS) regression analyses, we compare achievement and behaviour for children with low participation in all three structured activities (Cluster 3) to scores for children who participate in various combinations of structured activities by testing the effects of the four remaining clusters relative to this group. The base model consists of the relations of these four cluster groupings (with Cluster 3 as the omitted category) to the dependent variable; the full model includes the four sets of control variables previously described in addition to the cluster membership variables. Means and standard deviation of the outcome variables are listed to ease interpretation of the parameter estimates.

Results of the achievement analysis are presented in Table 3. Effects on the math score were positive and significant for Clusters 4 (high sports and clubs) and Cluster 5 (participation in all three structured activities) in comparison to those in no structured activities. In addition, children in Cluster 5 (participation in all three structured activities) and Cluster 2 (high sports) were rated significantly higher in achievement by their parents than those in no structured activities. These effects did not change appreciably with the inclusion of controls for child, parent and family background variables. These effects suggest that about a fifth to a quarter of a standard deviation change in math scores and parent-reported achievement is associated with membership in Cluster 5.

Results of the analysis for the behavioural outcomes are presented in Table 4. Children who participated in all three structured activities manifested few behaviour problems and more pro-social behaviour than did those children who had low participation (Cluster 3). For pro-social behaviour, participation in the high sports group (Cluster 2) is also positively associated with children's positive behaviour. The effects of participating in Cluster 5 (all activities) are largely sustained with the inclusion of covariates, although the effect for Cluster 2 falls below statistical significance in the full model. There are no effects of cluster

membership on parental reports of contact about behaviour problems in school.[2] These effects are slightly smaller than those for the academic outcomes — 15 to 20 per cent of a standard deviation change in child behaviour is associated with membership in Cluster 5.

In both sets of models (predicting the achievement and behavioural outcomes), socio-economic variables had at most a weak association with outcomes for children. Perhaps the focus on a more homogeneous low-income population resulted in this reduced pattern of effects for variables that have shown a stronger pattern of association in other work. That is, level of income within a very disadvantaged sample may indeed have very little effect on outcomes for children. However, the focus of this paper is to use these variables to control for observed parental and family influences, rather than to obtain unbiased estimates of the effects of particular socio-economic characteristics on outcomes for children.

In order to determine whether participation predicted achievement and behaviour differently for boys and girls, split-sample regression analyses were conducted by child gender and comparisons were made between the coefficients on the cluster membership variables for each of the child outcomes examined (results not shown). The test statistic used to compare impacts is the weighted sum of squares of the impact estimates for the subgroups and has a chi-squared distribution (Cooper & Hedges, 1994; Greenberg, Meyer, & Wiseman, 1993). Note that this analysis is analogous to the more traditional two-way interaction approach, but without assuming homogeneity of variance across groups. In no case were the differences in parameter estimates statistically significantly different for boys and girls, suggesting that these effects pertain to both sexes.

Fixed Effect Analysis. Sibling fixed-effect analyses were conducted on four of the five child-outcome measures listed above (the sample for the math score was too small to permit this analysis). Because this analysis relies on the more limited sample of children with siblings, we also conducted parallel OLS models for this same subsample to provide comparisons between the two different analyses. These analyses rely on a sample of 927 children in 428 families.

Results for these analyses are presented in Table 5. The OLS model for the sibling subsample shows positive effects of membership in Cluster 5 for both parent-reported achievement and pro-social behaviour (with coefficients of 0.28 and 0.15, respectively). Unlike in the OLS models with the larger sample, we do not find a positive effect of membership in Cluster 5 for behaviour problems — a difference that may be a function of the reduced sample size or the composition of the sibling sample. The significant coefficients in predicting achievement and pro-social behaviour remain positive and significant in the fixed effect estimates — with the fixed effect coefficient larger than the OLS estimate for school achievement (0.62 standard deviation change in child achievement as a result of membership in Cluster 5), and the fixed effect estimate of comparable size to the OLS for pro-social behaviour (0.17 standard deviation change in pro-social behaviour as a result of membership in Cluster 5).

[2]Since contacts about behaviour problems in school is not a true continuous dimension, parallel models were conducted using logistic regression on a dichotomous version of this variable (no contacts vs. any contacts). The conclusions based on this analysis are consistent with those presented in this paper.

Table 3: Regression Models Testing the Effect of Cluster Membership on Child Achievement

	Math Score ($\bar{x}$ =0.53 s=0.28)				Achievement ($\bar{x}$ =3.66 s=0.94)			
	Base Model		Full Model		Base Model		Full Model	
	Parameter Estimate	Standard Error	Parameter Estimate	Standard Error	Parameter Estimate	Standard Error	Parameter Estimate	Standard Error
Cluster 1: High clubs	-0.015	(0.024)	-0.015	(0.024)	-0.009	0.060	-0.058	(0.060)
Cluster 2: High sports	0.036	(0.023)	0.022	(0.022)	0.137	0.059*	0.141	(0.058)*
Cluster 4: High sports, clubs	0.067	(0.025)**	0.064	(0.025)*	0.097	0.066	0.085	(0.066)
Cluster 5: High sports, lessons, clubs	0.081	(0.024)**	0.072	(0.024)**	0.274	0.062**	0.216	(0.061)**
Demographics								
Child is a male			0.005	(0.016)			-0.272	(0.040)
Child's age			0.012	(0.005)*			0.007	(0.011)
Parent's age			-0.001	(0.002)			-0.004	(0.004)
Parent's ethnicity is not white			-0.016	(0.020)			0.081	(0.052)
Family composition								
Number of children in the household			0.002	(0.010)			-0.072	(0.024)**
Household's youngest child is five or younger			-0.044	(0.024)			0.140	(0.057)*
Parent is married or cohabiting			-0.024	(0.022)			-0.035	(0.056)
Socio-economic characteristics								
Total number of months on IA[a], year 3			-0.002	(0.002)			-0.008	(0.005)
Total number of months employed, year 3			0.002	(0.002)			0.005	(0.006)
Parent has a high school degree or GED[b]			0.062	(0.016)**			0.204	(0.041)**
Total income, year 3			0.000	(0.000)			0.000	(0.000)
Province and experimental status								
Family lives in New Brunswick			-0.038	(0.017)*			0.075	(0.044)
In experimental group			0.022	(0.016)			0.082	(0.041)*
R^2	0.016		0.051		0.012		0.063	
F-statistic	5.220**		3.990**		6.210**		8.070**	
N	1,270		1,270		2,075		2,075	

Notes: *Indicates <0.05, and **indicates <0.01.

Cluster 3 (Low sports, lessons and clubs) was the excluded category in the regressions estimating the effects of cluster membership on child cognitive performance and academic achievement.

[a]IA indicates income assistance.

[b]GED indicates General Educational Development certification.

Table 4: Regression Models Testing the Effect of Cluster Membership on Child Behaviour

	Total Problem Behaviour Scale ($\bar{x}$ =1.41 s=0.32)				Pro-Social Behaviour Scale ($\bar{x}$ =2.60 s=0.44)			
	Base Model		Full Model		Base Model		Full Model	
	Parameter Estimate	Standard Error	Parameter Estimate	Standard Error	Parameter Estimate	Standard Error	Parameter Estimate	Standard Error
Cluster 1: High clubs	0.013	(0.021)	0.030	(0.020)	0.030	(0.028)	0.015	(0.028)
Cluster 2: High sports	-0.025	(0.020)	-0.027	(0.020)	0.055	(0.027)	0.045	(0.027)
Cluster 4: High sports and clubs	-0.023	(0.022)	-0.028	(0.022)	0.042	(0.031)	0.044	(0.031)
Cluster 5: High sports, lessons, and clubs	-0.061	(0.021)**	-0.045	(0.021)*	0.120	(0.029)	0.087	(0.029)**
Demographics								
Child is a male			0.130	(0.014)**			-0.136	(0.019)**
Child's age			0.000	(0.004)			0.003	(0.005)
Parent's age			-0.001	(0.001)			0.000	(0.002)
Parent's ethnicity is not white			-0.043	(0.018)*			-0.012	(0.024)
Family composition								
Number of children in the household			-0.002	(0.008)			-0.031	(0.011)**
Household's youngest child is five or younger			0.029	(0.020)			0.024	(0.027)
Parent is married or cohabiting			0.006	(0.019)			-0.006	(0.026)
Socio-economic characteristics								
Total number of months on IA[a], year 3			0.000	(0.002)			-0.002	(0.002)
Total number of months employed, year 3			-0.001	(0.002)			0.004	(0.003)
Parent has a high school degree or GED[b]			-0.039	(0.014)**			0.059	(0.019)**
Total income, year 3			0.000	(0.000)			0.000	(0.000)
Province and experimental status								
Family lives in New Brunswick			0.008	(0.015)			-0.045	(0.021)
In experimental group			-0.016	(0.014)			-0.015	(0.019)
R^2	0.006		0.056		0.008		0.049	
F-statistic	3.060*		7.280**		4.390**		6.190**	
N	2,090		2,090		2,075		2,075	

(continued)

Table 4: Regression Models Testing the Effect of Cluster Membership on Child Behaviour (Cont'd)

	School Behaviour Problems ($\bar{x}$ =1.25 s=0.58)			
	Base Model		Full Model	
	Parameter Estimate	Standard Error	Parameter Estimate	Standard Error
Cluster 1: High clubs	-0.068	(0.037)	-0.036	(0.036)
Cluster 2: High sports	-0.014	(0.036)	-0.023	(0.035)
Cluster 4: High sports and clubs	0.003	(0.040)	-0.015	(0.040)
Cluster 5: High sports, lessons, and clubs	-0.057	(0.038)	-0.025	(0.037)
Demographics				
Child is a male			0.265	(0.025)
Child's age			0.008	(0.007)
Parent's age			-0.002	(0.002)
Parent's ethnicity is not white			-0.022	(0.032)
Family composition				
Number of children in the household			0.018	(0.014)
Household's youngest child is five or younger			0.039	(0.035)
Parent is married or cohabiting			0.014	(0.034)
Socio-economic characteristics				
Total number of months on IA[a], year 3			0.005	(0.003)
Total number of months employed, year 3			0.004	(0.003)
Parent has a high school degree or GED[b]			-0.026	(0.025)
Total income, year 3			0.000	(0.000)
Province and experimental status				
Family lives in New Brunswick			0.018	(0.027)
In experimental group			-0.005	(0.025)
R^2	0.003		0.059	
F-statistic	1.330		7.740**	
N	2,119		2,119	

Notes: *Indicates <0.05, and **indicates <0.01.

Cluster 3 (Low sports, lessons, and clubs) was the excluded category in the regressions estimating the effects of cluster membership on child behaviour.

[a]IA indicates income assistance.

[b]GED indicates General Educational Development certification.

Table 5: OLS and Fixed Effect Estimates of the Effects of Cluster Membership on Child Achievement and Behaviour

	Achievement		Total Problem Behaviour Scale		Total Pro-Social Behaviour Scale		School Behaviour Problem	
	OLS	Family Fixed Effects	OLS	Family Fixed Effects	OLS	Family Fixed Effects	OLS	Family Fixed Effects
Cluster 1: High clubs	0.038	0.161	0.001	-0.030	0.064	0.020	-0.043	-0.171
	(0.092)	(0.186)	(0.032)	(0.057)	(0.042)	(0.061)	(0.053)	(0.113)
Cluster 2: High sports	0.035	0.250	-0.011	-0.001	0.119**	0.140**	0.020	0.036
	(0.095)	(0.158)	(0.033)	(0.048)	(0.043)	(0.051)	(0.055)	(0.094)
Cluster 4: High sports and clubs	0.127	0.661**	-0.020	0.041	0.039	0.046	-0.055	-0.009
	(0.105)	(0.212)	(0.036)	(0.065)	(0.047)	(0.068)	(0.060)	(0.128)
Cluster 5: High sports, lessons, and clubs	0.282**	0.618**	-0.030	-0.024	0.148**	0.165*	-0.001	-0.146
	(0.107)	(0.228)	(0.037)	(0.069)	(0.049)	(0.073)	(0.062)	(0.136)
N (families)		415		418		414		428
N (children)	895	895	903	903	894	894	927	927

Notes: Standard errors in parentheses.

*Indicates <0.05, and **indicates <0.01.

The sample used for these analyses includes only those children for whom data is available on multiple children in the family.

Cluster 3 (Low sports, lessons, and clubs) was the excluded category in all regressions.

Discussion

We found that participation in a combination of all of the structured activities considered (sports, lessons, and clubs) is consistently significantly associated with benefits for children — children in this group scored higher than those who did not participate in any structured activities at all on school achievement and pro-social behaviour. Notably, these effects were sustained with controls for parent and child demographic characteristics and family composition, and also with the inclusion of parents' socio-economic characteristics. These effects were also apparent in analyses that controlled for unobserved characteristics. Similar benefits, but less consistent across outcomes and analyses (ordinary least squares (OLS) versus fixed effects), were found for the clusters representing participation in sports only (for achievement and pro-social behaviour) and for participation in sports and clubs (for math test score). The cluster analytic approach we adopted provided an alternative to the more commonly used variable-oriented approach. In particular, it yielded more insights into the naturally occurring patterns of children's time-use in the real world, and the benefits of those patterns for children's behavioural and academic outcomes. Our analysis suggested that a sizeable number of children participate in a combination of structured activities, and that the group who participated in all three of these activities demonstrated the greatest benefits in our assessments of well-being.

We found no differences between children who participated in structured clubs only and those with low participation in all three structured activities. These findings are consistent with prior work that finds that the quality and nature of the out-of-school activity is critical in understanding whether participation in those activities will benefit children's development. Although these club-type activities were supervised by an adult, participation in them was not meaningfully related to children's academic achievement and emotional well-being, perhaps because clubs provide less formal instruction or skill building opportunities than (for example) lessons, or perhaps because the nature of the participation is less regular or intensive. Clubs might also differ in terms of the intensity or quality of adult supervision or opportunities for peer interaction compared with other organized activities such as team sports. However, our analysis did not offer a fine-grained look at the quality or nature of clubs, and it is certainly possible that high-quality clubs that offer opportunities for skill development or positive social interactions could also confer benefits to children both cognitively and socially. Therefore we would not want to conclude that based on the present data all clubs fail to offer developmental benefits.

The natural question that arises from this type of cross-sectional analysis is whether we can attribute these observed associations to the causal effect of activity participation, or whether characteristics of children or families account for the observed relations. Parents might play a substantial role in choosing the activities that their children participate in, especially given the relatively young age of these children. For example, an especially motivated, involved, or dedicated parent might be more apt to allow, mandate, or encourage participation in team sports or lessons, perhaps because that parent is more willing or able to accept a greater responsibility of transporting the child, devoting extra week-end time to attending matches, and similar. Some parents might also be more motivated to help their

children in other ways that are correlated with their children's academic or behavioural adjustment. If this were the case, then the correlation between activity participation and child well-being would not be causal; it would simply reflect parental motivation or involvement.

Another threat to causation, especially in a low-income sample and for a set of activity choices including lessons and team sports, would be differences in family resources. For example, parents with more discretionary income might be more able to enrol their children in lessons or purchase uniforms and the like for a team sport, and that income might benefit children's outcomes as well.

We approach these threats to causation at the family level in two ways. Our inclusion of a large set of covariates capturing observed structural and economic characteristics of the family helps to mitigate against some of these family-level confounds. In addition, our sibling fixed effects models account for stable unmeasured family-level effects, such as preferences for or motivation to participate in different types of activities. By and large, the significant results reported here persist in these analyses. Because of these analyses, we are generally confident that the associations we have obtained here are not merely reflections of unmeasured parental characteristics.

While sibling fixed-effect models do a very good job of removing shared family influences on the effects of cluster membership on outcomes, they do little to control for individual child characteristics. It may be that children with certain characteristics select into a set of activities that suits their personalities. For example, children who are more motivated, athletically inclined, or perhaps more pro-social may be more likely, given a choice, to engage in sports. Or, very socially inclined children may seek out multiple activities that allow them multiple social interactions. Indeed, research has suggested that selection and causation operate simultaneously in the association between time use and children's adjustment (Posner & Vandell, 1999). Regrettably, our data do not provide a longitudinal assessment of change over time in children's characteristics, which would permit us to examine this causal order. An alternative approach would be to conduct an instrumental variables analysis, and the Self-Sufficiency Project (SSP) data do provide a single exogenous instrument — random assignment to the program and control group. However, because the program was targeted at multiple changes in families (parents' employment, welfare receipt and income) in addition to children's activity participation, more than one instrument would be needed to identify this model (Gennetian, Morris, & Bos, in press). Because we have access to only a single instrument, we cannot identify the effects of activity participation using this approach.

In addition to our inability to control for the effects of child characteristics, other limitations deserve mention. Most notably, our findings are most germane to the effects of activity participation on outcomes for children in single parent, welfare-recipient families. The same benefits of activity participation may not be found in more resource-rich families for whom activity participation may be less critical for children's developmental outcomes. In addition, while the cluster analytic approach did a good job of differentiating the groups of children based on their participation in structured activities, it did not differentiate among children based on their participation in *unstructured* activities. Because of this, our analysis could not test the extent to which unstructured activities might benefit children's development, or even compensate for lack of participation in structured activities. Indeed, while the cluster analysis yielded some interesting results about the effects of activity

participation on behavioural and achievement outcomes, it should not necessarily be interpreted as the "correct" number of groups in this sample. Finally, while the cluster analysis allowed us to test the effects on children's well-being of naturally-occurring patterns of activity participation, the results are consistent with the conclusion that the specific patterning may not in fact be any more important than the breadth of structured activity participation — and this latter effect might have been found using a more typical variable-centred analysis.

Our analysis provides evidence that participation in some types of structured, out-of-school activities can benefit children's academic adjustment and emotional well-being. The naturally occurring clusters of activity participation showed that many children participate in many kinds of activities but it appears that not all types of activities confer equal benefits. In general, children showed the greatest benefits when they participated in a combination of sports, clubs, and lessons; there was more limited evidence of benefits from participation in a combination of sports and clubs and sports only. The precise size of these effects varies depending on the analysis and the sample (the OLS estimates find effects in the one fifth to one quarter of a standard deviation range, while those in the sibling samples and those from the fixed-effect estimates are considerably larger), but all show a benefit that is large enough to be considered noteworthy for children's development.

The common factor among the different groupings of activities associated with positive adjustment is sports participation. Team sports may help children to develop skills that are important to successful development during this stage of life, including athletic competencies, emotional and behavioural self-regulation, and the development of ties to peers and other adult mentors. The experiences of success and enjoyment while learning these skills might be expressed in superior academic and behavioural adjustment. Given that successful development in these arenas can help place children on positive trajectories as they move into adolescence, these findings should help to bolster efforts to provide meaningful and enriching opportunities for children during the out-of-school hours.

References

Cooper, H., & Hedges, L. (1994). *The Handbook of Research Synthesis.* New York: Russell Sage Foundation.

Eccles, J. (1999). The development of children ages 6 to 14. *The Future of Children, 9* (2), 30–44.

Erikson, E. (1968). *Identity, youth, and crisis.* New York: W. W. Norton and Company.

Gennetian, L. A., & Miller, C. (2002). Children and welfare reform: A view from an experimental welfare program in Minnesota. *Child Development, 73* (2), 601–620.

Gennetian, L. A., Morris, P., & Bos, J. (in press). Using instrumental variables analysis to learn more from social policy experiments. In H. Bloom (Ed.), *Moving to the Next Level: Combining Experimental and Non-experimental Methods to Advance Employment Policy Research.* New York: Russell Sage.

Greenberg, D., Meyer, R. H., & Wiseman, M. (1993). Prying the lid from the black box: Plotting evaluation strategy for welfare employment and training programs. Madison, WI: University of Wisconsin, Institute for Research on Poverty.

Huston, A. C., Duncan, G. J., Granger, R., Bos, J., McLoyd, V., Mistry, R., Crosby, D., Gibson, C., Magnuson, K., Romich, J., & Ventura, A. (2001). Work-based anti-poverty programs for parents can enhance the school performance and social behavior of children. *Child Development, 72*, 318–336.

Jarett, R. (1999). Successful parenting in high-risk neighborhoods. *The Future of Children, 9* (2), 45–50.

Lamb, M. (1998). Non-parental child care, context, quality, correlates and consequences. In I. E. Sigel & K. A. Renninger (Eds.), *Handbook of Child Psychology* (4th ed., pp. 73–134), New York: Wiley.

Mahoney, J. L., & Stattin, H. (2000). Leisure time activities and adolescent anti-social behavior: The role of structure and social context. *Journal of Adolescence*, *23*, 113–127.

Michalopoulos, C., Tattrie, D., Miller, C., Robins, P. K., Morris, P., Gyarmati, D., Redcross, C., Foley, K., & Ford, R. (2002). *Making work pay: Final report on the Self-Sufficiency Project for long-term welfare recipients.* Ottawa: Social Research and Demonstration Corporation.

Milligan, G. W. (1996). Clustering validation: Results and implications for applied analysis. In P. Arabie, L. J. Hubert, & G. De Soete (Eds.), *Clustering and Classification.* River Edge, NJ: World Scientific Publications.

Morris, P., Huston, A., Duncan, G., Crosby, D., & Bos, J. (2001). *How Welfare and Work Policies Affect Children: A Synthesis of Research.* New York: Manpower Demonstration Research Corporation.

Morris, P., & Michalopoulos, C. (2000). *The Self-Sufficiency Project at 36 Months: Effects on Children of a Program that Increased Parental Employment and Income.* Ottawa: Social Research and Demonstration Corporation.

Morris, P., & Michalopoulos, C. (2003). Findings from the Self-Sufficiency Project: Effects on children and adolescents of a program that increased employment and income. *Journal of Applied Developmental Psychology, 24* (2), 201–239.

Peterson, J. L., & Zill, N. (1986). Marital disruption, parent-child relationships, and behavior problems in children. *Journal of Marriage and the Family, 48*, 295–307.

Pettit, G., Bates, J., Dodge, K., & Meece, D. (1999). The impact of after-school peer contact on early adolescent externalizing problems is moderated by parental monitoring, perceived neighborhood safety, and prior adjustment. *Child Development, 70*, 768–778.

Pierce, K., Hamm, J., & Vandell, D. (1999). Experiences in after-school programs and children's adjustment in first-grade classrooms. *Child Development, 70*, 756–767.

Polit, D. F. (1996). *Self administered teacher questionnaire in the New Chance 42-month survey*. New York: Manpower Demonstration Research Corporation.

Posner, J., & Vandell, D. (1994). Low-income children's after-school care: Are there beneficial effects of after-school programs? *Child Development, 65*, 440–456.

Posner, J., & Vandell, D. (1999). After-school activities and the development of low-income urban children: A longitudinal study. *Developmental Psychology, 35*, 868–879.

Rosenthal, R., & Vandell, D. (1996). Quality of school-aged child-care programs: Regulatable features, observed experiences, child perspectives, and parent perspectives. *Child Development, 67*, 2434–2445.

Shonkoff, J. P., & Philips, D. A. (2000). *From neurons to neighborhoods: The science of early childhood development.* Washington, DC: National Academy Press.

Vandell, D., & Shumow, L. (1999). After-school childcare programs. *The Future of Children, 9* (2), 64–80.