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La contribution du climat social de la classe et de l'implication des parents à la maternelle à la réussite scolaire au primaire

par
Youmna Ghosn

Département de psychologie
Faculté des arts et des sciences

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présentée par
Youmna Ghosn

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Michel Janosz, président rapporteur
Linda S. Pagani, directrice de recherche
Sophie Parent, membre du jury
Christa Japel, examinateur externe
_____, représentant du doyen de la FES

Résumé

Cette thèse examine le rôle du climat social de la classe sur le développement comportemental et le rôle de l'implication des parents dans la vie scolaire sur le développement cognitif au primaire.

Le premier article examine la relation entre le climat social de la classe mesuré par l'enseignant de la maternelle et le développement comportemental entre la maternelle et la troisième année du primaire. Plus précisément, il examine l'impact de l'appui reçu de la part de l'enseignant et de l'importance accordée à la réglementation sur le développement de la détresse émotionnelle et de l'agressivité physique entre la fin de la maternelle et la fin de la troisième année du primaire. Des analyses multiniveaux à mesures répétées effectuées sur un échantillon de l'Étude montréalaise longitudinale sur le préscolaire (N = 619) indiquent que le climat social de la classe explique partiellement les différences interindividuelles dans les trajectoires comportementales. Les enfants qui expérimentent une plus grande importance accordée à la réglementation connaissent une baisse de leur détresse émotionnelle et de leur agressivité physique à travers le temps.

Le second article examine en profondeur la relation entre l'implication des parents dans la vie scolaire à la maternelle et les habiletés en mathématiques à la fin de la deuxième année du primaire. Plus précisément, il examine l'effet modérateur du revenu familial et l'effet médiateur des habiletés d'attention de l'enfant. Des analyses de régressions hiérarchiques effectuées sur un échantillon de l'Étude montréalaise longitudinale sur le préscolaire (N = 264) indiquent des résultats différents selon le revenu familial. Dans les familles dont le revenu est inférieur à 25,000 $CAN, l'implication des parents à la maison dans les expériences éducatives de l'enfant et l'implication des parents à l'école sont associées à de meilleures habiletés en mathématiques. Dans les familles dont le revenu est supérieur ou égal à 25,000 $CAN, l'implication des parents à la maison dans les expériences éducatives de l'enfant est marginalement associée à de moins bonnes habiletés en mathématiques. Aucune de ces relations n'est expliquée par les habiletés d'attention de l'enfant.

Mots-clés : climat social de la classe, développement comportemental, implication des parents dans la vie scolaire, développement cognitif, revenu familial, habiletés d'attention, maternelle et début du primaire

Abstract

This thesis examined the role of classroom social climate on behavioral development and the role of parental involvement in schooling on cognitive development in elementary school.

The first article examined the links between teacher-reported kindergarten classroom social climate and children behavioral development from kindergarten to third grade. More specifically, it examined the impact of teacher support and classroom management on the development of emotional distress and physical aggression between the end of kindergarten and the end of third grade. Using a subsample from the Montreal Longitudinal Preschool Study (N = 619), multilevel analyses results indicated that classroom social climate partly accounted for the differences in children's behavioral trajectories. Children exposed to more classroom management in kindergarten showed significant decreases in emotional distress and physical aggression over time. These findings are above and beyond the influence of related child, family, and teacher characteristics and have implications for research and policy improvement.

The second article conducted in-depth examination of the relationship between parental involvement in kindergarten and math skills in second grade. More specifically, it paid close attention to the moderating effect of family income and the intermediate effect of attention skills. Using a subsample from the Montreal Longitudinal Preschool Study (N = 264), hierarchical regression analyses suggested different processes. When family income was less than CDN $25,000, parental involvement in learning experiences at home and parental involvement at school were associated with better math skills. When family income was CDN $25,000 or more, parental involvement in learning experiences at home was marginally associated with lower math skills. None of these relationships was explained by attention skills. These findings are above and beyond the influence of gender, prior cognitive and behavioral characteristics, parental education, and family structure. They suggest that parental involvement in schooling should be viewed as an effective intervention for improving the learning outcomes of children living in intense poverty.

Keywords: Classroom social climate, behavioral development, parental involvement in schooling, cognitive development, family income, attention skills, middle childhood

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Liste des sigles et des abréviations

CES	Classroom Environment Scale
CLASS	Classroom Assessment Scoring System
GFF	General Family Functioning
LCS	Learning Climate Scale
MAR	Missing At Random
MCAR	Missing Completely At Random
MLPS	Montreal Longitudinal Preschool Study
NICHD	National Institute of Child Health and Human Development
NKT	Number Knowledge Test
NLSCY	National Longitudinal Study of Children and Youth
NMAR	Not Missing At Random
PPVT	Peabody Picture Vocabulary Test
SBQ	Social Behavior Questionnaire

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Introduction

Contexte théorique

Les caractéristiques personnelles à l'âge préscolaire sont associées à l'adaptation psychosociale au cours du développement (Duncan et al., 2007 ; McClelland, Acock, & Morrison, 2006 ; Sameroff, 1998 ; Tremblay, Pihl, Vitaro, & Dobkin, 1994 ; Vitaro, Brendgen, Larose, & Tremblay, 2005). À titre d'exemple, les déficits de l'attention à la maternelle sont associées au rendement scolaire au primaire (Duncan et al., 2007) et à l'obtention d'un diplôme d'études secondaires au début de l'âge adulte (Vitaro et al., 2005). Les résultats des études encouragent les chercheurs et les éducateurs à envisager les problèmes socioaffectifs et cognitifs à l'école primaire comme des éléments intermédiaires dans la chaîne développementale et à considérer l'âge préscolaire comme une période importante pour la promotion des habiletés nécessaires à la préparation et à la réussite scolaires.

Des programmes préscolaires tels que *Head Start*, *Perry Preschool* et Opération Renouveau ont vu le jour, en Amérique du Nord, à la suite des politiques de lutte contre la pauvreté. Les concepteurs de ces programmes souhaitaient offrir aux enfants des milieux défavorisés des chances de développement équivalentes à celles des enfants des milieux plus favorisés en mettant à leur disposition des ressources développementales absentes de leur milieu de vie familial. De nos jours, les chercheurs et les éducateurs reconnaissent l'importance d'améliorer les habiletés socioaffectives et de stimuler les connaissances en mathématiques et en littératie de tous les enfants d'âge préscolaire (Duncan et al., 2007 ; Klein, 2004). Au Québec, les classes de maternelle cinq ans à plein temps initialement réservées aux enfants des milieux défavorisés sont ainsi accessibles, depuis 1997, à tous les enfants de la province quelle que soit leur origine économique.

La transition du préscolaire au primaire représente une période importante de la scolarisation (Dionne & Rousseau, 2006). Lorsqu'ils intègrent l'école primaire, les enfants doivent s'adapter à un environnement d'apprentissage plus structuré, plus formel et davantage orienté vers l'acquisition d'habiletés et de connaissances cognitives. Les chercheurs et les éducateurs considèrent les programmes préscolaires comme des interventions pertinentes pour aider les enfants à développer les aptitudes

nécessaires à la préparation et à la réussite scolaires (Campbell & Ramey, 1994 ; Capuano et al., 2001).

L'impact des programmes préscolaires sur la réussite scolaire a fait l'objet de nombreuses études. Les études qui se sont intéressées à la simple fréquentation (Pagani, Larocque, Tremblay, & Lapointe, 2003, 2004) et à la durée de fréquentation d'un programme préscolaire (Entwisle & Alexander, 1998 ; Entwisle, Alexander, Cadigan, & Pallas, 1987 ; Frazier & Morrison, 1998 ; Karweit, 1994 ; Lapointe, Tremblay, & Hébert, 2005 ; Reynolds, 1995) ne révèlent généralement aucun effet sur le niveau de performance individuelle des enfants à moyen et à long terme. Au contraire, les études qui se sont intéressées au type de programme (Weikart, 1987 ; Weikart & Schweinhart, 1992) révèlent un effet sur le niveau de performance individuelle des enfants à moyen et à long terme. Ces résultats ont amené les chercheurs à conclure que plus que la simple fréquentation ou que la durée de fréquentation d'un programme préscolaire, c'est le contenu de l'intervention (e.g., le curriculum ou l'environnement socioéducatif) qui influence la réussite scolaire des enfants (Lapointe et al., 2005 ; Pagani et al., 2004 ; Paquette, 1998). Alors que l'importance des programmes préscolaires ne semble plus être remise en question (Capuano et al., 2001 ; Gorey, 2001 ; Preschool Curriculum Evaluation Research Consortium, 2008), il convient d'identifier plus en profondeur les liens entre leur contenu et les indicateurs de la réussite scolaire.

La mission éducative des programmes préscolaires est d'assurer le développement des capacités intellectuelles, affectives, morales et sociales de l'enfant. Elle vise à instruire et à socialiser l'enfant afin de lui permettre de s'adapter à l'école et de s'intégrer à la société en tant que citoyen compétent (Shonkoff & Phillips, 2000 ; Zigler, Haskins, & Lyon, 2004). Le développement de l'enfant est le résultat de relations bidirectionnelles et continues entre ses caractéristiques personnelles et l'ensemble des contextes dans lesquels il évolue. L'accompagnement de l'enfant doit donc être pensé en fonction des facteurs biologiques, psychologiques, sociaux et culturels qui influencent sa vie.

La reconnaissance de la globalité de l'enfant et de son environnement implique la nécessité pour les institutions éducatives d'adopter une approche compréhensive qui

intègre les ressources éducatives présentes dans les différents milieux de vie de l'enfant. Plus particulièrement, elle implique la nécessité pour les institutions éducatives d'appréhender leur environnement socioéducatif de façon large. En effet, l'environnement socioéducatif des programmes préscolaires et scolaires efficaces ne se cantonne pas aux dimensions spécifiques à l'institution éducative *stricto sensu*, notamment à son climat social et aux pratiques éducatives entre les élèves, les enseignants et la direction de l'école. Il se rapporte également à la philosophie de l'institution éducative à l'égard du rôle des différents milieux de vie de l'enfant et aux pratiques éducatives mises en place pour favoriser l'implication de ces milieux de vie dans la vie scolaire de l'enfant.

Les parents sont les premiers éducateurs de l'enfant (Lerner, Castellino, Terry, Villarruel, McKinney, 1995). Leur influence s'exerce tout au long de sa vie, même si elle varie en fonction des étapes de son développement. Avec l'avènement de la révolution industrielle, le rôle des parents dans l'instruction de l'enfant avait diminué en faveur d'une réglementation attribuant de plus en plus de pouvoirs à l'école (Connors & Epstein, 1995 ; Fishel & Ramirez, 2005). Une dichotomie s'était ainsi créée entre la famille comme principal agent de socialisation et l'école comme principal agent d'instruction. Au cours des dernières décennies, le modèle écologique de Bronfenbrenner (1979) a particulièrement favorisé la reconnaissance grandissante de l'influence de la famille et de l'école sur le développement général de l'enfant et a encouragé un rapprochement entre ces deux institutions (Fantuzzo, Tighe, & Childs, 2000). Depuis, de nombreuses pratiques et politiques scolaires préconisant l'implication des parents dans la vie scolaire de l'enfant ont vu le jour dans des lieux aussi divers que l'Angleterre, l'Australie, les États-Unis (Connors & Epstein, 1995 ; Desimone, 1999) et le Québec (MEQ, 1999, 2000).

Les chercheurs, les éducateurs et les parents considèrent le climat social et l'implication des parents dans la vie scolaire de l'enfant comme des indicateurs importants pour l'évaluation de l'environnement socioéducatif des écoles primaires et secondaires (e.g., Janosz, Georges, & Parent, 1998 ; Pritchett Johnson, Livingston, Schwartz, & Slate, 2000). La présente thèse s'intéresse à la contribution du climat social et de l'implication des parents dans la vie scolaire de l'enfant à la maternelle

au développement socioaffectif et cognitif des enfants issus de milieux défavorisés au début du primaire. À la maternelle, les enfants passent la plupart de leur temps dans un local principal, en compagnie d'un enseignant principal et d'un seul groupe d'élèves. Il apparaît donc pertinent d'en mesurer le climat social au niveau de la classe plutôt que de l'école. En conclusion, nous espérons que les résultats de ce travail guideront les chercheurs et les éducateurs qui souhaiteraient promouvoir à la maternelle un environnement socioéducatif favorable à la réussite scolaire des enfants issus de milieux défavorisés au début du primaire.

Présentation des articles de la thèse

La présente thèse se base sur les données de l'Étude montréalaise longitudinale sur le préscolaire menée auprès d'enfants résidant dans les quartiers les plus pauvres de la région de Montréal. Elle comporte deux articles d'égale importance auxquels j'ai contribué en effectuant les recherches documentaires, les analyses statistiques et la rédaction des textes.

Article 1. How does kindergarten classroom social climate contribute to behavioral development in middle childhood?

Les études sur l'environnement socioéducatif sont fortement influencées par les travaux de Moos et de Trickett (Moos, 1979 ; Moos & Trickett, 1974) et plus particulièrement par leur évaluation du climat social de la classe. Selon ces auteurs, l'environnement d'une classe comporte une dimension physique, une dimension organisationnelle, une dimension d'agrégation sociale et une dimension de climat social. Cette dernière est la plus importante, car elle médiatise l'effet des trois autres sur le développement socioaffectif et cognitif de l'enfant. Elle a trait à l'atmosphère générale qui se dégage du contexte de la classe, c'est-à-dire aux caractéristiques qui y sont valorisées, récompensées et le plus visiblement ressenties. Elle comporte une composante relationnelle (l'investissement du milieu, le soutien relationnel et l'expression personnelle), une composante de croissance personnelle (les opportunités qu'offre le milieu pour le développement personnel) et une composante de maintien et de changement du système (l'ordre, la clarté des attentes, le contrôle et la réaction au changement).

Une bonne compréhension de l'impact du climat social de la classe sur le développement général de l'enfant est essentielle pour l'amélioration de l'environnement socioéducatif de la classe et est nécessaire pour la formation et l'évaluation des enseignants (Pianta, Belsky, Houts, Morrison, & The NICHD Early Child Care Research Network, 2007). De nombreuses études ont analysé les caractéristiques du climat social de la classe qui profiteraient le mieux à la réussite scolaire des élèves. Ces études ont principalement examiné la contribution du climat social de la classe à l'instruction de l'enfant et se sont ainsi principalement limitées à la mission de l'école dans le développement cognitif de l'enfant. L'intérêt des chercheurs pour la contribution du climat social de la classe à la socialisation de l'enfant semble néanmoins se préciser depuis quelques années. Ces chercheurs suggèrent qu'un climat relationnel chaleureux et soutenant et qu'un climat disciplinaire clair, juste et consistant favorisent le développement socioaffectif de l'enfant (Moos, 1979; Rimm-Kaufman, La Paro, Downer, & Pianta, 2005). Mais, pour certaines raisons (e.g., utilisation de mesures très larges), les résultats de leurs études ne permettent pas encore de préciser clairement le lien entre l'atmosphère relationnelle et disciplinaire de la classe de maternelle et l'adaptation socioaffective au primaire.

L'objectif de ce premier article de nature empirique est d'avoir une meilleure connaissance de la contribution de l'atmosphère relationnelle et disciplinaire de la classe de maternelle au développement comportemental de l'enfant. Plus précisément, cette étude longitudinale et prospective examine l'impact de l'appui reçu de la part de l'enseignant et de l'importance accordée à la réglementation sur le développement de la détresse émotionnelle et de l'agressivité physique de l'enfant entre la maternelle et la troisième année du primaire.

Article 2. How does kindergarten parental involvement in schooling contribute to cognitive development in middle childhood? Moderating and mediating processes

L'implication des parents dans la vie scolaire s'intéresse, comme son nom l'indique, au rôle des parents dans la vie scolaire de l'enfant (Deslandes, Potvin, & Leclerc, 2000 ; Keith, Reimers, Fehrmann, Pottebaum, & Aubey, 1986). Diversement définie, elle renvoie globalement à la participation des parents aux

expériences et aux processus éducatifs de l'enfant (Jeynes, 2007). Elle comporte plusieurs formes telles que les aspirations et les attentes des parents (Fan & Chen, 2001 ; Hong & Ho, 2005 ; Jeynes, 2007 ; Lee & Bowen, 2006 ; Smith & Hausafus, 1998), leur implication dans les activités d'apprentissage à la maison (Bérubé, Poulin, & Fortin, 2007 ; Epstein, 1995 ; Kohl, Lengua, & McMahon, 2000), les contacts qu'ils entretiennent avec les enseignants et l'école (Deslandes et al., 2000 ; Epstein, 1995 ; Fantuzzo et al., 2000) et leur implication à l'école (Epstein, 1995 ; Hill & Craft, 2003 ; Reynolds, Mavrogenes, Bezruczko, & Hagemann, 1996).

Les chercheurs reconnaissent la contribution des parents à la vie scolaire de l'enfant (Bronfenbrenner, 1974 ; Connors & Epstein, 1995 ; Pianta, 1997). Les études soulignent la nécessité de les impliquer, dès le préscolaire, afin d'offrir à l'enfant l'environnement le plus approprié à ses apprentissages, d'améliorer ses habiletés cognitives et son rendement scolaire et de favoriser sa réussite scolaire (Dearing, Kreider, Simpkins, & Weiss, 2006; Fantuzzo et al., 2000 ; Gershoff, Aber, Raver, & Lennon, 2007; Miedel & Reynolds, 1999 ; Reynolds, 1992 ; Shumow, Vandell, & Kang, 1996). Malgré ce consensus, notre compréhension du rôle des parents dans la vie scolaire de l'enfant demeure, à certains égards, quelque peu limitée.

Effet modérateur du revenu familial. L'implication des parents dans la vie scolaire est perçue par certains chercheurs, intervenants et décideurs comme une ressource environnementale socioéducative susceptible d'améliorer la performance scolaire des enfants pauvres (Connors & Epstein, 1995) et de réduire l'écart qui les sépare des enfants mieux nantis (Domina, 2005). Pourtant, il existe, à ce jour, seulement deux études qui analysent l'effet modérateur unique du revenu familial sur la relation entre l'implication des parents et la performance scolaire de l'enfant (Desimone, 1999 ; Lee & Bowen, 2006). La première rapporte quelques effets différentiels à l'école secondaire qui favorisent tantôt les enfants à revenu familial faible, tantôt les enfants à revenu familial moyen. La seconde rapporte un seul effet différentiel à l'école primaire qui concerne les attentes parentales élevées à l'égard du niveau d'éducation que l'enfant atteindra et qui favorise les enfants issus des milieux moins défavorisés. Ces études souffrent de problèmes méthodologiques qui

en limitent sérieusement les conclusions (absence de mesure du rendement scolaire antérieur et, surtout, concomitance des mesures de l'implication des parents et du rendement scolaire). En effet, en l'absence d'un devis longitudinal, il est impossible de savoir si les résultats de ces études traduisent l'effet différentiel de l'implication des parents sur la performance scolaire ou l'effet différentiel de la performance scolaire sur l'implication des parents.

Le premier objectif de ce second article de nature empirique est d'avoir une meilleure connaissance de l'effet modérateur du revenu familial sur la relation entre l'implication des parents dans la vie scolaire à la maternelle et les habiletés en mathématiques à la fin de la deuxième année du primaire.

Effet médiateur de l'engagement scolaire et plus précisément des habiletés d'attention. Les mécanismes qui lient l'implication des parents dans la vie scolaire au développement cognitif de l'enfant sont, à quelques exceptions près, encore peu connus. L'invitation des chercheurs (Grolnick & Slowiaczek, 1994 ; Hong & Ho, 2005 ; Slaughter-Defoe, 1999) à effectuer un changement de cap dans les études et à s'intéresser davantage à ces mécanismes est donc la bienvenue. Il est d'ailleurs étonnant qu'une telle démarche ait été timide jusque-là, car l'étude de l'implication des parents dans la vie scolaire s'inscrit dans une perspective interactionnelle du développement. Elle attribue à l'enfant un rôle central et actif dans son propre développement et suggère que l'impact des processus familiaux sur sa réussite scolaire est médiatisé par l'augmentation de son potentiel d'adaptation (Epstein, 1995 ; Ryan & Adams, 1995). Epstein (1995) précise que la famille, l'école et la communauté ne peuvent pas « produire » un élève qui réussit bien, mais peuvent l'influencer de telle sorte qu'il soit lui-même l'artisan de son propre succès.

Après s'être longtemps intéressées à la contribution des interactions interindividuelles et extraindividuelles, les études devraient désormais porter plus d'attention aux facteurs intra-individuels qui permettent aux processus cognitifs de se mettre en place et aux habiletés cognitives de s'exprimer. Un début de réflexion et d'indices existe déjà dans la littérature. L'engagement scolaire, la motivation, l'autorégulation et les processus d'attribution sont au cœur de cette réflexion et

semblent constituer des voies prometteuses pour la compréhension des mécanismes qui lient l'implication des parents à la réussite scolaire de l'enfant.

Sur un plan théorique, Scott-Jones (1995) propose un modèle de médiation séquentielle qui comporte deux chaînes causales complémentaires, l'une plus indirecte que l'autre. Selon la plus courte, la participation des parents aux devoirs favorise la réussite scolaire de l'enfant en contribuant au développement de ses habiletés cognitives. Selon la plus longue, la valorisation de la réussite scolaire par les parents, leur supervision (devoirs, performance scolaire et comportements) et leur participation aux devoirs favorisent la réussite scolaire de l'enfant en contribuant, dans un premier temps, au développement de son engagement scolaire et de sa motivation et, dans un second temps, au développement de ses habiletés cognitives.

Ce modèle théorique est intéressant, mais incomplet, car il omet de prendre en compte plusieurs formes d'implication des parents dans la vie scolaire de l'enfant. En effet, la première chaîne se limite à l'aide aux devoirs. Pourtant, les parents peuvent fournir à leur enfant un étayage approprié dans les limites de la zone proximale de son développement et l'aider à acquérir de nouvelles habiletés cognitives à travers une large gamme d'activités conjointes (e.g., lecture d'une histoire, résolution d'un jeu de puzzle, visite d'un musée). Par ailleurs, la seconde chaîne semble se limiter aux attitudes et aux comportements mis en place à la maison en vue de soutenir les apprentissages de l'enfant. Pourtant, les chercheurs suggèrent qu'en manifestant de l'enthousiasme et un intérêt actif pour l'éducation et les apprentissages de leur enfant, les parents lui expriment leur amour et la valeur que l'éducation revêt à leurs yeux (Gonzalez-DeHass, Willems, & Doan Holbein, 2005). En se sentant aimé et encouragé à travailler bien dans le rôle d'élève, l'enfant est alors plus enclin à faire de son mieux pour apprendre et réussir à l'école (Epstein, 1995). Ainsi, toutes les formes d'implication des parents possèderaient le potentiel d'encourager l'enfant à mettre en place les conditions propices à son développement cognitif et à sa réussite scolaire, plus particulièrement le potentiel de favoriser son engagement scolaire et sa motivation. À ce propos, Marchant, Paulson et Rothlisberg (2001) relèvent que la motivation de l'enfant en cinquième et en sixième années du primaire médiatise la relation entre la valorisation de l'effort et de la réussite scolaire par les parents et la

performance scolaire générale des élèves. De plus, Hill et Craft (2003) notent que les comportements d'apprentissage de l'enfant à la maternelle (e.g., s'atteler sans tarder à la tâche et persévérer dans la tâche) médiatisent la relation entre la perception par l'enseignant de la valeur que les parents accordent à l'éducation et la performance en lecture de tous les élèves ainsi que la relation entre l'implication des parents à l'école et la performance en mathématiques des élèves d'origine africaine.

Le second objectif de ce second article de nature empirique est d'avoir une meilleure connaissance de l'effet médiateur des habiletés d'attention sur la relation entre l'implication des parents dans la vie scolaire de l'enfant à la maternelle et les habiletés en mathématiques à la fin de la deuxième année du primaire. L'implication des parents y est mesurée en termes d'attentes à l'égard du niveau d'éducation que l'enfant atteindra, de valorisation de la performance scolaire, d'implication à la maison dans les expériences éducatives de l'enfant, de communication avec l'école et d'implication à l'école. Bien que cette étude longitudinale et prospective ne se base pas sur des formes d'implication des parents qui sont nécessairement initiées ou encouragées par les enseignants ou par l'école, ses résultats permettront de fournir aux chercheurs et aux éducateurs des connaissances importantes pour l'établissement d'un environnement socioéducatif à la maternelle favorable au développement cognitif au primaire.

Article 1

How does kindergarten classroom social climate contribute to behavioral development in middle childhood?

par Youmna Ghosn et Linda S. Pagani

Abstract

Development is a product of dynamic relationships between an individual and the multiple contexts in which he or she is embedded. In the past, families were believed to be the most influential institutional shaper of children's socioemotional development. Over the past decades, there has been increasing recognition that the school socio-educational environment matters too. The present study tries to better understand how kindergarten classroom social climate shapes behavioral development during middle childhood. As a first formal academic setting, kindergarten represents a developmentally salient context. It is the first organized group experience with structured learning. It also precedes the developmentally salient transition to formal schooling. Using a subsample from the Montreal Longitudinal Preschool Study (N = 619), we examined the impact of teacher support and classroom management in kindergarten on the development of emotional distress and physical aggression between the end of kindergarten and the end of third grade. Multilevel analyses results indicated that kindergarten classroom social climate accounted, in part, for differences in later behavioral development. Children exposed to greater amounts of classroom management in kindergarten showed significant decreases in emotional distress and physical aggression in primary school. These findings are above and beyond the influence of related child, family, and teacher characteristics and have implications for research and policy improvement.

Keywords: Classroom social climate, behavioral development, middle childhood

How does kindergarten classroom social climate contribute to behavioral development in middle childhood?

Parents and practitioners want children to be psychosocially well adjusted over the course of their development. The importance of behavioral functioning during middle childhood for later adjustment is well acknowledged. Children who are emotionally distressed or physically aggressive are at risk for poor peer relationships, continuing internalizing and externalizing disorders, and school dropout (Cairns, Cairns, Neckerman, Gest, & Gariépy, 1988; Kupersmidt & Coie, 1990; Pedersen, Vitaro, Barker, & Borge, 2007). A better understanding of the early contextual predictors of these behaviors may provide parents and practitioners with an effective means to promote beneficial environments for behavioral development and to help children engage on a socially valued life course.

Development is a product of reciprocal, continuous, and changing relationships between developing individuals and the multiple contexts in which they are embedded. As a consequence of the circular function involved in these feedback loops, individuals and settings mutually affect each other (Lerner, 2002). By middle childhood, children come to spend most of their day in learning environments, more particularly in a classroom with a leading teacher and a unique group of classmates. Because of its high stability, the classroom learning environment becomes an active and secondary vehicle of social experience.

Kindergarten represents a developmentally salient context. It is the first organized group experience with structured learning. It also precedes the transition to the primary grades and their charged curriculum. It is plausible that, as a first experience, kindergarten classroom learning environment lays the groundwork for later person-environment fit in school and thus plays an important role in preventing behavioral failure in middle childhood (Bennett, Elliott, & Peters, 2005). If it does chart a course toward middle childhood adjustment, this would have implications for the design of prevention efforts in mental health and social skills (NICHD Early Child Care Research Network, 2003a).

Classroom Social Climate

In his social-ecological conceptual framework, Moos (1979) proposes that the classroom learning environment is a major determiner of development. An important assumption of his framework is that both the attributes of the individuals and the characteristics of the classroom learning environment influence stability and change in behavior. The classroom social climate represents an important dimension of the classroom learning environment. It concerns the overall atmosphere of a classroom that surrounds the students during the academic year and that emerges from many environmental factors present in the classroom.

With the beginning of an academic year, teachers usually try to establish and maintain an appropriate learning environment that fits the needs of their students, promotes their psychosocial adjustment and development, and influences their ability to succeed in school. Some researchers have argued that a classroom characterized by a positive emotional and disciplinary atmosphere constitutes such an environment (Moos, 1979; Rimm-Kaufman, La Paro, Downer, & Pianta, 2005).

The relationship between the classroom emotional and disciplinary atmosphere and the socioemotional functioning of preschool and elementary students has been primarily investigated with cross-sectional designs. The results of these studies suggest that the classroom social climate determines the behavioral problems and competencies of the students in the concurrent year (Bohn, Roehrig, & Pressley, 2004; Brody, Dorsey, Forehand, & Armistead, 2002; NICHD Early Child Care Research Network, 2002, 2003a, 2006; Pianta, La Paro, Payne, Cox, & Bradley, 2002; Wright & Cowen, 1982). In classrooms characterized by a positive emotional atmosphere, children manifest less internalizing and externalizing behavior and more positive interactions with peers (NICHD Early Child Care Research Network, 2002, 2003a, 2006). Similarly, in classrooms characterized by a positive disciplinary atmosphere, children benefit by having less internalizing and externalizing behavior and more self-regulation (Brody et al., 2002). Findings from Brody and colleagues (2002) suggest that the classroom social climate in elementary and secondary school constitutes a protective factor for psychosocial adjustment when parenting processes are compromised. Children who are exposed to poor parenting processes at home and

to a poor social climate in the classroom have more externalizing behavior, more symptoms of depression, and less self-regulation than children who experience high parenting processes and/or a positive social climate in the classroom.

Research using longitudinal designs brings limited and mixed evidence for a prospective link between the classroom emotional and disciplinary atmosphere and the socioemotional development of preschool and elementary students. Some studies (e.g., NICHD Early Child Care Research Network, 2006; Peisner-Feinberg et al., 2001) suggest that the influence of the classroom social climate is primarily concurrent. In an interesting longitudinal study, Peisner-Feinberg and colleagues (2001) examined the relationship between the quality of the classroom practices in pre-kindergarten (which included in reality measures of the emotional and disciplinary atmosphere of the classroom) and the social and behavioral development of the students from pre-kindergarten to second grade. After accounting for classroom practices and teacher-student relationship in kindergarten and second grade, the quality of classroom practices in pre-kindergarten was not associated with social and behavioral functioning in second grade. Similarly, the NICHD Early Child Care Research Network (2006) examined the contribution of classroom emotional climate in first grade to behavioral problems and competencies in third and fourth grade. After accounting for classroom positive climate in third grade, classroom emotional climate in first grade was not associated with socioemotional functioning in later years. On the contrary, other studies suggest that the influence of the classroom social climate is longitudinal. Capuano and colleagues (2001) examined the contribution of classroom social climate in pre-kindergarten to behavioral problems and competencies in kindergarten. They observed a significant association between the level of classroom emotional support among the students in pre-kindergarten, indicated by the level of mutual attachment between them, and a decrease in externalizing behavior one year later.

Overall, two limitations restrict, to some extent, the interpretation and the scope of this body of research:

First, some of the constructs used in the available literature capture a configuration of characteristics of the classroom learning environment making it

difficult to ascertain what aspect of the classroom social climate affects which behavioral outcomes (LoCasale-Crouch et al., 2007). For instance, the Classroom Assessment Scoring System (CLASS; Pianta, La Paro, & Hamre, 2004) is an observational measure that contains nine dimensions assessing the emotional and instructional atmosphere of the classroom. The emotional measures include five scales: (1) the positive climate reflects the enthusiasm, enjoyment, and respect displayed during interactions between teachers and children and among children; (2) the negative climate is the degree to which the classroom has a negative emotional and social tone (displays of anger, aggression, or harshness); (3) teacher sensitivity is the extent to which teachers provide comfort, reassurance, and encouragement; (4) over-control reflects the extent to which classroom activities are rigidly structured or regimented; and (5) effective behavior management encompasses teachers' ability to use effective methods to prevent and redirect children's misbehaviors.

Most of the studies that rely on the CLASS (e.g., NICHD Early Child Care Research Network, 2002, 2003a, 2006; Pianta et al., 2002) collapse its specific dimensions into broad categories. Pianta and colleagues (2002) measure what they refer to as the classroom child-centered climate in terms of positive emotional climate, negative emotional climate, over-control, effective classroom management, and child responsibility. The NICHD Early Child Care Research Network (2002, 2003a, 2006) measures the classroom emotional support in terms of positive classroom climate, negative classroom climate, teacher sensitivity, over-control, and effective classroom management. The NICHD Early Child Care Research Network (2006) measures the classroom positive climate in terms of positive classroom climate, negative classroom climate, teacher sensitivity, and productive use of instructional time. Such composites combine indiscriminately measures pertaining to the level of emotional support among the students, emotional support from the teacher, discipline in the classroom, and instructional support provided by the teacher.

Second, although some of the studies in the available literature rely on longitudinal designs, they examine changes in behavioral outcomes between two points in time. One way to get a clearer, more accurate picture of the association

between classroom emotional and disciplinary atmosphere with behavioral development would be to examine behavioral trajectories.

The present prospective longitudinal study addresses these limitations. It examines the role of teacher-reported kindergarten classroom social climate in shaping behavioral development during middle childhood. First, how do levels of emotional distress and physical aggression change between kindergarten and third grade? Second, do these trajectories of change differ according to kindergarten levels of teacher support and classroom management?

Method

Participants and Procedure

The Montreal Longitudinal Preschool Study (MLPS) comprises five consecutive cohorts launched from 1997 to 2000 in the poorest neighborhoods of Montreal, Canada. The original sample of French-speaking preschool children (N = 2095), representing one-third of the population invited to participate, was obtained after a multilevel consent process involving school board officials, local school committees, teachers, and parents. Given that some of the cohorts do not meet all the data requirements for our research objective, we limit ourselves to two cohorts of children beginning kindergarten in fall 1998 and fall 1999 (N = 770). At that time, the focus of the Montreal Head Start kindergarten curriculum was on cognitive and socioemotional development.

Initial and follow-up data were collected from multiple sources, including direct cognitive assessments of children, and surveys of parents and teachers. Although initial data were available for 770 children, the final sample for these analyses was reduced to 619 participants because of incomplete longitudinal data. Students in the study included 303 boys and 316 girls for whom data were available on key independent variables (Teacher Support and Classroom Management) and on outcome measures at kindergarten entry and one other time point (Emotional Distress and Physical Aggression). Descriptive statistics for child, teacher, and family sociodemographic characteristics are reported in Table 1.

At the beginning and end of the kindergarten school year, children's receptive verbal skills were individually assessed by a research assistant and parents were asked to complete a questionnaire inspired from that used in the National Longitudinal Study of Children and Youth (NLSCY). This questionnaire, returned by mail, assessed family history, sociodemographic characteristics, and environment, and child behavioral data. At the same time, teachers were asked to complete a questionnaire excerpted form the NLSCY teacher survey, comprising questions about the specific child's behavior and school performance. At the mid-year point, teachers were asked to complete a questionnaire on their classroom social climate as well.

At the end of the first, second, and third grade, parents and teachers were once again retraced and asked to complete our questionnaires. Some children changed schools and neighborhoods, which required a more complex solicitation process (described above) from the school and its committee in order to grant permission for the follow-up process.

To understand the pattern of incomplete data on these variables, we conducted independent-samples *t* tests. The significant results were as follows: Children with incomplete data on emotional distress at kindergarten entry and one other time point had higher scores on Classroom Management. Children with incomplete data on physical aggression at kindergarten entry and one other time point had lower levels of physical aggression by end of kindergarten and lower scores on Teacher Support. Finally, children with incomplete data on Classroom Management had higher levels of emotional distress by end of kindergarten.

Table 1

Descriptive statistics for Child, Family Sociodemographic, and Teacher Characteristics

Variables	*Frequency (%)*	*Cut-off scores for bottom quartile if dichotomized*	*M (SD)*
Child Characteristics at Kindergarten Entry			
Gender			
Male	303 (48.9%)	-	-
Female	316 (51.1%)	-	-
Country of Origin			
Canada	223 (36.03%)	-	-
Central American, South America, and the Caribbean	41 (6.62%)	-	-
Western Europe and Eastern Europe	32 (5.17%)	-	-
Asia Meridional, South Asia, and South-East Asia	18 (2.91%)	-	-
Africa	20 (3.23%)	-	-
Missing	285 (46.04%)	-	-
Language Spoken at Home			
French or French and other	174 (28.11%)	-	-
English	15 (2.42%)	-	-
Other	112 (18.09%)	-	-
Missing	318 (51.37%)	-	-
Family Characteristics at Kindergarten Entry			
Family Structure			
Intact Family	300 (48.5%)	-	-
Else	143 (23.1%)	-	-
Missing	176 (28.4%)	-	-
Mother's Age at Birth of First Child	406 (65.6%)	≤ 21	25.63 (5.07)
Missing	213 (44.4%)	-	-
Mother's Years of Education	379 (61.2%)	≤ 10	12.48 (3.40)
Missing	240 (38.8%)	-	-

Table 1, continued

Descriptive statistics for Child, Family Sociodemographic, and Teacher Characteristics

Variables	Frequency (%)	Cut-off scores for bottom quartile if dichotomized	M (SD)
Family Characteristics at Kindergarten Entry			
Father's Years of Education	340 (54.9%)	≤ 10	12.49 (3.85)
Missing	279 (45.1%)	-	-
Family Income	371 (59.9%)	≤ 14999	Bracket of 25,000 to 29,999
Missing	248 (40.1%)	-	-
Teacher Characteristics at Mid-Point of Kindergarten			
Years of Experience	619 (100%)	≤ 6.42	14.54 (10.10)
Education			
Bachelor Degree in Education	470 (75.9%)	-	-
Else	149 (24.1%)	-	-
Teaching Permit	335 (54.1%)	-	-
Else	284 (45.9%)	-	-
Bachelor Degree in Education and/or a Teaching Permit	565 (91.3)	-	-
Else	54 (8.7)	-	-

Dependent Variables

At the beginning and end of kindergarten, and at the end of first, second, and third grade, teachers completed the Social Behavior Questionnaire (SBQ) for one or more children in their classroom who participated in the study. The SBQ was developed by Tremblay, Offord, and Boyle for the NLSCY and originates from the Ontario Child Health Study (directed by David Offord) and the Montreal-Longitudinal-Experimental Study (directed by Richard E. Tremblay). Norms (NLSCY) are available from ages 4 to 11.

The SBQ assesses children's early behavioral adjustment and represents a good predictor of later psychosocial adjustment (Dobkin, Tremblay, Mâsse, & Vitaro, 1995; Haapasalo & Tremblay, 1994; Tremblay, Pagani-Kurtz, Mâsse, Vitaro, & Pihl,

1995; Tremblay, Pihl, Vitaro, & Dobkin, 1994). It takes 15 minutes to complete and it uses a 3-point Likert-type scale (i.e., often; sometimes; never) to indicate how frequent each item is for the child. The items on the questionnaire can be divided into several conceptual scales among which:

Anxiety (3 items: Seems worried or fearful; Seems anxious; and Is nervous or very tense) and *Depression* (2 items: Seems unhappy, sad or depressed; and Cries a lot). An *Emotional Distress* scale was created by combining the depressed with the anxious items. The items were reverse scored so that a higher score on the scale indicates greater emotional distress.

Physical Aggression (7 potential items: Fights at least once a day; Threatens others; Bullies, is cruel, or mean to others; Hits, bites, and kicks other children; Gets into many fights; If accidentally hurt, assumes it was intentional; and Physically attacks people). Because the two cohorts received slightly different versions of the SBQ with varying number of items on the Physical Aggression scale, only the four items they had in common were used for the analyses (i.e., threatens others; bullies, is cruel, or mean to others; hits, bites, and kicks other children; and gets into many fights). The items were reverse scored so that a higher score on the scale indicates greater physical aggression.

Both outcome measures were rescaled on 0-10 for multilevel analyses. Descriptive statistics for outcome measures and independent variables are reported in Table 2, and the correlation matrix for the outcome measures is reported in Table 3.

Table 2

Ranges, Cronbach's Alphas, Means, and Standard Deviations for Dependent and Independent Variables, and Cut-Off Points of Continuous Covariates

Variables	*Range*	*Cronbach's Alpha*	*M*	*SD*	*Cut-off Scores*
Dependent Variables					
Emotional Distress [a]					
Kindergarten Entry	5 – 15	.79	6.48	2.02	-
End Kindergarten	5 – 15	.81	6.54	2.01	-
End 1st Grade	5 – 15	.79	6.46	1.91	-
End 2nd Grade	5 – 15	.84	6.66	2.14	-

Table 2, continued

Ranges, Cronbach's Alphas, Means, and Standard Deviations for Dependent and Independent Variables, and Cut-Off Points of Continuous Covariates

Variables	*Range*	*Cronbach's Alpha*	*M*	*SD*	*Cut-off Scores*
Dependent Variables					
Emotional Distress [a]					
End 3rd Grade	5 – 15	.85	6.74	2.23	-
Physical Aggression [a]					
Kindergarten Entry	4 – 12	.84	4.57	1.33	-
End Kindergarten	4 – 12	.87	4.64	1.44	-
End 1st Grade	4 – 12	.89	4.63	1.58	-
End 2nd Grade	4 – 12	.83	4.67	1.41	-
End 3rd Grade	4 – 12	.90	4.73	1.63	-
Key Independent Variables					
Teacher Support	0 – 24	.42	17.55	2.05	-
Classroom Management	0 – 16	.63	14.24	1.26	-
Control Variables					
Sociofamilial Adversity	0 – 1	-	.30	.29	$\geq .5$ [b]
Family Functioning	0 – 36	.86	27.70	5.68	≤ 24 [c]
Parenting Behaviors	0 – 20	.80	13.72	3.23	≤ 12 [c]

Notes: [a] The outcomes remain construct valid for the entire period of observation.

[B] Cut-off scores for top quartile. [c] Cut-off scores for bottom quartile.

Table 3

Correlation Matrix for Outcome Measures from Kindergarten Entry to End of Third Grade

Dependent Variables	*1.*	*2.*	*3.*	*4.*	*5.*
Emotional Distress					
1. Kindergarten Entry	-				
2. End Kindergarten	.58**	-			
3. End 1st Grade	.15**	.15**	-		
4. End 2nd Grade	.25**	.12*	.32**	-	
5. End 3rd Grade	.10	.11*	.33**	.28**	-

Table 3, continued

Correlation Matrix for Outcome Measures from Kindergarten Entry to End of Third Grade

Dependent Variables	*1.*	*2.*	*3.*	*4.*	*5.*
Physical Aggression					
1. Kindergarten Entry	-				
2. End Kindergarten	.69**	-			
3. End 1st Grade	.35**	.37**	-		
4. End 2nd Grade	.24**	.32**	.48**	-	
5. End 3rd Grade	.30**	.23**	.45**	.35**	-

Notes: * $p < .05$. ** $p < .01$.

Key Independent Variables

At the mid-point of kindergarten, teachers completed the Learning Climate Scale (LCS; Michaud, Comeau, & Goupil, 1990: Inventaire du climat d'apprentissage) on a 5-point Likert-type scale (i.e., strongly agree; agree; nor agree nor disagree; disagree; strongly disagree). The LCS assesses the classroom social climate. It is an adapted French Canadian version of the Classroom Environment Scale (Moos & Trickett, 1974). It comprises seven scales of six items each. Two scales were extracted from this questionnaire:

Teacher Support indicating the degree of learning support and positive attention offered by the teacher to the students (6 items: I give my attention to every child (reverse scored); For the children, I am more a friend than a superior (reverse scored); I do everything in my power to help the children (reverse scored); I trust the children (reverse scored); If a child wants to talk to me, I find the time to listen to him (reverse scored); and I am harsh when I talk to children). A higher score on the scale indicates greater teacher support. Although the scale had a very low internal consistency (Cronbach's alpha = .42), removing any single item did not improve its reliability.

Classroom Management indicating the degree of rule clarity, fairness, and consistent application (6 items: In classroom, rules are clear (reverse scored); I explain well the rules (reverse scored); I apply well the rules (reverse scored);

Children are punished for small offenses; I am not very harsh (reverse scored); and When children do not follow the rules, I ask them to (reverse scored)). A higher score on the scale indicates greater classroom management. Because the scale had a very low internal consistency (Cronbach's alpha = .40), we removed two items (I am not very harsh and When children do not follow the rules, I ask them to) in order to improve its reliability (Cronbach's alpha = .63). Both independent scales were rescaled on 0 to 10 and centered about the mean for multilevel analyses.

Covariates: Child Characteristics

Gender. Female was chosen as the reference category in multilevel analyses. Some research work (e.g., Côté, Vaillancourt, Barker, Nagin, & Tremblay, 2007; Maccoby, 1998; Pagani et al., 2006) suggests that boys and girls experience and interpret social factors differently during early and middle childhood.

Receptive Verbal Skills. At kindergarten entry, a research assistant assessed children's receptive verbal skills using the French adaptation of the Peabody Picture Vocabulary Test (PPVT, Forms A and B, French adaptation by Dunn, Thériault-Whalen, & Dunn, 1993: Échelle de vocabulaire en images Peabody). At least 17.93% of the sample appeared to be ethnolinguistic minorities with the child or at least one parent born outside of Canada. As such, this variable was used to control for children's cognitive development as well as linguistic skills. The PPVT have been shown to correlate significantly with measures of reading, language, and general achievement (Altepeter & Handal, 1985; Vance, Kitson, & Singer, 1985), and very few items have been found to be culturally biased against ethnic populations when used to indicate extensiveness of receptive vocabulary (Argulewicz & Abel, 1984; Reynolds, Willson, & Chatman, 1984).

The scale comprises five practice items, followed by 170 items that are ordered in increasing difficulty. Every item is shown in four possible images. The child must indicate which image corresponds to the correct answer. Individual administration takes approximately 8 to 10 minutes. The PPVT French version was standardized with a sample of 2,038 French-Canadian children (ages 2 to 18). Reliability was established using the split-half method with Spearman-Brown correction for each age group and for both Forms A and B (r = .66 and .85 respectively). Test-retest

reliability of the parallel forms was .72 at a one week interval. Correlations with other French vocabulary tests and other intelligence tests were also high (Dunn et al, 1993). Children in the sample had a raw score mean of 49.13 and a standard deviation of 25.46. The scale was standardized for multilevel analyses.

Covariates: Family Characteristics

At kindergarten entry, the person-most-knowledgeable (usually the mother) provided data on child characteristics, family sociodemographic factors, and home environment.

Rates of incomplete data were high for family covariates (28.4% for sociofamilial adversity; 39.9% for family functioning; and 34.2% for parenting behaviors) because 36.2% of the parents who agreed to participate in the study did not return their questionnaire at kindergarten entry. Although these variables could have been discarded, they repeatedly have been shown to be related to children's behavioral problems (e.g., Loeber & Farrington, 2000 for sociofamilial adversity; Pagani et al., 2006 for family functioning; Côté et al., 2007 for parenting behaviors). As such, we decided to include them in the analyses.

Several procedures for managing incomplete data are possible. The shortcomings of case-deletion strategies have been well documented (e.g., Little & Rubin, 1987). Case-deletion strategies lead to valid inferences only if data are Missing Completely At Random (MCAR), in the sense that the discarded cases do not differ systematically from the rest of the sample in terms of the analysis being performed. When data are Missing At Random (MAR) or are Not Missing At Random (NMAR), case-deletion strategies may lead to serious biased estimates and cases with incomplete values should be replaced[1] or at least accounted for. Given that family characteristics were control variables and had high rates of incomplete data, we decided to indicate that the information was incomplete by replacing it with a zero-score.

Sociofamilial Adversity. Parents provided data on family structure, mother's age at birth of first child, years of education of both parents other than kindergarten, and family income. Family structure was scored 0 if the child was living with both

natural parents and 1 for all other cases. The other variables were scored 1 when the respective scores were in the bottom quartile and 0 for higher values. Three or more variables were required for the adversity index to be computed, since information was not always completely available. Half of children had data available on all five variables. The items were averaged, then scored 0 when three values or more were missing, 1 when the respective scores were in the top quartile (indicating high sociofamilial adversity), and 2 for lower values (indicating low to average sociofamilial adversity).

Family Functioning. The General Family Functioning (GFF) was developed by researchers at Chedoke-McMaster Hospital, McMaster University (Epstein, Baldwin, & Bishop, 1983. For more information regarding validity and reliability, see Byles, Byrne, Boyle, & Offord (1988); and for the interpretation and use of the GFF with respect to longitudinal data, see Pagani et al. (2006). This measure assesses support, communication, and family problem-solving on a 4-point Likert-type scale (strongly agree to strongly disagree). Items are: Planning family activities is difficult because we misunderstand each other; In times of crisis we can turn to each other for support; We cannot talk to each other about sadness we feel; Individuals in the family are accepted for what they are; We avoid discussing our fears or concerns; We express our feelings to each other; There are lots of negative feelings in the family, In the family, we feel accepted for what we are; The family has difficulties taking decisions; We are able to take decisions on how to settle our problems; We do not get along with each other; and We confide to each other. To create the family functioning variable, positively-worded items were reverse scored so that a higher score indicates greater agreement with the statement. The 12 items were summed and scored 0 when one value or more was missing, 1 when the respective scores were in the bottom quartile (indicating poor family functioning), and 2 for higher values (indicating moderate to good family functioning).

Parenting Behaviors. Data on parenting behaviors were collected on a 5-point Likert-type scale (never to several times a day). To create this scale, five items were summed: I congratulate my child by saying bravo, very good, or what you did is very nice; I talk, play with my child for more than five minutes just for fun; I laugh with

my child; I do special activities with my child that he/she likes; and I do sport activities or play games with my child. The items were then scored 0 when one value or more was missing, 1 when the respective scores were in the bottom quartile (indicating poor parenting behaviors), and 2 for higher values (indicating moderate to good parenting behaviors).

Covariates: Teacher Characteristics

At the mid-point of kindergarten, teachers reported their education and experience. Education varied from undergraduate to graduate university degree, with the average being Bachelor's level. Experience ranged from .5 to 35 years, with half teachers reporting less than 12 years experience. To index this variable, years of experience were scored 0 when the respective scores were in the bottom quartile and 1 for higher values, and teacher education was scored 1 for a Bachelor degree in education and/or a Teaching Permit and 0 for other values. The items were then summed and scored 0 when these subscores were 0 or 1 (indicating low to moderate positive characteristics and corresponding to 28.8% of the teachers) and 1 when the subscore was 2 (indicating high positive characteristics and corresponding to 71.2% of the teachers).

Analytic Strategy

Multilevel modeling was used to estimate the associations between classroom social climate and children's behavioral trajectories while controlling for child, family, and teacher characteristics. Children's developmental trajectories were estimated using longitudinal data with five potential assessment points. Such growth curve models are able to examine "within-person true [change] as a function of time and between-person differences in true change as a function of predictors" (Willett & Sayer, 1994, p. 363). In other words, they are able to examine individual change and systematic interindividual differences in change over time.

We sought to conduct multilevel analyses with a classroom-level scale (measurements nested within students and students nested within classrooms) given the fact that key independent variables represent teacher-reported classroom social climate. It is noteworthy that most teachers had only one child in their classroom

who participated in this study. As such, we resorted to using a two level model (for an example of another study in which classroom was not treated as a level because of too few students in each class, see Vitaro, Brendgen, Larose, & Tremblay, 2005). Time was treated as a continuous predictor and coded 0 (kindergarten entry), 1 (end kindergarten), 2 (end first grade), 3 (end second grade), and 4 (end third grade) so that the intercept estimates the true value of the outcome at initial status (Snijders & Bosker, 1999). Moreover, true individual change was modelled as a linear function of time. Earlier longitudinal studies provide detailed evidence about quantitative continuity in the development of emotional distress and physical aggression between kindergarten and third grade (e.g., Côté et al., 2007; Pagani et al., 2006). Moreover, we conducted empirical growth plots with superimposed OLS trajectories for 22 randomly selected cases. The results indicated a nearly linear change between kindergarten entry and end of third grade for the behavioral outcomes.

Following standards for model building (see Singer & Willett, 2003), the first model tested represents an unconditional means model. Instead of describing change over time, this model assesses the amount of outcome variation that exists at within-person and between-person levels while assuming no change in the true individual trajectories.

The second model tested represents an unconditional growth model, which adds a fixed effect and a random slope for time. This allows us to determine the extent to which the within-person variation in the outcome is systematically associated with linear time and the need to incorporate potential predictors of change for explaining the between-person variation that remains in the true initial status and in the true rate of change.

The third model tested represents the first conditional model. This model explores the between-person variation in intercept and slope as a function of level-2 covariates: classroom social climate characteristics and their interaction with time. This allows us to stipulate that a student's behavior score is related to classroom social climate characteristics and that these relations can vary across time.

Model 4 adds controls for child characteristics and Model 5 adds controls for family and teacher characteristics. These models allow us to determine the

associations between classroom social climate characteristics and the outcome variables, net of confounding variables. The estimating equations for the five models are described in the appendix.

Results

Descriptive Statistics

Table 2 reports the mean levels for measures of children's behaviors. The mean levels of children's emotional distress and physical aggression increased slightly between beginning of kindergarten and end of third grade from 6.48 to 6.74 and from 4.57 to 4.73, with a small decline at the end of the first grade.

Table 3 reports Pearson correlations for children's behaviors. The correlations between the five assessments varied from .10 to .58 for emotional distress and .23 to .69 for physical aggression. All, except one, were significant as is noteworthy that children's emotional distress at beginning of kindergarten and at end of third grade did not seem to be correlated.

Growth Curve Models of Emotional Distress

Square root of emotional distress scores ranging from 0 to 10 was used in the subsequent analyses to allow the level-1 and the first level-2 raw residuals to be normally distributed. Results for the unconditional means model are reported in Table 4. The average true emotional distress score across children between kindergarten entry and end of third grade significantly differed from zero (.87, $p <$ .001), telling us that the average child had little emotional distress according to his or her teachers. The intraclass correlation coefficient ρ was .28, indicating that 28% of the total variance in emotional distress scores lied between children.

Model 2 tests how well the unconditional growth model fits the emotional distress data. Emotional distress for the average child remained low (.83, $p < .001$) and marginally increased between kindergarten entry and end of third grade (.03, $p =$ .07). Children with higher emotional distress scores at initial status increased their behavior less rapidly over time (-.09, $p < .001$). The within-person variance diminished ([.593 - .494] / .593 = .17), indicating that 17% of the within-children variation in emotional distress was systematically associated with linear time. The

variances around the average intercept and slope were significant (.41, $p < .001$ and .04, $p < .001$), suggesting the need to include level-2 covariates to explain such variation. It is clear that the unconditional growth model did a better job in predicting the observed outcome than the unconditional means model which assumes no change in individual growth trajectories ($x^2(3) = 60.3, p < .001$).

Model 3 tests the results of fitting the first conditional model to the emotional distress data while including classroom social climate characteristics at the mid-point of kindergarten as predictors of both average intercept and slope. The true initial status of children who experienced average classroom social climate characteristics was .83 ($p < .001$). More emotionally distressed children at kindergarten entry experienced greater management in their classroom (.12, $p < .05$). Although the average trajectory may have been flat (.03, $p = .05$), some of the individual trajectories were not. Emotional distress scores decreased (-.04, $p < .05$) when classroom management was high. The difference in deviance statistics ($x^2(4) = 14.1$, $p < .01$) suggests a small improvement in fit compared to the unconditional growth model. Overall, kindergarten classroom social climate explained very little of the variance in the rate of change of emotional distress ([.042 – .04] / .042 = .05, i.e., 5%).

Model 4 tests the results of fitting the second conditional model and allows us to explore the relationship between child emotional distress trajectories and classroom social climate characteristics net of child characteristics. The average emotional distress score at kindergarten entry for students who had average classroom social climate characteristics and an average score on the PPVT was higher for girls (.73, $p < .001$) than for boys (.20, $p < .001$). The results from Model 3 remained globally robust despite the controls implemented which reduced the between-person variation. Overall, the goodness of fit of Model 4 was better than that of Model 3 ($x^2(2) = 17.1$, $p < .001$).

Model 5 tests the last conditional model. This fully controlled model did not provide a better fit than the former more parsimonious one ($x^2(7) = .5$, *ns*).

Table 4

Results of Multilevel Models for Change in Emotional Distress from Kindergarten Entry to End of Third Grade

EMOTIONAL DISTRESS	Model 1 Estimate	Model 2 Estimate	Model 3 Estimate	Model 4 Estimate	Model 5 Estimate
Fixed effects					
Intercept	.870 (.025) ***	.830 (.034) ***	.829 (.034) ***	.729 (.042) ***	.728 (.055) ***
Classroom Social Climate					
Teacher Support			-.013 (.044)	-.015 (.043)	-.011 (.044)
Classroom Management			.116 (.051) *	.121 (.051) *	.112 (.051) *
Child Characteristics					
Gender (male)				.204 (.049) ***	.210 (.049) ***
PPVT				-.005 (.025)	.002 (.026)
Family Characteristics					
Missing sociofamilial adversity					-.138 (.117)
High sociofamilial adversity					.214 (.066) **
Missing family functioning					.131 (.089)
Poor family functioning					.050 (.068)
Missing parenting behaviors					.103 (.114)
Poor parenting behaviors					.025 (.065)
Teacher Characteristics					
Low to moderate teacher characteristics					-.016 (.056)

Table 4, continued

Results of Multilevel Models for Change in Emotional Distress from Kindergarten Entry to End of Third Grade

EMOTIONAL DISTRESS	Model 1 Estimate	Model 2 Estimate	Model 3 Estimate	Model 4 Estimate	Model 5 Estimate
Rate of change					
Intercept		.025 (.014) †	.027 (.014) †	.027 (.014) *	.027 (.014) †
Teacher Support			-.005 (.017)	-.004 (.017)	-.005 (.017)
Classroom Management			-.044 (.021) *	-.045 (.020) *	-.045 (.021) *
Variance components					
Within-person	.593 (.020) ***	.494 (.020) ***	.494 (.020) ***	.495 (.020) ***	.494 (.020) ***
In initial status	.226 (.023) ***	.411 (.044) ***	.400 (.043) ***	.393 (.043) ***	.387 (.043) ***
In rate of change		.042 (.007) ***	.040 (.007) ***	.040 (.007) ***	.040 (.007) ***
Covariance		-.086 (.015) ***	-.081 (.015) ***	-.082 (.015) ***	-.081 (.015) ***
Model fit statistics					
Deviance (= -2log-likelihood)	6012.5	5952.2	5938.1	5921	5920.5
Difference in deviance statistics between each model and the previous one [a]		$x^2(3) = 60.3$ ***	$x^2(4) = 14.1$ **	$x^2(2) = 17.1$ ***	$x^2(7) = 0.5$

Notes: † $p < .10$. * $p < .05$. ** $p < .01$. *** $p < .001$.
The full maximum likelihood estimation method was used.
[a] It is recommended to use deviance statistics to compare the goodness-of-fit of nested models (Singer & Willett, 2003).

Growth Curve Models of Physical Aggression

Model 1 in Table 5 reports the results of fitting the unconditional means model to the physical aggression data. The average true physical aggression score across children between kindergarten entry and end of third grade was .82 ($p < .001$), telling us that the average child showed very little physical aggression according to his or her teachers. The intraclass correlation coefficient ρ was .41, indicating that 41% of the total variance in physical aggression scores was between children.

Model 2 tests the unconditional growth model. On average, initial status significantly differed from zero (.74, $p < .001$) and physical aggression slightly increased between kindergarten entry and end of third grade (.05, $p < .05$). Children with higher physical aggression scores at initial status increased their behavior less rapidly over time (-.21, $p < .001$). The within-person variance diminished ([2.010 - 1.678] / 2.010 = .17), indicating that 17% of the within-children variation in physical aggression was systematically associated with linear time. The linear model did a better job in predicting the observed outcome than the flat model ($x^2(3) = 59.7$, $p < .001$).

Model 3 tests the first conditional model. The average true initial status controlling for the classroom social climate characteristics was .74 ($p < .001$). Children showing less physical aggression at kindergarten entry enjoyed greater teacher learning support and positive attention (-.22, $p < .05$), whereas children more physically aggressive at kindergarten entry experienced higher levels of management in their classroom (.27, $p < .05$). The average true slope controlling for the classroom social climate characteristics was .06 ($p < .05$). The rate of change was lower for children who experienced greater classroom management (-.12, $p < .01$) at the mid-point of kindergarten. It was also marginally higher for children who enjoyed greater teacher support (.05, $p = .08$). The difference in deviance statistics ($x^2(6) = 14.1$, $p < .05$) suggests a small improvement in fit compared to the unconditional growth model ($x^2(4) = 17.4$, $p < .01$). Overall, kindergarten classroom social climate explained very little of the variance in the rate of change of physical aggression ([.138 – .132] / .138 = .04, i.e., 4%).

Model 4 tests the second conditional model. The average physical aggression score at kindergarten entry for students who had average classroom social climate characteristics and an average score on the PPVT was lower for girls (.34, $p < .001$) than for boys (.81, $p < .001$). Though the results from Model 3 remained globally valid, this model provided controlled answers to the research questions and allowed to reduce the between-person variation in the intercept. The goodness of fit of Model 4 was better than that of Model 3 ($x^2(2) = 53.9, p < .001$).

Model 5 tests the third conditional model. The average girl (.07, *ns*) and boy (.80, $p < .001$) showed no or little teacher-rated physical aggression. The other control variables did not account for any significant unique variance in the intercept and the relationships between growth rate parameters and classroom social climate characteristics remained the same. The difference in deviance statistics ($x^2(7) = 16.6$, $p < .05$) suggests a small improvement in fit compared to model 4.

Table 5

Results of Multilevel Models for Change in Physical Aggression from Kindergarten Entry to End of Third Grade

PHYSICAL AGGRESSION	Model 1 Estimate	Model 2 Estimate	Model 3 Estimate	Model 4 Estimate	Model 5 Estimate
Fixed effects					
Intercept	.822 (.056) ***	.738 (.068) ***	.737 (.068) ***	.341 (.084) ***	.071 (.125)
Classroom Social Climate					
Teacher Support			-.220 (.086) *	-.231 (.084) **	-.229 (.084) **
Classroom Management			.265 (.101) **	.277 (.098) **	.275 (.099) **
Child Characteristics					
Gender (male)				.809 (.108) ***	.800 (.107) ***
PPVT				.023 (.055)	.062 (.056)
Family Characteristics					
Missing sociofamilial adversity					-.199 (.252)
High sociofamilial adversity					.144 (.144)
Missing family functioning					.244 (.193)
Poor family functioning					.054 (.147)
Missing parenting behaviors					.452 (.247) †
Poor parenting behaviors					.212 (.140)
Teacher Characteristics					
Low to moderate teacher characteristics					-.022 (.121)

Table 5, continued

Results of Multilevel Models for Change in Physical Aggression from Kindergarten Entry to End of Third Grade

PHYSICAL AGGRESSION	Model 1 Estimate	Model 2 Estimate	Model 3 Estimate	Model 4 Estimate	Model 5 Estimate
Rate of change					
Intercept		.054 (.026) *	.055 (.026) *	.057 (.026) *	.058 (.026) *
Teacher Support			.054 (.032) †	.057 (.032) †	.058 (.032) †
Classroom Management			-.116 (.038) **	-.119 (.038) **	-.120 (.038) **
Variance components					
Within-person	2.010 (.068) ***	1.678 (.068) ***	1.676 (.067) ***	1.677 (.068) ***	1.677 (.067) ***
In initial status	1.401 (.116) ***	1.793 (.172) ***	1.738 (.169) ***	1.578 (.160) ***	1.528 (.158) ***
In rate of change		.138 (.024) ***	.132 (.023) ***	.132 (.023) ***	.133 (.023) ***
Covariance		-.210 (.054) ***	-.193 (.053) ***	-.194 (.051) ***	-.196 (.051) ***
Model fit statistics					
Deviance (= -2log-likelihood)	9156.5	9096.8	9079.4	9025.5	9008.9
Difference in deviance statistics between each model and the previous one [a]		$x^2(3) = 59.7$ ***	$x^2(4) = 17.4$ **	$x^2(2) = 53.9$ ***	$x^2(7) = 16.6$ *

Notes: † $p < .10$. * $p < .05$. ** $p < .01$. *** $p < .001$.
The full maximum likelihood estimation method was used.
[a] It is recommended to use deviance statistics to compare the goodness-of-fit of nested models (Singer & Willett, 2003).

Discussion

For children, the objective of kindergarten is to provide an early school experience that lays the foundations for learning and enhances their psychosocial adjustment. As suggested by Piaget, "full development of the personality in its most intellectual aspects is indissoluble from the whole group of emotional, ethical, or social relationships that make up school life" (Piaget, 1973, p. 106). Considering that kindergarten learning environment may be particularly important in responding to the needs of the children and in forming expectations for adequate behavior in formal school, the present study sought to examine how kindergarten classroom social climate predicts behavioral development in early elementary.

Teacher Support

Teacher support in kindergarten did not contribute to the development of emotional distress and physical aggression between kindergarten and third grade. Children who experienced more teacher support in the classroom seemed to be unaffected by it. Of course, the measure of teacher support used in our study had a very low internal consistency suggesting that the composite used was not a reliable indicator of the construct it was designed to measure. Yet, our observation corroborates findings from the NICHD Early Child Care Research Network (2006) which found no relationship between first grade classroom emotional support and changes in behavior problems and social skills in third and fourth grade.

One possible explanation is that teacher support was measured by the teacher in our study and that classroom emotional support was measured by external observers in the NICHD Early Child Care Research Network (2006) study. Classroom social climate can be measured by using student perception, teacher perception, or external observer rating. The assessment of the classroom social climate is not necessarily the same across these methods. Michaud and colleagues (1990) compared the perceptions by the students and the teachers of the classroom social climate in fourth, fifth, and sixth grade using the LCS. They found a non significant difference on four scales (e.g., mutual attachement and classroom management) and a significant difference on three scales (e.g., teacher support). For example, teachers perceived more teacher support in their classrooms than their students did. Significant

differences in the assessment of the classroom social climate may yield differential associations with the outcome measures under study. Moos and Moos (1978) examined the relationship between classroom social climate and students' grades and absences in high school. They found that the perceptions by the students and the teachers of the classroom social climate were in many cases differentially related to the outcome measures. For example, classrooms with higher average final grades were perceived by students as high on student involvement, student affiliation, and teacher support and by teachers as high on student involvement only.

Another possible explanation is that teacher-student relationship of individual students is more salient and more closely associated with behavioral development than the affective orientation of the teacher, especially in the early years. Being in classrooms characterized by teacher support may not inform us about the teacher-student relationship of individual students which seems to be largely dependent on children personal characteristics or on the fit between children and teacher personal characteristics (Ladd and Burgess, 1999; Pianta & Stuhlman, 2004). Findings from previous concurrent and longitudinal research suggest that teacher-student relationship plays a role in behavioral development either as a protective resource or as a stress-enhancer. It provides or deprives children from opportunities and support needed for personal growth and positive school functioning and influences their ability to succeed in school. For example, children who have a close relationship with their teacher benefit by having less internalizing behavior by the end of the year (Pianta & Stuhlman, 2004) and by having less internalizing and externalizing behavior in subsequent years (Hamre & Pianta, 2001; Pianta & Stuhlman, 2004; Silver, Measelle, Armstrong, & Essex, 2005). On the contrary, children who have a negative relationship with their teacher are at greater risk for internalizing and externalizing behavior by the end of the year (Pianta & Stuhlman, 2004) and for more externalizing behavior and discipline infractions in subsequent year (Hamre & Pianta, 2001; Pianta & Stuhlman, 2004). In their longitudinal study, Peisner-Feinberg and colleagues (2001) examined the relationship between students' experience in pre-kindergarten and their social and behavioral development from pre-kindergarten to second grade. Pre-kindergarten experience was measured in terms of the quality of classroom practices (which included in reality measures of the classroom social

climate) and the closeness of teacher-student relationship. After accounting for classroom practices and teacher-student relationship in kindergarten and second grade, the quality of classroom practices in pre-kindergarten was not associated with social and behavioral functioning in second grade whereas the closeness of teacher-student relationship in preschool was significantly associated with fewer problem behaviors and more social skills in second grade.

Classroom Management

Classroom management in kindergarten contributed to the development of emotional distress and physical aggression between kindergarten and third grade. Children who experienced more management in the classroom showed a decrease in their emotional distress and physical aggression in comparison to children who experienced less management in the classroom. This observation suggests that a disciplinary atmosphere characterized by high levels of rule clarity, fairness, and consistent application help kindergarten students disengage from their behavioral problems in early elementary. From the point of view of the children, it may consolidate their sense of security and foster their emotional maturity. From the point of view of the teacher, it may prevent them from reinforcing negatively the aggressive behaviors of their students and from engaging in coercive interactions with them. As a result of these two processes, children may be learning ways of fostering their emotional well-being and of establishing relationships with others in kindergarten that carry over in part into their behavioral adaptation in subsequent years. Although the practices used by the teacher to install a positive disciplinary atmosphere in the classroom are likely to differ across the grades, our findings combined with those of Brody and colleagues (2002) highlight the importance of this classroom social climate characteristic and provide support for its importance as a promotive factor for behavioral development in kindergarten and early elementary.

Overall, the contribution of the classroom social climate to behavioral development between end of kindergarten and end of third grade was small. These results suggest that teacher-reported kindergarten classroom social climate matters, yet to a small extent. Having that said, it is important to keep in mind two points. First, children who participated in the present study were psychosocially well

adapted. Their level of emotional distress and physical aggression was low when they entered kindergarten and remained low across the early elementary grades making them perhaps less responsive to variations in the social climate of their classroom. Second, the present study relied on naturally occurring variations in the classroom learning environment. Thus, observed effects were perhaps small "because the degree of natural variation [was] small, rather than because the setting [was] irrelevant" (Duncan & Raudenbush, 1999, p. 29). For that matter, most children experienced a generally positive classroom social climate.

Study Limitations

The present study is not without limitations. First, only children with complete data on the classroom social climate characteristics and on the outcome measures at kindergarten entry and one other time point were included in the analyses resulting in the loss of 19.61% of the original sample. Nonetheless, these selection criteria were necessary to the design and there were no significant differences in gender or in any behavioral and cognitive measure at baseline between children who participated in the study and those who did not. Second, data on classroom social climate in first, second, and third grade was missing. Findings from previous research suggest that children classroom experiences are not particularly consistent from one year to the next (Pianta, Belsky, Houts, Morrison, & The NICHD Early Child Care Research Network, 2007) and that changes in behavior may be better explained by the contemporaneous classroom environment of each new grade (Barth, Dunlap, Dane, Lochman, & Wells, 2004; NIHCD Early Child Care Research Network, 2006; Peisner-Feinberg et al., 2001). Hence, our findings have perhaps overestimated the lasting effect of kindergarten classroom social climate on behavioral development during the middle years.

Future Research and Policy Implications

This research allows a greater understanding of the effects of the emotional and disciplinary atmosphere of the kindergarten classroom on behavioral development in middle childhood. While no research using correlation data can demonstrate causation, the present longitudinal study brings support to classroom management as a promotive factor for behavioral development in middle childhood. It suggests that

teachers should use strategies that provide their students with a positive disciplinary atmosphere in the kindergarten classroom to help them disengage from their developmental difficulties in kindergarten and early elementary. But, overall, it suggests that teachers may need to rely on other indicators than their perception of the classroom social climate in order to promote the positive development of their students. This is particularly the case for the emotional atmosphere of the classroom.

Many possible and promising avenues need to be investigated in order to provide teachers with an effective means to identify and implement strategies aimed at improving children's experiences in their classroom and psychosocial adjustment in subsequent years. Future research needs to examine simultaneously the contribution of students' and teachers' perceptions of actual classroom climate, the contribution of the difference between students' perceptions of actual and preferred classroom social climate (Fraser & Fisher, 1983), and the contribution of classroom social climate and teacher-student relationships. Considering the low internal consistency of the original scales of the LCS in the present study, it may be necessary as a first step to validate the LCS in kindergarten or to elaborate and validate a new instrument designed for kindergarten teachers and children.

Footnote

[1] Unlike mean substitution and regression-based single imputation, multiple imputation (MI) is an appropriate method. Not only does it concentrate on identifying a replacement for an incomplete value, but it also tries to preserve the variance of the variable as well as relationships in the entire dataset. For Graham and Hofer (2000), MI seems even appropriate when data are NMAR: since incomplete data are often made up of both MAR and NMAR data, a sound attitude should be to account for as much of the mechanism responsible for the incomplete data as possible.

Appendix

The estimating equations for the five models tested are as follows (Singer, 1998):

Model 1:

(1) $Y_{ij} = [\beta_{00}] + [\mu_{0j} + r_{ij}]$

where Y_{ij} is the observed value of the behavioral outcome for child j at time i; β_{00} is the average true behavioral score across persons and occasions; μ_{0j} is the residual for child j across occasions; and r_{ij} is the residual for child j at occasion i. The between-person variance of μ_{0j} and the within-person variance of r_{ij} estimate the average scatter of the children-specific true means around the sample true mean and the average scatter of child's j observed outcome values around his or her own true mean, respectively.

Model 2:

(2) $Y_{ij} = [\beta_{00} + \beta_{10}TIME_{ij}] + [\mu_{0j} + \mu_{1j}TIME_{ij} + r_{ij}]$

where β_{00} is the average true initial status or intercept across persons; $\beta_{10}TIME_{ij}$ is the average true slope across persons; μ_{0j} is the residual in the intercept for child j; $\mu_{1j}TIME_{ij}$ is the residual in the slope for child j; and r_{ij} is the residual for child j at occasion i, i.e., the part of child's j value at time i not predicted by the time. The variance of this level-1 residual informs us about the average scatter of child's j observed outcome values around his or her own true linear change trajectory.

Model 3:

(3) $Y_{ij} = [\beta_{00} + \beta_{10}TIME_{ij} + \beta_{01}TS_j + \beta_{02}CM_j + \beta_{11}(TS_j)x(TIME_{ij}) + \beta_{12}(CM_j)x(TIME_{ij})] + [\mu_{0j} + \mu_{ij}TIME_{ij} + r_{ij}]$

where β_{00} and $\beta_{10}TIME_{ij}$ are respectively the intercept and slope for cases in which the values of the classroom covariates are 0. Because the covariates have been centered about the mean to ease the interpretation of the estimates, β_{00} and $\beta_{10}TIME_{ij}$ have the same meaning as in Model 2, with only a slight difference. They represent the average true intercept and slope in the individual growth model controlling for the covariates. The terms $\beta_{01}TS_j$ and $\beta_{02}CM_j$ represent the relationship between initial status and key independent variables controlling for all

other predictors in the model; and ß11(TSj)x(TIMEij) and ß12(CMj)x(TIMEij) represent the relationship between growth rates and key independent variables controlling for all other predictors in the model. In this third model, $\mu 0j$ and $\mu ijTIMEij$ become conditional components and represent the portions of the personal growth parameters that remain unexplained after accounting for the effects of the level-2 predictors.

Models 4 and 5:

(4) $Yij = [ß00 + ß10TIMEij + ß01TSj + ß02CMj + ß11(TSj)x(TIMEij) + ß12(CMj)x(TIMEij) + \gamma 01CHILDj] + [\mu 0j + \mu ijTIMEij + rij];$

(5) $Yij = [ß00 + ß10TIMEij + ß01TSj + ß02CMj + ß11(TSj)x(TIMEij) + ß12(CMj)x(TIMEij) + \gamma 01CHILDj + \gamma 02FAMILYj + \gamma 03TEACHERj] + [\mu 0j + \mu ijTIMEij + rij]$

where $\gamma 01CHILDj$, $\gamma 02FAMILYj$, and $\gamma 03TEACHERj$ are the relationships between initial status and each control variable. In Model 5, the intercept parameter represents the average behavior score at kindergarten entry for girls with average classroom social characteristics, an average score on the PPVT, a low to average sociofamilial adversity, a moderate to good family functioning, moderate to good parenting behaviors, and high positive teacher characteristics.

Article 2

How does kindergarten parental involvement in schooling contribute to cognitive development in middle childhood? Moderating and mediating processes

par Youmna Ghosn et Linda S. Pagani

Abstract

Development is a product of dynamic relationships between an individual and the multiple contexts in which he or she is embedded. In the past, schools were believed to be the most influential institutional shaper of children's cognitive development. Over the past decades, there has been increasing recognition that parental involvement in schooling contributes to children's learning and should be an integral part of the school socio-educational environment. Using a subsample from the Montreal Longitudinal Preschool Study (N = 264), we conducted in-depth examination of the relationship between parental involvement in kindergarten and math skills in second grade. Focus on the moderating effect of family income and the intermediate effect of attention skills using hierarchical regression analyses suggested different processes. When family income was less than CDN $25,000, parental involvement in learning experiences at home and parental involvement at school were associated with better math skills. When family income was CDN $25,000 or more, parental involvement in learning experiences at home was marginally associated with lower math skills. None of these relationships was explained by attention skills. These findings are above and beyond the influence of gender, prior cognitive and behavioral characteristics, parental education, and family structure. They suggest that parental involvement in schooling should be viewed as an effective intervention for improving the learning outcomes of children living in intense poverty.

Keywords: Parental involvement in schooling, cognitive development, family income, attention skills, middle childhood

How does kindergarten parental involvement in schooling contribute to cognitive development in middle childhood? Moderating and mediating processes

Economically disadvantaged parents participate less in the educational processes and experiences of their children than more advantaged parents due, in part, to financial constraints and inflexible work schedules (Heymann & Earle, 2000). They have lower educational expectations for their children. They invest less money and/or time in cognitively stimulating materials, discussions, and activities with their children. They also attend school meetings and events and volunteer in school activities less often (Benveniste, Carnoy, & Rothstein, 2003; Coley, 2002; De Civita, Pagani, Vitaro, & Tremblay, 2004; Federal Interagency Forum on Child and Family Statistics, 2000; Gershoff, Aber, Raver, & Lennon, 2007; Lee & Bowen, 2006). Nonetheless, prior research has established that their involvement in schooling from kindergarten onward is related to better learning outcomes in elementary (Jimerson, Egeland, & Teo, 1999; Reynolds, Mavrogenes, Bezruczko, & Hagemann, 1996). Our understanding of this topic is limited in two regards. First, few studies have examined the moderating role of family income on the relationship between parental involvement in schooling and children's learning. Second, few studies have examined the mechanisms through which parental involvement in schooling contributes to children's learning. These limitations are particularly noticeable when considering their implications for theoretical advancement and policy improvement.

Moderating Effect of Family Income

Family income matters for school success (Patterson, Kupersmidt, & Vaden, 1990), especially during early and middle childhood (Duncan & Brooks-Gunn, 1997). Children living in poor families display lower levels of school readiness (Duncan, Brooks-Gunn, & Klebanov, 1994), cognitive skills (Gershoff et al., 2007), academic performance (Jimerson et al., 1999), and educational attainment in early adulthood (Entwisle, Alexander, & Olson, 2005). Parental involvement in schooling is often considered by policymakers as a means to reduce the achievement gap between these children and their better-off peers. Yet, the moderating effect of family income on the relationship between parental involvement in schooling and achievement is unclear.

From the available literature, one can derive two competing hypotheses related to the moderating effect of family income. The first hypothesis assumes that parental involvement in schooling is less effective for children living in poverty. Compared to children living in wealthier families, they are exposed to greater, more frequent, and more intense environmental stressors (Evans, 2004). As a result, they may be less responsive to the participation of their parents in their educational processes and experiences (Desimone, 1999; Duncan & Brooks-Gunn, 1997). The second hypothesis assumes that parental involvement in schooling is, on the contrary, more effective for children living in poverty. Compared to children living in more advantaged families, they are brought up in less stimulating environments. They experience lower cognitive enrichment and quality education and are at risk for underachievement and school failure. As a result, they may particularly benefit from the attitudes and behaviors of their parents that foster their cognitive development and achievement (Dearing et al., 2006; Duncan & Brooks-Gunn, 1997).

Psychologists, sociologists, and educators have paid some attention to the moderating effect of family socioeconomic characteristics on the relationship between parental involvement in schooling and children's learning (Farkas, 2003). The conclusions of their studies are mixed. Building on the work of Bourdieu on social and cultural capital, Lareau (1989) argues that middle- and upper-class parents help their children succeed more effectively because they possess skills that are valued and necessary to gain educational advantages for their children in the school setting. They feel entitled to interact as equals with the teachers, they are familiar with the educational jargon, they benefit from a large social network to gain informal information about the educational processes, and they possess skills for helping their children at home that are well adapted to the culture of the school. In other words, Lareau (1989) suggests that the educational system favors the reproduction of the social classes. On the contrary, Domina (2005) reports that parental volunteering at school and helping with homework in early elementary grades is more highly associated with math and reading achievement in late elementary grades for children from low socioeconomic backgrounds. Still, Duncan and Brooks-Gunn (1997) argue that parental resources, such as value of achievement, are generally more beneficial

for poor children under a certain threshold of risk (i.e., children living in poor two-parent households) and for better-off children above that threshold (i.e., children living in non-poor single-parent households).

The literature on intervention programs does not provide more conclusive results (for a literature review of the effects of intervention programs according to family socioeconomic characteristics, see Cunha, Heckman, Lochner, & Masterov, 2005; Hertzman & Wiens, 1996). Cunha et al. (2005) point out to the importance of the timing. Viewing human development as sensitive at certain periods, self-productive, and complementary, they suggest that environment-enriching policies reap greater educational rewards for low ability children from disadvantaged backgrounds and for high ability adolescents from more advantaged backgrounds. Yet, the conflicting findings of the studies dealing with childhood do not make it possible to infer such a clear age-specific pattern.

In conclusion, the relationship between parental involvement in schooling and children's learning according to family income is not clear. Although the impacts of poverty and parental involvement in schooling on learning have been largely explored, to date, no rigorous study has examined how family income affects the relationship between parental involvement in schooling and learning. There is a obviously a need to clarify and disentangle the moderating effect of family income from that of other socioeconomic factors, especially when considering that family income is a better predictor of learning than maternal education and family structure during early elementary (Duncan & Brooks-Gunn, 1997; Patterson et al., 1990). A potential moderating effect may have important consequences for policy efforts by identifying children who will most likely benefit from intervention programs that involve parents.

Mediating Effect of Attention

In the past, families were thought to play a critical role in socioemotional development and schools were believed to play a critical role in cognitive development (Connors & Epstein, 1995; Fishel & Ramirez, 2005). More recently, parental participation in the educational processes and experiences of their children

has been increasingly recognized as an integral part of the school socio-educational environment (Janosz, Georges, & Parent, 1998) and as an important way of improving achievement and avoiding grade retention (Connors & Epstein, 1995; Dearing et al., 2006; Miedel & Reynolds, 1999; Reynolds, 1992). Yet, the processes through which this influence occurs are not well known (Grolnick & Slowiaczek, 1994; Hong & Ho, 2005; Slaughter-Defoe, 1999).

Research on parental involvement in schooling has been largely influenced by developmental contextualism. This theoretical perspective emphasizes the dynamic relationships between children and contexts they are embedded in and recognizes the active and central contribution of children to their own development (Lerner, 2002). In light of this, several theoretical models consider that children are the main actors in their own education and suggest that the involvement of their parents contributes to their learning primarily through their personal characteristics (Epstein, 1995; Ryan & Adams, 1995; Scott-Jones, 1995). These models view school engagement as one important intermediate process (Epstein, 1995; Scott-Jones, 1995). For instance, Scott-Jones (1995) proposes a sequential theoretical model with two complementary causal chains. The shortest chain implies that parental helping with academic tasks is associated with children's cognitive skills and in turn with children's school success. The longest chain implies that parental value of achievement, helping with academic tasks, and monitoring of school homework, performance, and behavior is associated with children's motivation and school engagement and in turn with children's cognitive skills and ultimately with children's school success. The assumption underlying this second chain is that parents "cannot simply produce successful students". Rather, they may impact their children in such ways that they "produce their own successes". When their "children feel cared for and encouraged to work hard in the role of student, they are more likely to do their best to learn to read, write, calculate, [...] and to remain in school" (Esptein, 1995, p. 702).

School engagement refers to behavioral, emotional, and cognitive investment of school (Fredricks, Blumenfeld, & Paris, 2004). Being a modifiable characteristic that contributes to learning, school engagement has become an important goal for school

interventions and reforms over the past decades (Fredricks et al., 2004; Marks, 2000).

School engagement does not rely exclusively on individual characteristics. Rather, it is responsive to changes in different academic and social environments. Ample evidence points to the impact of the educational context (Ladd, Birch, & Buhs, 1999; Marks, 2000; Stipek, 2002). Characteristics such as school size, school support, classroom teacher and peer support, and classroom challenging activities represent important precursors of school engagement. Some evidence also points to the impact of the family context. Based on a cross-sectional design, findings by Marks (2000) suggest that elementary and high school students whose parents are generally involved in their schooling report more effort, attention, and completion of assignment in math and social studies. They also report lower feelings of boredom in the classroom. Based on a large ethnically and socio-economically heterogeneous population of high school students, findings by Steinberg, Lamborn, Dornbusch, and Darling (1992) suggest that students whose parents are generally involved in their schooling report one year later lower levels of school misconduct and higher levels of classroom engagement in English, math, science, and social studies. They also report having better relationships with their teachers and enjoying and valuing school more.

School engagement represents a prominent precursor of children's learning. Prospective and longitudinal studies underscore the long-term impact of school engagement on standardized achievement, teacher-assigned grades, and academic attainment. School engagement in the early years determines achievement during early and late elementary school and dropout status in high school (Alexander, Entwisle, & Dauber, 1993; Alexander, Entwisle, & Horsey, 1997; Reynolds et al., 1996). More particularly, attention as an important construct of school engagement seems pivotal for school readiness and success (Howse, Lange, Farran, & Boyles, 2003; Finn, Pannozzo, & Voelkl, 1995). Children who initiate, sustain, and shift flexibly their attention according to the needs of specific learning situations and who ignore distracting or irrelevant stimuli benefit from the opportunities and resources provided to them. They allocate more time to acquire information or solve problems

and ultimately achieve better. Duncan and colleagues (2007) used six longitudinal international data sets to assess the effect of children characteristics at kindergarten entry on achievement in third grade. Kindergarten math skills and kindergarten reading and language skills were respectively the first and second most important predictors of subsequent math and reading. Coming in third in effect-size, attention was the only other significant predictor of later achievement. Socioemotional behaviors seemed unimportant.

Preliminary evidence points to the role of school engagement as a possible explanatory factor between parental involvement in schooling and children's learning. Learning behaviors such as being a self-starter and staying on task in kindergarten seem to partly explain the relationship between concurrent parental involvement at school and math outcomes and the relationship between concurrent teacher perceptions of parental educational values and literacy outcomes (Hill & Craft, 2003). Ability to sustain attention and inhibit impulsive responding at 54 months of age also seems to partly explain the relationship between the quality of family environment in early childhood and achievement in first grade (NICHD Early Child Care Research Network, 2003b). Although family environment and parental involvement in schooling are quite different notions, they share common concepts (i.e., physical resources and maternal cognitive stimulation).

In conclusion, the evidence for the intermediate effect of school engagement between parental involvement in schooling and achievement is sparse. There is clearly a need to test a prospective model of third-factor involvement. A potential mediating effect may have important implications for policy efforts by supplementing practitioners with additional means for improving children's investment of school and subsequent learning and by suggesting the importance of sequential intervention programs.

Objectives

The present prospective longitudinal study focuses on the conditions under which and the mechanisms through which parental involvement in schooling influences children's learning. In terms of conditions, does the level of family poverty at

kindergarten entry moderate the relationship between kindergarten parental involvement in schooling and second grade math skills? In terms of mechanisms, do attention skills measured at the end of first grade mediate the relationship between kindergarten parental involvement in schooling and second grade math skills?

Method

Participants and Procedure

The Montreal Longitudinal Preschool Study (MLPS) comprises five consecutive cohorts launched from 1997 to 2000 in the poorest neighborhoods of Montreal, Canada. The original sample of French language preschool children (N = 2095), representing one-third of the population invited to participate, was obtained after a multilevel consent process involving school board officials, local school committees, teachers, and parents. Given that some of the cohorts do not meet all the data requirements for the research objectives examined here, we limit ourselves to two cohorts of children beginning kindergarten in fall 1998 and fall 1999 (N = 770).

Initial and follow-up data were collected from multiple sources, including direct cognitive assessments of children, and parent and teacher surveys. Although initial data were available for 770 children, the final sample for these analyses was reduced to 264 participants because of incomplete data. Students in the study included 127 boys and 137 girls for whom data were available on key independent variables (Parental Involvement in Schooling, Family Income, and Attention at the end of first grade) and on the outcome measure (Math Skills at the end of second grade). Incomplete data were partly due to the fact that by the end of first and second grade some children changed schools and neighborhoods, which required a more complex solicitation process from the school and its committee in order to grant permission for the follow-up process. Children had to be retraced and their teachers were asked to complete the student behavioral and school performance questionnaire.

To understand the pattern of incomplete data on these variables, we conducted independent-samples t tests. The significant results were as follows: Children with incomplete data on family income had lower levels of preschool number knowledge, receptive verbal skills, and attention at kindergarten entry. They also had lower

scores on attention at the end of first grade. Children with incomplete data on the constructs of parental involvement in schooling reported by parents had lower levels of preschool number knowledge, receptive verbal skills, and attention at kindergarten entry. Finally, children with incomplete data on the Attention scale at the end of first grade had lower levels of preschool number knowledge and higher levels of disruptive behavior at kindergarten entry. In all likelihood, children with incomplete data belonged to the least advantaged families. As a consequence, our estimates of effects are likely to be conservative.

Almost 67% of the children in the final sample for analysis were born in Canada, 56.8% spoke French at home, and 67.4% were living with both of their biological parents at kindergarten entry. On average, mother's age at birth of first child was 25.40 (SD = 5.17), mother's years of education were 12.57 (SD = 3.66), and father's years of education were 12.44 (SD = 3.97).

Dependent Variable

Math Skills. At the end of second grade, a research assistant assessed children's math skills using the Number Knowledge Test (NKT). Norms were developed for children from ages 4 through 10 with both low- and middle-income children from Ontario, Massachusetts, Oregon, and California (Okamoto & Case, 1996). The NKT has been previously used throughout primary school as a reliable outcome (Duncan et al., 2007; Pagani, Larocque, Tremblay, & Lapointe, 2003). The second grade version of the test comprises 38 items ordered in increasing difficulty and tests number positioning, additions, subtractions, and multiplications. Scores are derived by summing the number of correct responses for each child. Descriptive statistics for the dependent variable are reported in Table 1.

Table 1

Ranges, Means, and Standard Deviations for the Dependent Variable

Variables	*Possible Range*	*Observed Range*	*M*	*SD*
NKT End 2nd Grade				
Whole Sample	0 – 38	2 – 38	29.41	6.21
Family Income Less than $25,000	0 – 38	8 – 38	28.01	6.46
Family Income $25,000 or more	0 – 38	2 – 38	30.85	5.61

Key Independent Variables: Main predictors

Parental Educational Expectations. At kindergarten entry, parents answered on a 5-point Likert-type scale (i.e., elementary school; secondary school; high school; apprenticeship; university) one item that reflects their educational expectations: What level of education do you expect your child to complete? Most parents (71.6%) expected their children to complete university. Thus, the item was scored 1 for university and 0 for other values.

Parental Value of Achievement. At kindergarten entry, parents answered on a 4-point Likert-type scale (i.e., not important; slightly important; important; very important) one item that reflects their belief about the value of achievement: How important is it for you that your child has good grades at school? Only 1.5% of the parents considered that it was slightly important that their children have good grades, 39.8% considered it to be important, and 58.7% considered it to be very important. Thus, the item was scored 1 for very important and 0 for other values.

Parental Involvement in Learning Experiences at Home. At kindergarten entry, parents answered three items that reflect their involvement in learning activities at home: Do you or another adult read regularly to your child?; How often do you help or encourage your child to write or to pretend writing? (8-point Likert-type scale: rarely to several times a day); and Do you praise your child by telling him "Bravo!", "It is very nice", or "Very good"? (5-point Likert-type scale: never to several times a day). The "read regularly to your child item" was rescaled from *no* = 0 and *yes* = 1 to *no* = 0 and *yes* = 28. The "help or encourage your child to write or pretend writing" item was rescaled from a 0 – 7 scale to a 0 – 28 scale. The "praise your child" item

was rescaled from a 0 – 4 scale to a 0 – 28 scale. The three items were then summed (Cronbach's alpha = .43).

Family-School Communication. At the end of kindergarten, teachers rather than parents answered on a 4-point Likert-type scale (i.e., often; sometimes; never; does not apply) five items that reflect family-school communication from the beginning to the mid-point of the school year: Met child's teacher for report cards; Called child's teacher; Wrote child's teacher; Met teacher to discuss child's academic achievement and behavior; and Attended parent meetings (Cronbach's alpha = .79).

The five types of family-school communication were not systematically offered to parents as evidenced by the number of teachers who answered "does not apply" (2.3% for the item "Met child's teacher for report cards"; 5.3% for the item "Called child's teacher"; 3% for the item "Wrote child's teacher"; 3.4% for the item "Met teacher to discuss child's academic achievement and behavior"; and 6.1% for the item "Attended parent meetings"). On average, teachers offered 4.8 (*SD* = .80) types of family-school communication of which parents used 3.38 (*SD* = 1.35). The Family-School Communication construct was created by dividing each parent's level of family-school communication by the number of types of family-school communication offered by the teacher and then by transforming the missing values to 0. In order to measure each parent's level of family-school communication, the five items were rescaled (*does not apply and never* = 0; *sometimes* = 1; and *often* = 2) and then summed. In order to measure the number of types of family-school communication offered by the teacher, the five items were rescaled (*does not apply* = 0 and *never, sometimes, and often* = 1) and then summed. The missing values in the Family-School Communication construct were due to the fact that it is impossible to divide 0 by 0.

Parental Involvement at School. At the end of kindergarten, teachers rather than parents answered on a 4-point Likert-type scale (i.e., often; sometimes; never; does not apply) four items that reflect parental involvement at school from the beginning to the mid-point of the school year: Assisted teacher during some classroom activities; Accompanied the class on field trips; Attended classroom for special

events (Christmas, Halloween, etc.); and Participated in parent-child workshops (Cronbach's alpha = .74).

The four types of family-school communication were not systematically offered to parents as evidenced by the number of teachers who answered "does not apply" (38.6% for the item "Assisted teacher during some classroom activities"; 13.3% for the item "Accompanied the class on field trips"; 34.8% for the item "Attended classroom for special events"; and 46.2% for the item "Participated in parent-child workshops"). On average, teachers offered 2.67 (*SD* = 1.33) types of parental involvement at school of which parents used 1.09 (*SD* = 1.21). The Parental Involvement at School construct was created by dividing each parent's level of involvement at school by the number of types of parental involvement at school offered by the teacher and then by transforming the missing values to 0. In order to measure each parent's level of involvement at school, the four items were rescaled (*never and does not apply* = 0; *sometimes* = 1; and *often* = 2) and then summed. In order to measure the number of types of parental involvement at school offered by the teacher, the five items were rescaled (*does not apply* = 0 and *never, sometimes, and often* = 1) and then summed. The missing values in the Parental Involvement at School construct were due to the fact that it is impossible to divide 0 by 0.

Key Independent Variables: Moderator Variable

Family Income. At kindergarten entry, the person-most-knowledgeable reported the family annual income on a scale listing income brackets in CDN $5,000 increments (minimum: none; maximum: $60,000 or more). The item was scored 0 when family income was less than CDN $25,000 and 1 when family income was CDN $25,000 or more. The cut-off used to create the two subgroups corresponds to the scores at the 50^{th} percentile of the distribution.

Key Independent Variables: Mediator Variable

Attention. At the end of first grade, teachers reported upon children attention using the Social Behavior Questionnaire (SBQ; Tremblay et al., 1991). The SBQ was developed by Tremblay, Offord, and Boyle for the National Longitudinal Study of Children and Youth (NLSCY) and originates from the Ontario Child Health Study

and the Montreal-Longitudinal-Experimental Study. It assesses children's behavioral adjustment on a 3-point Likert-type scale (i.e., often; sometimes; never) to indicate how frequent each item is for the child. When it was not available, Attention at the end of first grade was replaced by its correspondent value at the end of kindergarten (N = 46). The Attention scale comprises three items: Easily distractible; Unable to concentrate; and Is inattentive (Cronbach's alpha = .91). A higher score on the scale indicates greater attention. Descriptive statistics for the key independent variables are reported in Table 2.

Table 2

Frequencies, Ranges, Means, and Standard Deviations for the Key Independent Variables

Variables	*Fequency*		*Possible Range*	*Observed Range*	*M*	*SD*
	0	*1*				
Parental Involvement in Schooling						
Parental Educational Expectations Dichotomized						
Whole Sample	75	189	-	-	-	-
Family Income Less than $25,000	33	101	-	-	-	-
Family Income $25,000 or more	42	88	-	-	-	-
Parental Value of Achievement Dichotomized						
Whole Sample	109	155	-	-	-	-
Family Income Less than $25,000	43	91	-	-	-	-
Family Income $25,000 or more	66	64	-	-	-	-
Parental Involvement in Learning Experiences at Home						
Whole Sample	-	-	0 – 84	14 – 84	68.02	14.61
Family Income Less than $25,000	-	-	0 – 84	14 – 84	67.23	15.59
Family Income $25,000 or more	-	-	0 – 84	19 – 84	68.83	13.52
Family-School Communication						
Whole Sample	-	-	0 – 2	0 – 2	.93	.49
Family Income Less than $25,000	-	-	0 – 2	0 – 2	.90	.48
Family Income $25,000 or more	-	-	0 – 2	0 – 2	.97	.49

Table 2, continued

Frequencies, Ranges, Means, and Standard Deviations for the Key Independent Variables

Variables	*Fequency*		*Possible Range*	*Observed Range*	*M*	*SD*
	0	*1*				
Parental Involvement in Schooling						
Parental Involvement at School						
Whole Sample	-	-	0 – 2	0 – 2	.52	.63
Family Income Less than $25,000	-	-	0 – 2	0 – 2	.54	.67
Family Income $25,000 or more	-	-	0 – 2	0 – 2	.51	.60
Moderator Variable						
Family Income						
Whole Sample	-	-	From none to 60,000 or more	From less than 5,000 to 60,000 or more	Bracket of 25,000 to 29,999	
Family Income Less than $25,000	134		-	-	-	-
Family Income $25,000 or more	130		-	-		-
Mediator Variable						
Attention End 1st Grade						
Whole Sample	-	-	3 – 9	3 – 9	7.39	1.86
Family Income Less than $25,000	-	-	3 – 9	3 – 9	7.37	1.84
Family Income $25,000 or more	-	-	3 – 9	3 – 9	7.52	1.81

Covariates: Child Characteristics

Gender. Gender was scored 0 for boys and 1 for girls.

Preschool Number Knowledge. At kindergarten entry, a research assistant assessed children's informal number knowledge and conceptual prerequisites of arithmetic operations using the kindergarten version of the NKT. This version comprises 19 items and tests number positioning and additions.

Receptive Verbal Skills. At kindergarten entry, a research assistant assessed children's receptive verbal skills using the French adaptation of the Peabody Picture Vocabulary Test (PPVT, Forms A and B, French adaptation by Dunn, Thériault-Whalen, & Dunn, 1993: Échelle de vocabulaire en images Peabody). Up to 30.68% of the sample appeared to be ethnolinguistic minorities with the child or at least one

parent born outside of Canada. As such, this variable was used to control for children's receptive vocabulary. The PPVT have been shown to correlate significantly with measures of reading, language, and general achievement (Altepeter & Handal, 1985; Vance, Kitson, & Singer, 1985), and very few items have been found to be culturally biased against ethnic populations when used to indicate extensiveness of receptive vocabulary (Argulewicz & Abel, 1984; Reynolds, Willson, & Chatman, 1984). The scale comprises five practice items, followed by 170 items that are ordered in increasing difficulty. Every item is shown in four possible images. The child must indicate which image corresponds to the correct answer. Individual administration takes approximately 8-10 minutes.

Attention. At kindergarten entry, teachers reported upon children attention using the SBQ. The Attention scale extracted from the questionnaire is identical to the one used at end of first grade (Cronbach's alpha = .88).

Disruptive Behavior. At kindergarten entry, teachers reported upon children hyperactivity and physical aggression using the SBQ. A Disruptive Behavior scale was created by combining five hyperactivity items with four physical aggression items: Has difficulty staying in one place, seems agitated or hyperactive; Keeps moving; Seems impulsive, acts without thinking; Has difficulty waiting for his/her turn; Has difficulty staying calm; Threatens others; Bullies, is cruel, or mean to others; Hits, bites, and kicks other children; and Gets into many fights (Cronbach's alpha = .90). The items were reverse scored so that a higher score on the scale indicates greater disruptive behavior.

Covariates: Family Characteristics

Parental Education. At kindergarten entry, the person-most-knowledgeable reported the years of education of both parents. It has been suggested that the highest level of education across parents is a better indicator of the child's environment associated with parental education than other alternative such as the average level of parental education (Simpkins, Davis-Kean, & Eccles, 2005). As such, the highest number of years of education across parents was used in our study to measure parental education.

Family structure. At kindergarten entry, the person-most-knowledgeable provided data on family structure. The item was scored 0 if the child was living with one adult and 1 if the child was living with two adults.

Controlling for child earlier number knowledge, receptive verbal skills, and behavioral characteristics allows us to account for the influence of biologically based characteristics and continuity in development, and to separate the causes and effects of parental involvement in schooling. Controlling for parental education and family structure allows us to document the moderating influence of family income net of two important competing explanations for poverty effects. Descriptive statistics for the covariates are reported in Table 3.

Table 3

Frequencies, Ranges, Means, and Standard Deviations for the Covariates

Variables	*Fequency*		*Possible Range*	*Observed Range*	*M*	*SD*
	0	*1*				
Child Characteristics						
Gender (Boys = 0)						
Whole Sample	127	137	-	-	-	-
Family Income Less than $25,000	57	77	-	-	-	-
Family Income $25,000 or more	70	60	-	-	-	-
NKT Kindergarten Entry						
Whole Sample	-	-	0 – 19	0 – 19	10.82	4.58
Family Income Less than $25,000	-	-	0 – 19	0 – 19	9.60	4.58
Family Income $25,000 or more	-	-	0 – 19	0 – 19	12.08	4.25
PPVT Kindergarten Entry						
Whole Sample	-	-	0 – 170	2 – 124	53.05	26.25
Family Income Less than $25,000	-	-	0 – 170	2 – 105	45.07	24.02
Family Income $25,000 or more	-	-	0 – 170	9 – 124	61.28	26.00
Attention Kindergarten Entry						
Whole Sample	-	-	3 – 9	3 – 9	7.44	1.82
Family Income Less than $25,000	-	-	3 – 9	3 – 9	7.37	1.84
Family Income $25,000 or more	-	-	3 – 9	3 – 9	7.52	1.81

Table 3, continued

Frequencies, Ranges, Means, and Standard Deviations for the Covariates

Variables	*Fequency*		*Possible Range*	*Observed Range*	*M*	*SD*
	0	*1*				
Child Characteristics						
Disruptive Behavior Kindergarten Entry						
Whole Sample	-	-	9 – 27	9 – 26	11.56	3.55
Family Income Less than $25,000	-	-	9 – 27	9 – 23	11.66	3.76
Family Income $25,000 or more	-	-	9 – 27	9 – 26	11.47	3.35
Family Characteristics						
Parental Education						
Whole Sample	-	-	-	0 – 27	13.64	3.66
Family Income Less than $25,000	-	-	-	0 – 22	12.56	3.48
Family Income $25,000 or more	-	-	-	5 – 27	14.74	3.45
Family Structure (One Adult=0)						
Whole Sample	64	200	-	-	-	-
Family Income Less than $25,000	43	91	-	-	-	-
Family Income $25,000 or more	21	109	-	-	-	-

Analytic Strategy

Moderation. Moderation is said to occur when the effect of a predictor variable on an outcome variable is changed by a third variable or moderator. Moderation is established when three conditions are met (Baron & Kenny, 1986; Kenny, 2009; Kraemer, Stice, Kazdin, Offord, & Kupfer, 2001): (1) ideally the moderator variable is measured prior to the predictor variable; (2) ideally the moderator variable is not correlated with the predictor variable; and (3) the moderator variable affects the relationship between the predictor variable and the outcome variable. In other words, the effect of the predictor variable on the outcome variable is weakened, amplified, or reversed because of the moderator variable. If the moderator variable is a characteristic of the individual (e.g., family income), then it indicates on whom the predictor variable may have the most significant effects.

Mediation. Mediation is said to occur when the effect of a predictor variable on an outcome variable is transmitted by a third variable or mediator. Mediation is

established when five conditions are met (Baron & Kenny, 1986; Lindley & Noble Walker, 1993): (1) the predictor variable, the mediator variable, and the outcome variable are measured chronologically in the same order; (2) the predictor variable affects the outcome variable; (3) the predictor variable affects the mediator variable; (4) the mediator variable affects the outcome variable; and (5) the previously significant association between the predictor variable and the outcome variable is reduced once the mediator variable is included in the equation. In a multiple linear or logistic regression analysis, if the effect of the predictor variable is reduced to zero after the introduction of the mediator variable, full mediation is indicated. If the effect of the predictor variable is reduced, but not to zero, partial mediation is indicated. Although these conditions meet the requirements of mediation, Aroian (1947) recommended a more rigorous test of mediation. He developed a formula to test if the indirect effect of the predictor variable on the outcome variable via the mediator variable is significantly different from zero:

$$z\text{-value} = a*b / \sqrt{(b^2*sa^2 + a^2*sb^2 + sa^2*sb^2)}$$

where a is the unstandardized regression coefficient of the predictor variable in the multiple linear or logistic regression analysis with the predictor variable predicting the mediator variable and sa its standard error; and b is the unstandardized regression coefficient of the mediator variable in the multiple linear or logistic regression analysis with the predictor variable and the mediator variable predicting the outcome variable and sb its standard error.

Analyses. A hierarchical multiple linear regression analysis was first performed to investigate the contribution of parental involvement in schooling to second grade math skills and the moderating effect of family income on this relationship. Child and family covariates were included in the first step of the analysis. The constructs of parental involvement in schooling and Family Income were included in the second step. The interaction terms between the constructs of parental involvement in schooling and Family Income were included in the last step. All the continuous independent variables were centered about the mean. The final equation is as follows:

$$NKT_{i2nd} = a + \gamma_1 CHILD_{iK} + \gamma_2 FAMILY_{iK} + \beta_1 PIS_{iK} + \beta_2 INCOME_{iK} +$$

$$ß_3PISiK*INCOMEiK + ei \quad (1.1)$$

where $NKTi2nd$ is the predicted NKT score of child i at the end of second grade; $CHILDiK$ and $FAMILYiK$ are the child and family covariates for child i at kindergarten entry; $PISiK$ is the collection of the constructs of parental involvement in schooling of child i at kindergarten entry or between the beginning and the mid-point of the kindergarten school year; $INCOMEiK$ is the family income of child i at kindergarten entry; and $PISiK*INCOMEiK$ is the collection of the interaction terms between the constructs of parental involvement in schooling and family income for child i. In order to highlight the fact that the simple intercept and the simple slope of the outcome variable $NKTi2nd$ regressed on the main predictor variable $PISiK$ are a function of the moderator variable $INCOMEiK$, equation 1.1 can be rearranged as follows:

$$NKTi2nd = (a + \gamma_1 CHILDiK + \gamma_2 FAMILYiK + ß_2 INCOMEiK) + (ß_1 + ß_3\ INCOMEiK)*PISiK + ei \quad (1.2)$$

where $(a + \gamma_1 CHILDiK + \gamma_2 FAMILYiK + ß_2 INCOMEiK)$ is the simple intercept and $(ß_1 + ß_3\ INCOMEiK)$ is the simple slope.

According to Aiken and West (1991), the significance of the test of the $ß_3$ coefficient of the interaction term between a continuous predictor variable and a categorical moderator variable indicates only that there is a difference in the slopes of the regression lines as a function of the moderator variable. In order to interpret the interaction, it is important to test if the simple slopes in each of the groups of the moderator variable are significantly different from zero. A simple procedure can be used to test the simple slopes of the groups of Family Income. Concerning the group of children whose family income is less than CDN $25,000, the test of the $ß_1$ coefficient in the final model of the analysis provides the test of the simple slope of the group. If it is significant, it indicates that its simple slope differs from zero. Concerning the group of children whose family income is CDN $25,000 or more, the Family Income variable must be recoded so that the category of CDN $25,000 or more becomes the comparison group. The test of the $ß_1$ coefficient in the final model of the analysis conducted with the recoded moderator variable provides the test of the

simple slope of the group. If it is significant, it indicates that its simple slope differs from zero.

Hierarchical logistic regression analyses were then performed to investigate the association between parental involvement in schooling and first grade attention skills for each construct of parental involvement in schooling which main effect or interaction with family income was significant in equation 1.1. Logistic regression analyses were used because the assumption of normality of the regression standardized residuals was not met. The Attention scale was dichotomized and scored 0 when the scores were in the bottom quartile and 1 for higher values. Child and family covariates were included in the first step of each analysis. The construct of parental involvement in schooling and Family Income were included in the second step. The interaction term between the construct of parental involvement in schooling and Family Income was included in the last step. All the continuous independent variables were standardized. The final equation is as follows:

$$ATTDI_{i1rst} = (e^{a + \gamma 1CHILD_{ik} + \gamma 2FAMILY_{ik} + \beta 1PISI_{ik} + \beta 2INCOME_{ik} + \beta 3PISI_{ik}*INCOME_{ik} + e_i}) / (1 + e^{a + \gamma 1CHILD_{ik} + \gamma 2FAMILY_{ik} + \beta 1PISI_{ik} + \beta 2INCOME_{ik} + \beta 3PISI_{ik}*INCOME_{ik} + e_i}) \quad (2)$$

where $ATTDI_{i1rst}$ is the estimated probability for child i of having a low score or a moderate to high score on Attention at the end of first grade. Unlike the multiple linear regression model, the interpretation of the interaction term in the logistic regression model is straightforward. It is done simply by examining the significance and the sign of the ß3 coefficient of the interaction term between the construct of parental involvement in schooling and family income (Ganzach, Saporta, & Weber, 2000).

Hierarchical multiple regression analyses were finally performed for each construct of parental involvement in schooling which main effect or interaction with family income was significant in equation 2 in order to investigate two associations: 1) the association between first grade attention skills and second grade math skills; and 2) the association between parental involvement in schooling and second grade math skills after the introduction of first grade attention skills. Child and family covariates were included in the first step of each analysis. The construct of parental involvement in schooling and Family Income were included in the second step. The

interaction term between the construct of parental involvement in schooling and Family Income was included in the third step. Attention was included in the last step. All the continuous independent variables were centered about the mean. The final equation is as follows:

$$NKT_{i2nd} = a + \gamma_1 CHILD_{iK} + \gamma_2 FAMILY_{iK} + ß_1 PIS_{iK} + ß_2 INCOME_{iK} + ß_3 PIS_{iK} * INCOME_{iK} + ß_4 ATT_{i1rst} + e_i \quad (3)$$

where ATTi1rst is the score of child i on the Attention continuous scale at the end of first grade.

Results

Descriptive Statistics

Pearson coefficients are reported in Table 4. All predictors, except two, were significantly related to NKT at the end of second grade. The outcome variable correlated the most with children's characteristics, and more particularly with children's earlier NKT (.59). It did not correlate with parental involvement at school or with children's earlier disruptive behavior. Disruptive behavior at kindergarten entry was excluded from the analyses but parental involvement at school was not because of its conceptual importance (e.g., Jimerson et al., 1999). Correlations between most predictor variables were low to moderate.

Table 4

Correlation Matrix for Dependent and Independent Variables

	1.	*2.*	*3.*	*4.*	*5.*	*6.*	*7.*	*8.*	*9.*	*10.*	*11.*	*12.*	*13.*
1. NKT End 2nd Grade	-												
2. NKT K. Entry	.59***	-											
3. PPVT K. Entry	.31***	.49***	-										
4. Attention K. Entry	.31***	.27***	.11*	-									
5. Disruptive Behavior K. Entry	-.05	-.08	-.08	-.62***	-								
6. Parental Education K. Entry	.23***	.32***	.30***	.07	-.00	-							
7. Family Structure K. Entry	.18**	.12†	-.02	.12†	-.08	.06	-						
8. Parental Educational Expectations	.15**	.14*	-.07	.17**	-.07	.17**	.04	-					
9. Parental Value of Achievement	-.12*	-.18**	-.31***	.03	-.01	-.24***	-.01	.12*	-				
10. Parental Involvement in Learning Experiences at Home	.19**	.20**	.20**	.11†	.00	.14*	.08	-.01	.05	-			
11. Family-School Communication	.11*	.15*	.22***	-.06	.02	.23***	.02	-.05	-.25***	.06	-		
12. Parental Involvement at School	.04	.10	.15*	-.08	.10	-.01	-.06	-.22***	-.16**	.13*	.47***	-	
13. Attention End 1rst Grade	.36***	.29***	.17**	.45***	-.26***	.05	.15*	.15*	-.05	.04	.11†	.10	-

Notes: K. = Kindergarten

† $p < .10$. * $p < .05$. ** $p < .01$. *** $p < .001$

The variables were compared across family income. Independent-samples t-tests were conducted to compare the scores on the continuous dependent and independent variables. Children having a family income less than CDN $25,000 had lower scores on NKT at kindergarten entry (t = -4.56, p < .001), on PPVT at kindergarten entry (t = -5.26, p < .001), on Parental Education (t = -5.11, p < .001), on Attention at the end of first grade (t = -2.00, p < .05), and on NKT at the end of second grade (t = -3.82, p < .001) than children having a family income of CDN $25,000 or more. There were no significant differences in scores on Attention at kindergarten entry (t = -.70, p = .48), on Disruptive behavior at kindergarten entry (t = .42, p = .67), on Parental Involvement in Learning Experiences at Home (t = -.89, p = .38), on Family-School Communication (t = -1.04, p = .30), and on Parental Involvement at School (t = .47, p = .64). Although children having a family income less than CDN $25,000 displayed significantly lower levels of math skills at kindergarten entry and at the end of second grade, their rate of change was higher than that of children having a family income of CDN $25,000 or more. On a scale from one to 10, the rate of change was 2.32 points (SD = 1.95) when family income was less than $25,000 and 1.76 points ($SD$ = 1.95) when family income was $25,000 or more (t(264) = 2.32, p < .05).

Chi-Square tests were conducted to compare the scores on the dichotomous dependent and independent variables. The proportion of children whose parents had high educational expectations was not significantly different according to Family Income (X(1) = 1.56, p = .21). The proportion of children whose parents considered the value of achievement as very important was significantly higher when family income was less than CDN $25,000 ($X$(1) = 8.74, p < .01). Finally, the proportion of children who were living with only one adult was significantly higher when family income was less than CDN $25,000 ($X$(1) = 8.83, p < .01).

Tests of the Moderation and the Mediation Hypotheses

Table 5 reports the results for the first hierarchical multiple linear regression analysis predicting NKT at the end of second grade and including the constructs of parental involvement in schooling. The overall regression model was significant (F(17, 246) = 12.14, p < .001, with R^2 = .46). Gender (β = -.12, p < .05), NKT at

kindergarten entry ($\beta = .51, p < .001$), and Attention at kindergarten entry ($\beta = .17, p < .01$) were significant in Model 1 whereas Parental Education, Family Structure, and PPVT at kindergarten entry were not. A previous study using the MLEPS data set (Duncan et al., 2007) had a quite similar result. This study found no significant association between PPVT scores at the end of kindergarten and NKT scores at the end of first and third grade. The five constructs of parental involvement in schooling made no significant unique contribution to the prediction of NKT at the end of second grade in Model 2. The interaction terms related to Parental Involvement in Learning Experiences at Home ($\beta = -.23, p < .01$) and to Parental Involvement at school ($\beta = -.15, p < .05$) were significant in Model 3 and the interaction term related to Parental Value of Achievement ($\beta = -.16, p = .07$) was only marginally significant. The introduction of the interaction terms added 6% of the variance to the overall model.

The moderation effects were further explored using the simple slope analysis technique outlined by Aiken and West (1991). Concerning Parental Value of Achievement, the simple slopes for the two groups of Family Income were not significant ($t = 1.05, p = .30$ and $t = -1.48, p = .14$). Concerning Parental Involvement in Learning Experiences at Home, the simple slope for the group of children having a family income less than CDN $25,000 was significant ($t = 3.09, p < .01$) and the simple slope for the group of children having a family income of CDN $25,000 or more was only marginally significant ($t = -1.92, p = .06$). These results suggest that the relationship between Parental Involvement in Learning Experiences at Home and NKT at the end of second grade is positive when family income is less than CDN $25,000 and marginally negative when family income is CDN $25,000 or more. Concerning Parental Involvement at School, the simple slope for the group of children having a family income less than CDN $25,000 was significant ($t = 2.04, p < .05$) but the simple slope for the group of children having a family income of CDN $25,000 or more was not ($t = -.88, p = .38$). These results suggest that the relationship between Parental Involvement at School and NKT at the end of second grade is positive when family income is less than CDN $25,000 but not significant when family income is CDN $25,000 or more.

Table 5

Constructs of Parental Involvement in Schooling: Summary of Hierarchical Regression Analysis for Variables Predicting Raw Score on NKT at the End of Second Grade

Variable	B	SE B	β	R^2	Adjusted R^2
Step 1				.39	.38
Gender	-1.49	.61	-.12*		
NKT Kindergarten Entry	.69	.08	.51***		
PPVT Kindergarten Entry	.01	.01	.05		
Attention Kindergarten Entry	.57	.17	.17**		
Parental Education	.03	.09	.02		
Family Structure	1.39	.71	.10		
Step 2				.40	.37
Gender	-1.48	.62	-.12*		
NKT Kindergarten Entry	.66	.08	.49***		
PPVT Kindergarten Entry	.01	.02	.04		
Attention Kindergarten Entry	.54	.18	.16**		
Parental Education	-.01	.10	-.00		
Family Structure	1.27	.73	.09		
Parental Educational Expectations	1.06	.73	.08		
Parental Value of Achievement	-.35	.68	-.03		
Parental Involvement in Learning Experiences at Home	.02	.02	.04		
Family-School Communication	-.44	.75	-.04		
Parental Involvement at School	.40	.57	.04		
Family Income	.65	.69	.05		
Step 3				.46	.42
Gender	-1.71	.60	-.14**		
NKT Kindergarten Entry	.67	.08	.50***		
PPVT Kindergarten Entry	.01	.01	.02		
Attention Kindergarten Entry	.46	.17	.14**		
Parental Education	-.01	.09	-.01		
Family Structure	1.59	.72	.11*		
Parental Educational Expectations	2.00	1.02	.15†		
Parental Value of Achievement	.97	.92	.08		
Parental Involvement in Learning Experiences at Home	.09	.03	.20**		

Table 5, continued

Constructs of Parental Involvement in Schooling: Summary of Hierarchical Regression Analysis for Variables Predicting Raw Score on NKT at the End of Second Grade

Variable	B	SE B	β	R^2	Adjusted R^2
Step 3					
Family-School Communication	.04	1.02	.00		
Parental Involvement at School	1.56	.77	.16*		
Family Income	3.06	1.38	.25*		
Parental Educational Expectations * Family Income	-1.45	1.35	-.11		
Parental Value of Achievement * Family Income	-2.30	1.28	-.16†		
Parental Involvement in Learning Experiences at Home * Family Income	-.15	.04	-.23**		
Family-School Communication * Family Income	-.60	1.41	-.03		
Parental Involvement at School * Family Income	-2.28	1.12	-.15*		

Notes: † $p < .10$. * $p < .05$. ** $p < .01$. *** $p < .001$.

$\Delta R^2 = .01$ (step 2) and .06 (step 3)

On the basis of these analyses, the contribution of Parental Educational Expectations, Parental Value of Achievement, and Family-School Communication to Attention at the end of first grade was not examined given that the main effects of these constructs and their interaction with Family Income were not significant. The contribution of Parental Involvement in Learning Experiences at Home to Attention at the end of first grade was examined for the whole sample. Although the main effect of this construct was not significant, its interaction with Family Income and the simple slopes of the two groups of Family Income were significant or marginally significant. Finally, the contribution of Parental Involvement at School to Attention at the end of first grade was examined only for the subsample of children having a family income less than CDN $25,000 given that the main effect of the construct and the simple slope of the subsample of children having a family income of CDN $25,000 or more were not significant.

Table 6.1 reports the results for the hierarchical logistic regression analysis predicting attention at the end of first grade and including the construct of Parental Involvement in Learning Experiences at Home. NKT (odds ratio = 1.53, $p < .05$) and

Attention (odds ratio = 1.82, $p < .001$) at kindergarten entry were significant in Model 1. Children with higher scores on NKT or attention at kindergarten entry were more likely to have a moderate to high score on Attention at the end of first grade than were children with lower scores on NKT and attention. In fact, a one unit increment in earlier attention almost doubled the odds of having a moderate to high score on Attention at the end of first grade. None of the other variables included in the analysis was a meaningful predictor of the outcome variable. Therefore, the mediating effect of Attention at the end of first grade on the relationship between Parental Involvement in Learning Experiences at Home and NKT at the end of second grade was not further explored.

Table 6.1

Parental Involvement in Learning Experiences at Home: Summary of Logistic Regression Analysis for Variables Predicting Attention at the End of First Grade

Variable	B	SE	Wald	Odds Ratio	Confidence Interval	χ^2 for the Block
Step 1						χ^2 (6) = 39.82***
Gender (female)	.49	.29	2.92	1.64	.93 – 2.88	
NKT Kindergarten Entry	.43	.17	6.10	1.53*	1.09 – 2.15	
PPVT Kindergarten Entry	-.01	.17	.00	.99	.72 – 1.37	
Attention Kindergarten Entry	.60	.14	17.25	1.82***	1.37 – 2.41	
Parental Education	-.06	.15	.16	.94	.70 – 1.27	
Family Structure	.28	.33	.71	1.32	.69 – 2.52	
Step 2						χ^2 (2) = 3.30
Gender (female)	.55	.29	3.46	1.72	.97 – 3.06	
NKT Kindergarten Entry	.43	.18	5.98	1.53*	1.09 – 2.16	
PPVT Kindergarten Entry	.02	.17	.01	1.02	.73 – 1.43	
Attention Kindergarten Entry	.62	.15	18.11	1.87***	1.40 – 2.49	
Parental Education	-.08	.19	.22	.93	.68 – 1.27	
Family Structure	.28	.34	.67	1.32	.68 – 2.56	
Parental Involvement in Learning Experiences at Home	-.24	.16	2.40	.79	.58 – 1.07	
Family Income	.25	.32	.63	1.29	.69 – 2.41	

Table 6.1, continued

Parental Involvement in Learning Experiences at Home: Summary of Logistic Regression Analysis for Variables Predicting Attention at the End of First Grade

Variable	B	SE	Wald	Odds Ratio	Confidence Interval	χ^2 for the Block
Step 3						χ^2 (1) = 1.24
Gender (female)	.56	.29	3.60	1.75	.98 – 3.10	
NKT Kindergarten Entry	.45	.18	6.55	1.58*	1.11 – 2.23	
PPVT Kindergarten Entry	.02	.17	.01	1.02	.73 – 1.43	
Attention Kindergarten Entry	.60	.15	16.63	1.83***	1.37 – 2.44	
Parental Education	-.07	.16	.17	.94	.69 – 1.28	
Family Structure	.31	.34	.81	1.36	.70 – 2.65	
Parental Involvement in Learning Experiences at Home	-.12	.19	.39	.89	.61 – 1.29	
Family Income	1.91	1.55	1.52	6.76	.33 – 140.54	
Parental Involvement in Learning Experiences at Home * Family Income	-.87	.79	1.21	.42	.09 – 1.98	

Notes: * $p < .05$. *** $p < .001$.

-2 LL = 291.94; -2 LL = 288.65; -2 LL = 287.40

Table 6.2 reports the results for the hierarchical logistic regression analysis predicting attention at the end of first grade for the subsample of children having a family income less than $25,000 and including the construct of Parental Involvement at School. NKT (odds ratio = 1.60, $p < .05$) and Attention (odds ratio = 1.86, $p < .001$) at kindergarten entry were significant in Model 1. None of the other variables included in the analysis was a meaningful predictor of the outcome variable. Therefore, the mediating effect of Attention at the end of first grade on the relationship between Parental Involvement at School and NKT at the end of second grade was not further explored.

Table 6.2

Parental Involvement at School: Summary of Logistic Regression Analysis for Variables Predicting Attention at the End of First Grade if Family Income less than $25,000

Variable	B	SE	Wald	Odds Ratio	Confidence Interval	χ^2 for the Block
Step 1						χ^2 (6) = 20.12**
Gender (female)	.01	.40	.00	1.01	.46 – 2.18	
NKT Kindergarten Entry	.47	.23	4.16	1.60*	1.02 – 2.51	
PPVT Kindergarten Entry	-.02	.21	.01	.98	.65 – 1.48	
Attention Kindergarten Entry	.62	.20	9.53	1.86**	1.26 – 2.76	
Parental Education	-.28	.21	1.86	.76	.51 – 1.13	
Family Structure	.06	.43	.02	1.06	.46 – 2.46	
Step 2						χ^2 (1) = 1.84
Gender (female)	.55	.29	3.46	1.72	.97 – 3.06	
NKT Kindergarten Entry	.43	.18	5.98	1.53*	1.09 – 2.16	
PPVT Kindergarten Entry	.02	.17	.01	1.02	.73 – 1.43	
Attention Kindergarten Entry	.62	.15	18.11	1.87***	1.40 – 2.49	
Parental Education	-.08	.19	.22	.93	.68 – 1.27	
Family Structure	.28	.34	.67	1.32	.68 – 2.56	
Parental Involvement at School	-.24	.16	2.40	.79	.58 – 1.07	

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

-2 LL = 155.86; -2 LL = 154.02

Discussion

More than ever, at the dawn of the twenty-first century, policies, practices, and programs must be improved in order to counter the consequences of growing up poor and break the intergenerational transmission cycle. For many policymakers, this means encouraging parents to participate in the educational processes and experiences of their children. The present study conducts an in-depth examination of the relationship between parental involvement in kindergarten and math skills in second grade for children living in low-income families.

The role of Family Income

Parental involvement in schooling in kindergarten contributed to math skills in second grade for children living in intense poverty only. None of the main effects of parental educational expectations, value of achievement, involvement in learning experiences at home, communication with the school, and involvement at school was significantly associated with math skills at the end of second grade. However, the associations between parental involvement in learning experiences at home and parental involvement at school varied across family income. More specifically, both constructs were associated with better math skills at the end of second grade for children having a family income less than CDN $25,000 but not for children having a family income of CDN $25,000 or more. Contrary to an existing and prevailing hypothesis which suggests that parental involvement in schooling may not be as helpful for disadvantaged children, our findings show evidence that such an investment is likely to improve their outcomes and even help reduce the learning gap between themselves and their better-off peers. Although children having a family income less than CDN $25,000 displayed significantly lower levels of math skills at kindergarten entry and at the end of second grade, their rate of change was higher than that of children having a family income of CDN $25,000 or more. From a developmental standpoint and a preventive perspective, this is quite reassuring and encouraging given that the detrimental effects of poverty on children outcomes are stronger in intense poverty (Duncan & Brooks-Gunn, 1997), that math underachievement is predictive of half of grade retention cases in the early grades (Pagani, Tremblay, Vitaro, Boulerice, & McDuff, 2001), and that early achievement trajectories tend to stabilize beyond third grade (Entwisle et al., 2005).

Overall, one possible explanation for the observed moderating role of family income is that although attitudes and behaviors displayed by parents to foster children's cognitive development seem important when other cognitively stimulating resources are lacking, they may be ineffective or insufficient for children who already benefit from a more cognitively stimulating home environment. Concerning children having a family income of CDN $25,000 or more, it may be that the involvement of their parents in their education did not add sufficient resources for

these children to benefit from them. Our results resonate with a recent study (Dearing et al., 2006) which found that parental involvement at school is more beneficial for children from low-income families who face greater environmental stressors and are at exceptional risk for poor achievement by virtue of those stressors. Having fewer cognitively enriching experiences and fewer cognitive skills, children from low-income families have more to learn and are more responsive to variations in the involvement of their parents in their education. When their parents become involved in their learning experiences at home and get engaged in joint parent-child activities, they may help their children move through the zone of proximal development and provide them with a better foundation for learning. Moreover, when their parents become involved at school, they may acquire learning practices and learn cognitively stimulating activities adapted to the individual learning needs in math of their children.

The marginally negative relationship between parental involvement in learning experiences at home and second grade math skills for children living in less poverty warrants some caution. The *p* value is influenced by sample size. Hence, the observed negative and marginally significant relationship between the two variables may reflect inadequate power and deserves further comment. When they are faced with similar negative relationships, most researchers suggest that parents become more involved when their children face academic or behavioral difficulties at school (Hill & Craft, 2003; Sui-Chu & Willms, 1996). Having accounted for child effects, the present study brings stronger support for an alternative, less convenient hypothesis. It suggests that children living in less intense poverty do not perform as well in second grade math when their parents are more involved in their learning experiences at home during kindergarten. To the extent that this striking effect is real, it needs to be thoroughly documented by future research. One possible explanation is that the relationship between parental involvement in learning experiences at home and second grade math skills is not linear for those children. Rather it goes up at certain levels of involvement and down at higher levels. This pattern of association between the two variables may suggest that when parents having a family income of CDN $25,000 or more get more involved in the home learning experiences of their children, their involvement may be perceived as

controlling and intrusive by their children and become disruptive to their learning outcomes if their children are no longer in need of the assistance provided by their parents or at least if they are no longer in need of as much assistance provided by their parents (Fredricks & Eccles, 2005; Tharp & Gallimore, 1988).

The Role of Attention

Attention skills in first grade did not explain the relationship between parental involvement in schooling in kindergarten and math skills in second grade. More precisely, parental involvement in learning experiences at home and parental involvement at school did not contribute to attention skills in first grade.

The available literature (Barr, Zack, & Garcia, 2008; NICHD Early Child Care Research Network, 2003b) suggests that when they participate in joint parent-child activities, parents help their children initiate and sustain their attention on relevant aspects of the ongoing activities and turn away from less relevant or irrelevant aspects. In light of these findings, the non significant relationship between parental involvement in learning experiences at home and first grade attention may be explained, in part, by the fact that we only measured one explicitly joint parent-child activity (i.e., Do you or another adult read regularly to your child?) and that we measured it in terms of its frequency and not of its quality.

The available literature also suggests that when they show enthusiasm for their children's learning and take an active interest in their children's education, parents communicate to their children how important they are to them and how important learning is to them (Gonzalez-DeHass, Willems, & Doan Holbein, 2005). By feeling cared for and encouraged to work hard in the role of student (Epstein, 1995), their children are more likely to become engaged at school (Scott-Jones, 1995) by displaying behaviors that enable them to learn and perform well on academic tasks, including paying more attention to classroom activities and other cognitively stimulating resources. The relationship between parental involvement in schooling and attention skills may seem quite relevant when parents get involved in kindergarten, especially in school activities. Kindergarten teachers emphasize the importance of children's abilities to pay attention and to concentrate (teacher report in Duncan et al., 2007; Hill & Craft, 2003). Parents who are more involved in

kindergarten may become particularly sensitized to teacher values and, in turn, they may encourage and help their children acquire and maintain the skills that are valued and promoted in that specific classroom setting. Nevertheless, our findings suggest that kindergarten parental involvement in learning experiences at home and kindergarten parental involvement at school do not help children pay more attention to classroom related activities. In a recent study, Hill and Craft (2003) examined the intermediate effect of children's learning behaviors on the relationship between parental involvement in schooling and children's math skills in kindergarten. Our results resonate partly with their findings. Hill and Craft (2003) found that the relationship between parental involvement in learning experiences at home and learning behaviors is not significant for African Americans and Euro-Americans and that the relationship between parental involvement at school and learning behaviors is significant only for African Americans. Because the constructs of parental involvement in schooling and learning behaviors were measured concurrently, it is possible that African American parents became more involved at school when their children displayed better learning behaviors rather than African American children displayed better learning behaviors when their parents became more involved at school.

Study Limitations

Because the present study is based on secondary data analyses, some measurement issues may limit our findings. Family income does not adjust for differences in household and does not provide a clear picture of family economic conditions. Since information about the number of persons per household was not available, it was not possible to measure an income-to-needs ratio. Our measures of parental educational expectations, parental value of achievement, and parental involvement in learning experiences at home could have been more solid. The first two measures use single items. The third measure describes a narrow range of behaviors in which parents may have been involved and focuses on literacy-related behaviors rather than on math-related behaviors. Moreover, it has a low internal consistency ($\alpha = .43$). The three measures were nevertheless retained because of their conceptual importance.

Future Research and Policy Implications

This research allows a greater understanding of the effects of multiple types of involvement across demographic groups and of how to use parental involvement to address education gap. While no research using correlation data can demonstrate causation, the present longitudinal study brings support to parental involvement in schooling as a protective factor for children living in intense poverty. Although they are less prepared upon school entry and continue to fall behind in early elementary, these children improve their math skills when their parents get involved prior to formal school. Knowing that contacts between families and schools tend to diminish during the transition to kindergarten (Rimm-Kaufman & Pianta, 1999), the present naturalistic study suggests that systematic efforts from teachers and administrators to involve parents in learning experiences at home and at school may help these children overcome the disadvantage due to cumulative risk. Such early efforts are important because interventions offered to disadvantaged children tend to be more effective when they are still young (Cunha et al., 2005) and because the detrimental effects of learning problems on psychosocial adjustment tend to be stronger when learning problems occur in the early grades (Cairns, Cairns, & Neckerman, 1989; Ensminger & Slusarcick, 1992).

Less optimistic and more equivocal are the findings pertaining to children living in less intense poverty. The reasons for which parental involvement in schooling does not contribute or contributes negatively to their outcomes are not clear. Future research is needed to advance our knowledge and avoid hasty and overly simplistic conclusions. Such research will allow us to understand whether different interventions must be developed for these children or whether it is simply a matter of dosage.

Future research needs to further attend to the indirect pathways of the relationship between parental involvement in schooling in kindergarten and math skills in second grade for both theoretical advancement (Reynolds, 2007) and intervention improvement (Kraemer et al., 2001; Reynolds et al., 1996). One possible and promising avenue would be to examine the role of diverse dimensions of school engagement and of academic motivation as explanatory variables. Behavioral,

emotional, and cognitive dimensions of school engagement should preferably be explored together because they are interrelated (Fredricks et al., 2004).

Conclusion

Ayant réalisé les limites de l'intervention curative, les chercheurs et les intervenants en santé mentale et en pédagogie mettent, depuis quelques années, l'accent sur l'intervention préventive au préscolaire des problèmes d'adaptation psychosociale chez les enfants et les adolescents (DeV. Peters & Crill Russell, 1996). La mission éducative des programmes préscolaires vise à assurer le développement des capacités intellectuelles, affectives, morales et sociales de l'enfant. Elle vise à instruire et à socialiser l'enfant afin de lui permettre de s'adapter à l'école et de s'intégrer à la société en tant que citoyen compétent. Afin de mener au mieux leur mission, les programmes préscolaires doivent tenir compte de l'ensemble des milieux de vie dans lesquels l'enfant évolue. Leur environnement socioéducatif ne doit pas se limiter à l'institution éducative *stricto sensu*. Il doit également faire une place aux milieux de vie privilégiés de l'enfant en reconnaissant leur rôle dans son développement socioaffectif et cognitif et en favorisant leur implication dans sa vie.

La présente thèse s'intéresse à la contribution du climat social de la classe et de l'implication des parents à la maternelle au développement comportemental et cognitif de l'enfant au début du primaire. Elle s'inscrit dans une approche préventive et vise à fournir aux chercheurs et aux éducateurs des connaissances importantes pour l'établissement d'un environnement socioéducatif à la maternelle favorable à la réussite scolaire au primaire.

Synthèse des articles

Article 1. How does kindergarten classroom social climate contribute to behavioral development in middle childhood?

Cette étude longitudinale et prospective répondait à la question suivante : l'appui reçu de la part de l'enseignant et l'importance accordée à la réglementation à la maternelle affectent-ils le développement de la détresse émotionnelle et de l'agressivité physique entre la fin de la maternelle et la fin de la troisième année du primaire? Les analyses ont fait ressortir un effet non significatif de l'appui reçu de la part de l'enseignant et un effet significatif protecteur de l'importance accordée à la réglementation. S'il est vrai que la validité interne de l'échelle de mesure de l'appui reçu de la part de l'enseignant pourrait partiellement expliquer nos résultats, d'autres explications sont également possibles.

Première explication des résultats. La méthode de mesure n'est pas sans effet sur l'évaluation du climat social de la classe (Michaud, Comeau, &Goupil, 1990) et sur la relation entre l'évaluation du climat social de la classe et l'adaptation psychosociale des élèves (Moos & Moos, 1978). En effet, Michaud et al. (1990) ont noté certaines différences de perceptions entre les enseignants et les élèves de quatrième, cinquième et sixième années du primaire. Les enseignants et les élèves ont évalué de la même façon l'importance accordée à la réglementation, l'attachement mutuel entre les élèves (le degré d'amitié et de camaraderie entre les élèves), l'importance de la tâche (la valeur accordée à l'organisation, aux activités et au succès) et l'innovation pédagogique (le degré d'implication des élèves et de l'enseignant dans la planification des activités, leur diversité et leur originalité). Par contre, les enseignants ont évalué de façon plus positive l'appui reçu de la part de l'enseignant, la participation des élèves (l'intérêt des élèves pour les activités de la classe) et l'ordre et l'organisation (l'importance accordée à la bonne conduite, à la politesse et à l'organisation générale). Par ailleurs, Moos et Moos (1978) ont constaté que les perceptions des enseignants et des élèves du secondaire étaient différemment associées à la performance scolaire et au taux d'absentéisme des élèves. À titre d'exemple, les perceptions des élèves de l'appui reçu de la part de l'enseignant, de la participation des élèves et de l'attachement mutuel entre les élèves étaient associées à leur performance scolaire. Par contre, seule la perception des enseignants de l'attachement mutuel entre les élèves y était associée.

Si les résultats observés par Michaud et al. (1990) étaient applicables à la maternelle et au secondaire, ils pourraient expliquer les résultats de plusieurs études qui ont mesuré l'effet de la perception du climat social de la classe par les enseignants sur l'adaptation psychosociale des élèves. Tout d'abord, ils pourraient expliquer les résultats observés dans la présente étude (effet non significatif de l'appui reçu de la part de l'enseignant versus effet significatif de l'importance accordée à la réglementation). Ensuite, ils pourraient expliquer les résultats observés par Capuano et al. (2001, effet significatif de l'attachement mutuel entre les élèves). Finalement, ils pourraient expliquer les résultas observés par Moos et Moos (1978, effet non significatif de l'appui reçu de la part de l'enseignant et de la participation des élèves versus effet significatif de l'attachement mutuel entre les élèves).

Les travaux de Michaud et al. (1990) et de Moos et Moos (1978) indiquent clairement que le choix de la méthode de mesure du climat social de la classe revêt une grande importance. Il existe plusieurs méthodes de mesure du climat social de la classe : les perceptions des enseignants ; les perceptions des élèves et l'observation directe. L'utilisation de la méthode observationnelle pour l'étude de l'impact du climat social de la classe sous-entend que l'adaptation psychosociale des individus est influencée par le climat social de la classe « tel qu'il existe » (Turner & Meyer, 2000). Au contraire, l'utilisation des perceptions des enseignants ou des élèves sous-entend que l'adaptation psychosociale des individus est influencée par la manière dont ils perçoivent le climat social de la classe (Turner & Meyer, 2000). Toutefois, les modèles théoriques considèrent que l'influence du climat social « tel qu'il existe » sur l'adaptation psychosociale des élèves est en grande partie (Janosz, Georges, & Parent, 1998) voire totalement (Moos, 1979) médiatisée par l'évaluation cognitive du climat par les élèves. Ces modèles théoriques impliquent que les perceptions des enseignants soient utilisées pour prédire les comportements des enseignants dans le contexte de la classe et pour comprendre les similitudes et les différences entre leurs perceptions et celles des élèves ; que les perceptions des élèves soient utilisées pour prédire l'adaptation des élèves (e.g., Roeser, Eccles, & Sameroff, 1998) ; et que l'observation directe soit utilisée pour comprendre la relation entre la réalité objective du climat social et les perceptions qu'en ont les enseignants et les élèves. Des études sont nécessaires pour tester l'effet de médiation et pour préciser, dans quelle mesure, les objectifs de la recherche devraient dicter le choix de la méthode de mesure du climat social de la classe.

Seconde explication des résultats. Les dimensions du climat social de la classe n'ont peut-être pas la même importance pour l'expérience personnelle des élèves et pour leur adaptation psychosociale. La présente étude laisse entrevoir que l'atmosphère disciplinaire de la classe rend compte de l'expérience personnelle de l'enfant au niveau disciplinaire, mais que l'orientation affective de l'enseignant ne rend pas compte de l'expérience personnelle de l'enfant au niveau relationnel. Cette dernière relèverait peut-être davantage de processus interpersonnels dyadiques que de processus groupaux.

Un enfant peut se trouver dans une classe dont l'atmosphère relationnelle est bonne sans pour autant bénéficier d'une relation interpersonnelle positive avec l'enseignant, car la relation élève-enseignant semble dépendre de la compatibilité qui existe entre les styles relationnels de l'un et de l'autre lorsqu'elle est positive (chaleureuse, affectueuse et caractérisée par une bonne communication) et des caractéristiques stables de l'enfant lorsqu'elle est conflictuelle (Pianta & Stuhlman, 2004). Les études antérieures indiquent que la qualité de la relation élève-enseignant à la maternelle influence l'ajustement de l'enfant à son environnement actuel et son adaptation comportementale au primaire. Les élèves qui bénéficient d'une relation positive avec leur enseignant ont moins de comportements internalisés à la fin de la maternelle (Pianta & Stuhlman, 2004) et moins de comportements internalisés et externalisés au cours des années suivantes (Hamre & Pianta, 2001 ; Pianta & Stuhlman, 2004 ; Silver, Measelle, Armstrong, & Essex, 2005). Au contraire, les élèves qui souffrent d'une relation conflictuelle avec leur enseignant présentent plus de comportements internalisés et externalisés à la fin de la maternelle (Pianta & Stuhlman, 2004) et plus de comportements externalisés et de problèmes disciplinaires au cours des années suivantes (Hamre & Pianta, 2001 ; Pianta & Stuhlman, 2004).

Au cours de l'enfance, les élèves sont peut-être essentiellement marqués et influencés par la relation interpersonnelle qu'ils entretiennent avec leur enseignant. Peisner-Feinberg et al. (2001) ont examiné l'influence de la relation élève-enseignant et des pratiques éducatives (l'index des pratiques éducatives incluaient des mesures du climat social de la classe et plus particulièrement de l'orientation affective de l'enseignant) à la pré-maternelle sur le développement des élèves entre la pré-maternelle et la deuxième année du primaire. Les résultats de leurs analyses suggèrent que les pratiques éducatives ne sont pas liées au développement des élèves, mais que la relation élève-enseignant est associée à plus de compétences sociales et à moins de problèmes comportementaux en deuxième année du primaire. Cette étude ne permet certainement pas de conclure que le développement comportemental de l'enfant est influencé par la relation interpersonnelle qu'il entretient avec son enseignant plutôt que par l'atmosphère relationnelle générale entre les élèves et l'enseignant. Toutefois, elle souligne la nécessité d'étudier conjointement ces deux

dimensions pour mieux comprendre leur contribution unique à l'adaptation psychosociale et à la réussite scolaire des élèves.

Article 2. How does kindergarten parental involvement in schooling contribute to cognitive development in middle childhood? Moderating and mediating processes

Cette étude longitudinale et prospective répondait aux deux questions suivantes : la relation entre l'implication des parents dans la vie scolaire à la maternelle et les habiletés cognitives de l'enfant en deuxième année du primaire est-elle modérée par le revenu familial et est-elle médiatisée par les habiletés d'attention de l'enfant ?

Effet modérateur du revenu familial. L'implication des parents est perçue par les législateurs comme une politique scolaire susceptible d'améliorer la performance scolaire des enfants pauvres et de promouvoir l'égalité de chances de réussite scolaire entre les enfants. Pourtant, certains chercheurs pensent qu'elle est moins efficace dans les familles pauvres et qu'elle contribue, en réalité, à perpétuer les inégalités sociales.

Nos analyses ont fait ressortir un effet modérateur du revenu familial en faveur des enfants issus des milieux les plus défavorisés. En effet, l'implication des parents à la maison dans les expériences éducatives de l'enfant et l'implication des parents à l'école étaient associées à de meilleures habiletés en mathématiques uniquement dans les familles dont le revenu était inférieur à 25,000 $CAN. Si nos résultats ne nous informent pas sur l'impact à court terme de l'implication des parents à la maternelle, ils démontrent clairement que son impact à long terme favorise les enfants les plus démunis.

La pauvreté représente un facteur prédictif déterminant de la réussite scolaire. Les enfants issus des milieux défavorisés présentent de moins bonnes habiletés cognitives (Gershoff, Aber, Raver, & Lennon, 2007) et de moins bonnes performances scolaires (Jimerson, Egeland, & Teo, 1999) que les enfants mieux nantis. L'effet durable de l'implication des parents dans leur vie scolaire à la maternelle représente donc un effet protecteur extrêmement important, car les difficultés scolaires au début du primaire sont associées à des problèmes d'adaptation psychosociale au cours du développement (Cairns, Cairns, & Neckerman, 1989 ;

Ensminger & Slusarcick, 1992 ; Pagani, Tremblay, Vitaro, Boulerice, & McDuff, 2001) et que les trajectoires scolaires tendent à se stabiliser à partir de la troisième année du primaire (Entwisle, Alexander, & Olson, 2005).

Les études montrent que les parents issus des milieux défavorisés participent moins aux expériences et aux processus éducatifs de leurs enfants. Ils s'investissent moins à l'école. Ils investissent également moins de temps et/ou d'argent dans du matériel éducatif, des discussions et des activités éducatives avec eux (Benveniste, Carnoy, & Rothstein, 2003 ; Coley, 2002 ; Federal Interagency Forum on Child and Family Statistics, 2000 ; Lee & Bowen, 2006). Par ailleurs, les liens entre la famille et l'école diminuent lors de la transition à la maternelle. Les contacts y sont moins fréquents, plus formels et principalement motivés par la discussion des problèmes de l'enfant (Rimm-Kaufman & Pianta, 2000). Même si les enseignants de maternelle offrent aux parents la possibilité de communiquer avec l'école, ils leur offrent nettement moins la possibilité de s'y impliquer (résultats observés dans notre échantillon). Des efforts doivent donc être entrepris pour que les directeurs et les enseignants de maternelle encouragent et soutiennent l'implication des parents des milieux défavorisés dans la vie scolaire de leurs enfants. Les pratiques éducatives des écoles maternelles doivent pour cela être révisées afin de prendre en compte les obstacles que ces parents rencontrent dans leur implication à la maison et à l'école.

Effet médiateur de l'engagement scolaire et plus précisément des habiletés d'attention. Le béhaviorisme et le constructivisme ont particulièrement influencé la pratique de l'instruction au cours du siècle dernier (Case, 1996). Le béhaviorisme basé sur les travaux de Bijou (1976, 1992) attribue une place déterminante à l'environnement social dans l'acquisition des comportements cognitifs et préconise une instruction scolaire basée sur des personnes capables d'aider l'enfant à acquérir, à maintenir et à généraliser ses apprentissages. L'enfant occupe peu de place au sein de ce processus, il se borne à enregistrer les propriétés des objets. Le constructivisme basé sur les travaux de Piaget (1969) attribue une place déterminante à l'organisme dans l'acquisition des comportements cognitifs et préconise une instruction scolaire centrée sur l'activité de l'enfant et sur ses expérimentations. L'environnement occupe peu de place au sein de ce processus, il se limite à accélérer ou à ralentir le

développement prédéterminé de l'organisme. Contrairement au béhaviorisme et au constructivisme, l'étude de l'implication des parents s'inscrit dans une perspective interactionnelle du développement. Elle attribue à l'enfant un rôle central et actif dans son propre développement et suggère que l'impact des processus familiaux sur sa réussite scolaire est médiatisé par l'augmentation de son potentiel d'adaptation (Epstein, 1995 ; Ryan & Adams, 1995). Pourtant, les facteurs intra-individuels qui lient l'implication des parents à la réussite scolaire de l'enfant sont, à quelques exceptions près, encore peu connus. Quelques chercheurs y ont porté leur attention (Flouri, 2006 ; Grolnick & Slowiaczek, 1994 ; Hill & Craft, 2003 ; Keith., Reimers, Fehrmann, Pottebaum, & Aubey, 1986). Mais, la majorité de leurs analyses présentent un problème de concomitance des variables indépendantes principales et intermédiaires qui limite considérablement l'interprétation de leurs résultats.

Scott-Jones (1995) propose un modèle de médiation séquentielle qui comporte deux chaînes causales complémentaires. Selon la plus courte, les parents qui participent aux devoirs favorisent la réussite scolaire de l'enfant en contribuant au développement de ses habiletés cognitives. Selon la plus longue, les parents qui valorisent la réussite scolaire, qui supervisent les devoirs, la performance scolaire et les comportements et qui participent aux devoirs favorisent la réussite scolaire de l'enfant en contribuant, dans un premier temps, au développement de son engagement scolaire et de sa motivation et, dans un second temps, au développement de ses habiletés cognitives. Ce modèle est intéressant. Mais, il omet de prendre en compte plusieurs formes d'implication des parents dans la vie scolaire de l'enfant. En effet, la première chaîne se limite à l'aide aux devoirs et la seconde chaîne semble se limiter aux attitudes et aux comportements mis en place à la maison en vue de soutenir les apprentissages de l'enfant. La présente étude s'est inspirée de ce modèle en y intégrant des formes d'implication des parents qui n'y étaient pas prévues. Elle s'est intéressée à la contribution de cinq formes d'implication des parents (la valorisation de la performance scolaire, les attentes à l'égard du niveau d'éducation que l'enfant atteindra, l'implication à la maison dans les expériences éducatives de l'enfant, la communication avec l'école et l'implication à l'école) au développement des habiletés d'attention de l'enfant, dans un premier temps, et au développement de ses habiletés en mathématiques, dans un second temps.

Nos résultats suggèrent que les habiletés d'attention ne médiatisent pas la relation entre l'implication des parents dans la vie scolaire de l'enfant à la maternelle et les habiletés en mathématiques en deuxième année du primaire. En effet, l'implication à la maison dans les expériences éducatives de l'enfant n'était pas associée à de meilleures habiletés d'attention dans les familles dont le revenu était inférieur à 25,000 $CAN ni dans les familles dont le revenu était supérieur ou égal à 25,000 $CAN. Par ailleurs, l'implication à l'école n'était pas associée à de meilleures habiletés d'attention dans les familles dont le revenu était inférieur à 25,000 $CAN. Le rôle médiateur des habiletés d'attention a été testé uniquement sur ces deux formes d'implication des parents, car l'impact à long terme des attentes à l'égard du niveau d'éducation que l'enfant atteindra, de la valorisation de la performance scolaire et de la communication avec l'école sur les habiletés en mathématiques n'était pas significatif. Ainsi, s'il est vrai que les habiletés d'attention des enfants issus des milieux défavorisés sont moins développées que celles des enfants mieux nantis (Levy & Hobbes, 1979 ; Norman & Breznitz, 1992), l'implication de leurs parents à la maison et à l'école ne semble pas jouer un rôle efficace dans l'amélioration de leurs habiletés.

Nos résultats semblent contredire partiellement les conclusions d'une étude récente (Hill & Craft, 2003) qui suggère que les comportements d'apprentissage de l'enfant à la maternelle (e.g., s'atteler sans tarder à la tâche et persévérer dans la tâche) ne médiatisent pas la relation entre l'implication des parents à la maison dans les expériences éducatives de l'enfant et la performance en mathématiques des élèves d'origine africaine ni caucasienne, mais qu'ils médiatisent la relation entre l'implication des parents à l'école et la performance en mathématiques des élèves d'origine africaine peut-être parce que les parents de ces élèves ne bénéficient pas d'un réseau social qui leur permettrait de bien s'informer sur les habiletés valorisées par l'enseignant pour encourager et aider leur enfant à les développer. Toutefois, il est à noter que l'étude de Hill et Craft s'intéresse à la relation à court terme entre l'implication des parents et les comportements d'apprentissage de l'enfant et qu'elle souffre d'un problème méthodologique important puisque l'implication des parents et les comportements d'apprentissage de l'enfant y sont mesurés de façon concomitante.

Synthèse générale de la thèse

L'environnement socioéducatif de la maternelle est important, mais il convient de se garder d'un optimisme exagéré à l'égard de son impact réel sur la réussite scolaire au primaire. L'importance accordée à la réglementation telle que perçue par l'enseignant constitue une dimension efficace de l'environnement socioéducatif de la maternelle. Elle contribue au développement comportemental des enfants en favorisant la baisse de leur détresse émotionnelle et de leur agressivité physique à l'école primaire. L'implication des parents dans la vie scolaire de l'enfant constitue également une dimension efficace de l'environnement socioéducatif de la maternelle. Elle contribue au développement cognitif des enfants issus des milieux défavorisés et permet de réduire l'écart qui les sépare des enfants mieux nantis à l'école primaire. Bien que significative, la variance dans les différences interindividuelles expliquée par ces dimensions est faible. Nos résultats mettent en lumière les limites méthodologiques de notre étude et suggèrent que, loin d'être futiles, ces dimensions de l'environnement socioéducatif de la maternelle sont importantes, mais non suffisantes.

Tout d'abord, la nature des mesures utilisées pourrait, en partie, rendre compte de la faiblesse de la variance expliquée par les variables indépendantes principales. À cause de la nature secondaire des deux études, les mesures utilisées n'étaient pas toujours optimales. Dans la première étude, le climat social de la classe a été mesuré avec l'Inventaire du climat d'apprentissage (Michaud et al., 1990, aucune étude de validation de cet instrument n'a été publiée) et a été évalué par les enseignants. Dans la seconde étude, les mesures des attitudes des parents et de leur implication à la maison n'étaient pas solides. De plus, l'implication à la maison dans les expériences éducatives de l'enfant ne renvoyait pas clairement aux habiletés en mathématiques. Elle semblait mettre davantage l'accent sur les habiletés en littératie. Finalement, la réussite scolaire était mesurée à l'aide d'un test standardisé. Bien que l'utilisation de tests standardisés plutôt que des résultats scolaires permet d'éviter un biais de la part des enseignants (Entwisle et al., 2005), les études antérieures indiquent que l'implication des parents dans la vie scolaire de l'enfant est plus fortement associée aux résultats scolaires qu'aux résultats aux tests standardisés (Desimone, 1999).

Ensuite, les deux études ont respectivement examiné une seule dimension de l'environnement socioéducatif de la maternelle. Le développement de l'enfant est le résultat de relations bidirectionnelles et continues entre l'ensemble de ses caractéristiques personnelles et l'ensemble des caractéristiques environnementales qui l'entourent. À titre d'exemple, les enfants d'âge préscolaire qui présentent de bonnes compétences mais qui évoluent dans un environnement social caractérisé par plusieurs facteurs de risque sont moins adaptés à l'âge de 18 ans que les enfants d'âge préscolaire qui présentent de faibles compétences mais qui évoluent dans un environnement social caractérisé par plusieurs facteurs de protection (Sameroff, 1998). Par conséquent, les études qui se basent sur une caractéristique unique de l'environnement ne peuvent jamais expliquer plus qu'une simple proportion de la variance dans les différences interindividuelles développementales (Sameroff, 1998). Transposé au contexte de l'intervention à la maternelle, cela signifie qu'aucune caractéristique de l'environnement socioéducatif n'est à elle seule suffisante et que les enseignants et les parents doivent intervenir sur plusieurs ressources environnementales pour optimiser l'adaptation psychosociale et la réussite scolaire des enfants. Cette remarque est particulièrement importante pour la seconde étude, car l'implication des parents est perçue comme une politique scolaire efficace pour promouvoir l'égalité de chances de réussite scolaire entre les enfants. S'il est vrai qu'elle aide les enfants issus des milieux défavorisés à acquérir de meilleures habiletés cognitives, elle n'est pas suffisante pour éliminer l'écart qui les sépare des enfants mieux nantis. À la fin de la seconde année du primaire, malgré une plus grande amélioration de leurs habiletés en mathématiques, les enfants de notre échantillon dont le revenu familial était inférieur à 25,000 $CAN présentaient toujours de moins bonnes performances au *Number Knowledge Test*.

Finalement, il n'existe pas de solution magique qui, appliquée pendant une année dans une classe de maternelle ordinaire, peut assurer la réussite scolaire des enfants à moyen et à long terme. En effet, les effets des programmes préscolaires sont plus intenses lorsqu'ils sont mesurés à la fin de l'intervention et s'atténuent à l'école primaire (Paquette, 1998). Cela est tout à fait compréhensible, car le développement de l'enfant est un processus dynamique continu. Cela signifie non seulement que les compétences que l'enfant acquiert à un âge déterminé lui permettent d'en acquérir de

nouvelles à un âge ultérieur et que les efforts investis pour promouvoir le développement de l'enfant à un âge déterminé augmentent l'efficacité des investissements ultérieurs, mais aussi que les efforts investis pour promouvoir le développement de l'enfant à un âge déterminé doivent être suivis par des investissements ultérieurs pour être pleinement efficaces (Cunha, Heckman, Lochner, & Masterov, 2005 ; Reynolds, Mavrogenes, Bezruczko, & Hagemann, 1996). Or, les études indiquent que le climat social de la classe est moyennement à hautement variable d'une année à une autre (NICHD Early Child Care Research Network, 2006 ; Pianta, Belsky, Houts, Morrison, & The NICHD Early Child Care Research Network, 2007) et que l'implication à l'école des familles défavorisées diminue entre la maternelle et la fin du primaire (Dearing, Kreider, Simpkins, & Weiss, 2006). Des efforts doivent donc être entrepris pour que les directeurs et les enseignants du primaire offrent aux enfants un environnement socioéducatif aussi efficace que celui de la maternelle pour optimiser leur adaptation psychosociale et leur réussite scolaire.

Avant de conclure, il serait important de préciser que les deux études sont de nature corrélationnelle, longitudinale et prospective. Même si de telles études permettent d'établir la direction des liens entre les variables environnementales et la réussite scolaire des enfants, elles ne permettent pas d'établir des liens de causalité entre elles. En définitive, nous espérons que les résultats de ce travail inspireront les chercheurs et les éducateurs qui souhaiteraient promouvoir à la maternelle un environnement socioéducatif favorable à la réussite scolaire des enfants issus de milieux défavorisés au début du primaire.

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