

Developmental Patterns of Behavioural Self-Regulation and Peers in Early Childhood

by

Kenda Burke

A thesis submitted in partial fulfillment of the requirements for the degree of

Master of Science

DEPARTMENT OF PSYCHOLOGY
University of Alberta

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Abstract

The acquisition of behavioural self-regulation is a key developmental task of early childhood that involves integrating working memory, attention, and inhibitory control. Although behavioural self-regulation improves on average across early childhood, there is undoubtedly heterogeneity in the developmental patterns of behavioural self-regulation in early childhood. Children's behavioural self-regulation is often thought to be influenced by their interactions with primary caregivers, with little focus given to how early peer relations may be associated with children's behavioural self-regulation. Peer relations emerge in early childhood and may be important as children learn to regulate their behaviour in the classroom context. The current study examines heterogeneity in the developmental trajectories of behavioural self-regulation in early childhood and examines early peer relations (acceptance, sociability, rejection, and conflict) as predictors and outcomes of these behavioural self-regulation trajectories. Data come from a two-year longitudinal study that followed two cohorts of children ($N = 443$) across preschool and kindergarten. Latent growth mixture modeling was used to examine heterogeneity in children's behavioural self-regulation. Five distinct latent class trajectories were identified: advanced developers, early developers, moderate developers, typical developers, and late developers. Early peer acceptance differentiated between these trajectories: children who were more accepted by their peers at the start of preschool were more likely to be classified in the advanced and early developers trajectories relative to the typical and late developers trajectories. Peer acceptance, sociability, and rejection at the end of kindergarten were also associated with these trajectories. Children classified in the advanced developers trajectory experienced less peer rejection than children classified in the late developers trajectory at the end of kindergarten, but were less sociable than children classified in the typical developers trajectory. Children classified in the

early and typical developers trajectories were rated by teachers as more accepted by peers at the end of kindergarten than children classified in the late developers trajectory. These findings suggest that early peer acceptance may support children's development of behavioural self-regulation and that gains in behavioural self-regulation may support positive peer relations over time.

Preface

This thesis is an original work by Kenda Burke. The research project, of which this thesis is a part, received research ethics approval from the University of Alberta Research Ethics Board, Project Name “Early Experiences Project”, No. 00051399, September 9, 2014.

Acknowledgements

I would first like to thank my supervisor, Dr. Wendy Hoglund, whose expertise and guidance added considerably to my graduate experience. I am grateful to have had the opportunity to learn from her. I would also like to thank my committee members, Dr. Sandra Wiebe and Dr. Nancy Galambos for the feedback and assistance they provided in crafting this thesis. As well, I am thankful that Dr. Yuanyuan Jiang took time out of her busy schedule to serve as my external committee member.

I am also very thankful for the support of my peers in the PEERS Lab. I am lucky to have shared this experience with such a wonderful group of people who I am proud to call friends.

I would also like to thank my parents for consistently demonstrating that anything is possible with hard work and for (occasionally) excusing me from family activities when I had deadlines to meet.

Finally I would like to thank my husband and best friend, Andrew, who encouraged me to pursue this process in the first place and provided unconditional love and reassurance throughout every step of it.

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Developmental Patterns of Behavioural Self-Regulation and Peers in Early Childhood

Introduction

An increasing number of children in the United States are being expelled from preschool due to disruptive behaviours (Perry, Dunne, McFadden, & Campbell, 2008). More than one third of a random sample of preschool teachers in the United States reported that they had expelled at least one preschool child within the past year (Gilliam & Shahar, 2006). This trend indicates that young children may have difficulty regulating their behaviour to meet expectations in these early school contexts.

The acquisition of behavioural self-regulation, a dimension of self-regulation, is a key developmental task of early childhood that involves children's ability to integrate working memory, attention, and inhibitory control (McClelland, Cameron, Wanless, & Murray, 2007b; Ponitz et al., 2008). Working memory allows children to remember and follow instructions, such as those given by a caregiver or teacher. Paying attention enables children to maintain voluntary focus on a particular task, such as class activities, and ignoring distractions. Inhibitory control allows children to override an impulsive behaviour in favour of a more appropriate one, such as stopping the urge to call out in the classroom and raising a hand instead. By integrating these three processes, children can regulate their behaviour to match expectations in particular contexts, such as in the classroom.

There are age-related gains in behavioural self-regulation (Ponitz et al., 2008, McClelland et al., 2007a). When behavioural self-regulation is assessed in early childhood, children typically show rapid gains beginning at age three and continuing until about age seven when this rapid growth in behavioural self-regulation begins to slow down (Ponitz et al., 2008). This average developmental trend suggests that behavioral self-regulation is represented by a curvilinear

function. The early rapid gains that characterize this typical developmental pattern have been supported by cross-sectional and longitudinal studies. For example, a cross-sectional study by Diamond et al. (2002) found that four-and-a-half year old children had faster reaction times and better accuracy than did four-year old children on a task that requires them to guide their actions by rules and inhibit dominant responses. A longitudinal study by McClelland et al. (2007a) assessed 172 four-year-olds and found that, on average, children's behavioural self-regulation improved linearly from fall to spring of the preschool year. Descriptive statistics indicated variability in behavioural self-regulation. As well, the data showed some evidence of nonnormality, but did not ultimately meet the statistical requirements for nonnormality (McClelland et al., 2007a).

Ponitz et al. (2008) assessed 445 children's behavioural self-regulation at six-month intervals from ages three to six-and-a-half years and found that the average developmental trend showed a curvilinear pattern where children's scores increased at each assessment, but there was a steady deceleration in the rate of growth over time. The data were found to be somewhat bimodal, with most children scoring quite low or high on the task. Variability was found in behavioural self-regulation for children at all ages, with the greatest variability among four to five year olds. Variability decreased over time as children got older and generally scored close to ceiling levels (Ponitz et al., 2008). Together McClelland et al.'s (2007) and Ponitz et al.'s (2008) findings suggest that, on average, children's behavioural self-regulation increases across early to middle childhood with notable variability around this average trajectory.

As children start preschool, typically around age four in North America, they differ in their ability to self-regulate their behaviour (Lin, Lawrence, & Gorrell, 2003) and often show difficulties with behavioural self-regulation (Wanless, McClelland, Tominey, & Acock, 2011).

For some, these difficulties may persist across the transition to kindergarten. For example, Rimm-Kaufman, Pianta, and Cox (2000) found that 46% of teachers reported that at entry to kindergarten the majority of children do not have the behavioural self-regulation required to do well in school. These reports support previous findings that, although children improve rapidly in their behavioural self-regulation abilities from preschool to kindergarten, there is variability around this average developmental trend (McClelland et al., 2007a; Ponitz et al., 2008). It is possible that not all children begin to show rapid gains at age three. However, little is known about whether there may be qualitatively distinct subgroups of children who follow different developmental patterns of behavioural self-regulation across early childhood. The current study examines the proposition that there is heterogeneity in children's developmental patterns of behavioural self-regulation across preschool and kindergarten.

In addition to being an important developmental period for behavioural self-regulation, preschool is also when many children first begin to spend time interacting with groups of peers on a regular basis (Martin, Fabes, Hanish, & Hollenstein, 2006). These early peer relations in preschool mainly consist of play, which provides children with opportunities to practice monitoring and self-regulating their behaviour (Coplan & Arbeau, 2009). For example, early peer relations provide children with opportunities to pay sustained attention to their peers, comply with peer requests (Fabes, Martin, & Hanish, 2009), take turns (Coplan & Arbeau, 2009), and take on pretend roles that require more behavioural self-regulation than they regularly demonstrate (McClelland et al., 2007b). Over time, children who are better at regulating their behaviour may continue to experience more positive peer relations, such as being more accepted and sociable, as well as less rejection and conflict, because they are able to remember rules and inhibit behaviours that are appropriate in peer or classroom contexts (Fabes et al., 2009). The

current study examines children's early peer relations, including acceptance, sociability, rejection, and conflict, as both predictors and outcomes of heterogeneity in the developmental patterns of behavioural self-regulation.

Theoretical Framework

Eleanor Maccoby's (2007) socialization theory discusses the associations among peer relations, self-regulation, and successful socialization. According to Maccoby (2007), reciprocal interactions, such as between children and their peers at school, allow children to acquire the behaviours and skills required for functioning in various contexts. Socialization is generally considered to be successful if children are able to adjust well to the requirements of many major contexts, for example adjusting to expectations in the classroom (Maccoby, 2007). To meet classroom expectations, children must be able to regulate their behaviour. Peer relations may be directly related to the key skills involved in behavioural self-regulation, such as managing attention and inhibiting impulses, and may be both predictors and outcomes of children's behavioural self-regulation development (Coplan & Arbeau, 2009; Hay, 2005; Maccoby, 2007).

As children begin to interact with large peer groups in preschool, these interactions become an active source of information about social and behavioural norms in that context (Maccoby, 2007). Denham (2001) proposed that as children interact, they adopt behaviours that are similar to one another. The interactive play that develops among preschoolers involves increasingly complex social dynamics, such as looking at and attending to peers, mastering taking turns, and being generally agreeable and compliant with peers (Fabes et al., 2009). These aspects of play are directly related to behavioural self-regulation and may provide opportunities for children to practice the key skills involved in behavioural self-regulation (Coplan & Arbeau, 2009). For example, paying sustained attention to peers, inhibiting impulsive behaviours in order

to demonstrate reciprocal behaviours such as taking turns, and remembering rules in order to be compliant requires children to develop their working memory. Thus, children's peer relations at the start of preschool, such as acceptance, sociability, rejection, and conflict, may predict their developmental patterns of behavioural self-regulation.

Throughout preschool and kindergarten, children display increasingly differentiated social responses to their peers' behaviours (Coplan & Arbeau, 2009). They begin to structure their peer groups based on their preferences for particular behaviours and specific play activities (Chen, Fein, & Tam, 2001; Hay, Payne, & Chadwick, 2004). Some children also begin to be rejected by peers in these early years (Hay et al., 2004) or experience conflict with them (Chen et al., 2001), possibly because of differences in behavioural self-regulation. In alignment with this idea, children's developmental patterns of behavioural self-regulation may predict their peer relations at the end of kindergarten.

Heterogeneity in the Developmental Patterns of Behavioural Self-Regulation

The acquisition of behavioural self-regulation is a key developmental task of early childhood. Research indicates that, on average, children's behavioural self-regulation tends to increase across early childhood (Diamond et al., 2002; McClelland et al., 2007; Ponitz et al., 2008). Yet substantial variability has been reported in young children's ability to self-regulate their behaviour (Lin et al., 2003; Rimm-Kaufman et al., 2000; Wanless et al., 2011;), suggesting that children may follow different patterns of behavioural self-regulation across early childhood. It is important to understand whether there is heterogeneity in the developmental patterns of behavioural self-regulation because of the immediate and long-term implications for children's social development (e.g., peer relations). More competent behavioural self-regulation has been found to predict more peer acceptance (Coplan & Arbeau, 2009; Fabes et al., 1999) and more

sociability (Fabes et al., 1999), whereas children who display a limited ability to self-regulate their behaviour are less appealing to their peers and may experience more peer conflict (Chen et al., 2001). Children who follow different patterns of behavioural self-regulation in early childhood may also show varying degrees of success in their social development.

The few studies that have examined qualitatively distinct developmental patterns of behavioural self-regulation, rather than variability around an average trajectory, have found two to three distinct trajectories, with at least one trajectory showing early developers and another showing late developers (Montroy, Bowles, Skibbe, McClelland, & Morrison, 2016; Wanless et al., 2016). Wanless et al. (2016) collected data at three time points over an 18-month period from age four to five-and-a-half years with a sample of 191 Taiwanese children. Behavioural self-regulation was assessed using the Head-Toes-Knees-Shoulders task (Ponitz et al., 2008). Two latent class trajectories of behavioural self-regulation were found based on the timing of rapid gains, with gender differences in the latent class trajectory classifications. Two thirds of children were classified in an early developers trajectory. These children showed more initial behavioural self-regulation competence and early rapid gains in behavioural self-regulation followed by a leveling off.

One third of children in Wanless et al.'s study (2016) were classified in a late developers trajectory. These children showed limited initial behavioural self-regulation competence and did not demonstrate gains in behavioural self-regulation until after five years of age. Demographic covariates including child age, child gender and mother's education level did not predict children's membership in these latent class trajectories. Beyond these demographic covariates, contextual factors that may be important for children's emerging behavioural self-regulation, such as their early peer relations, were not examined.

A longitudinal study by Montroy et al. (2016) examined heterogeneity in the developmental patterns of behavioral self-regulation from age three to seven years. Participants included 1,386 children from three different samples that had at least two assessments of behavioural self-regulation collected in the fall and spring of each year. All three samples used the same direct measure of behavioural self-regulation, the Head-Toes-Knees-Shoulders task (Ponitz et al., 2008). Three distinct latent class trajectories of behavioural self-regulation fit the data best in all samples. These three latent class trajectories were distinguishable based on the timing of rapid gains and were categorized as early developers, intermediate developers, and late developers. Across the three samples, 20%, 29%, and 50% of children were classified in the early developers trajectory. These children showed the most competent behavioural self-regulation at the start of preschool and earlier gains in self-regulation relative to the other trajectories. There were also children who showed limited behavioural self-regulation at the start of preschool followed by rapid gains. These children were classified in the intermediate developers trajectory (45%, 45%, and 32% across the three samples). Children classified in the late developers group (35%, 26%, and 18% across the three samples) also demonstrated limited initial behavioural self-regulation at the start of preschool and showed slower gains in self-regulation than children classified in the other trajectories.

Overall, Montroy et al. (2016) found that girls were more likely to be classified in the early or intermediate developer trajectories than boys. In one sample, higher levels of expressive language at the start of preschool were found to be associated with early or intermediate trajectory classification. Mothers' education levels were also associated with children's development of behavioural self-regulation, with higher education predicting classification in the early or intermediate developer trajectories. Aside from these demographic predictors, other

contextual predictors such as peer relations were not examined. Their study also did not examine outcomes that may be associated with latent class trajectory membership. Possible contextual predictors and outcomes that have not been examined in this line of research include positive and negative peer relations at school.

Early Peer Relations

Preschool is an important period of development that may set the stage for children's later social adjustment and may also be associated with children's developmental patterns of behavioural self-regulation (Fabes et al., 2009). The quality and quantity of children's peer relations both increase across preschool and kindergarten (Coplan & Arbeau, 2009) and children show increasing preference for peers who display similar behaviours to themselves (Chen et al., 2001). Peer relations may include positive aspects, such as acceptance and sociability, as well as negative aspects, such as rejection and conflict. Peer acceptance is indicated by children being generally well-liked by their peers. Peer sociability refers to children's tendency to initiate positive, well-received interactions with their peers. Peer rejection is indicated by children being generally disliked by their peers. Peer conflict refers to peer interactions that are characterized by tension and negativity.

Peer relations as a predictor of behavioural self-regulation. Drawing from socialization theory in which children's development is proposed to be shaped by contextual factors including their interactions with others (Maccoby, 2007), the developmental patterns of children's behavioural self-regulation may be predicted by the frequency and quality of their early peer relations. For example, key features of successful early peer relations include inhibiting inappropriate behaviours in favour of paying sustained attention to peers, not being too rough with peers, and remembering social rules (Fabes et al., 2009). Practicing behavioural self-

regulation through peer relations and play may help children develop the ability to self-regulate their behaviour in other contexts (Kochanska, Coy, & Murray, 2001).

Children who are accepted, or well-liked, by their peers, and children who are more sociable, or who regularly seek out peer relations and experience positive behaviours with other children may have many opportunities to play with their peers from the start of preschool. These children may then have more chances to practice behavioural self-regulation with their peers. These opportunities may further predict more competent behavioural self-regulation (Coplan & Arbeau, 2009). In contrast, children who are rejected or disliked by their peers, or who experience frequent peer conflict, characterized by tense and negative peer relations may have few opportunities to play with their peers from the start of preschool. These children may have few opportunities to practice self-regulating their behaviour and over time have more difficulty doing so (Hay, 2005).

Elias and Berk (2002) followed 51 preschool children from fall to spring of one school year to examine how playing with peers and playing individually were related to behavioural self-regulation in the classroom. Playing with peers was found to predict improvements in observed behavioural self-regulation from fall to spring of preschool, for example during transition times such as clean-up. This suggests that children who experience positive early peer relations, such as being sociable and being accepted by their peers during play, may show more competent behavioural self-regulation at the start of preschool. These children may also show rapid gains in behavioural self-regulation across preschool and kindergarten compared to children who are rejected by their peers or experience other negative peer relations, such as conflict.

A review by Diamond and Lee (2011) found that early school interventions that aim to reduce classroom stress, encourage children's self-confidence, and promote social bonding best support children's ability to pay attention and control impulsive behaviours, which are key aspects of behavioural self-regulation. Positive peer relations may help to reduce children's classroom stress, increase their self-confidence, foster social bonding, and encourage children's development of behavioural self-regulation. Alternatively, experiencing negative peer relations may inhibit children's ability to regulate their behaviours (Hay, 2005). There is, however, little empirical evidence on whether children's early peer relations, specifically acceptance, sociability, rejection and conflict predict individual differences in their developmental patterns of behavioural self-regulation.

Peer relations as an outcome of behavioural self-regulation. Drawing from socialization theory in which children are proposed to play an active role in their own socialization and social development (Maccoby, 2007), children's developmental patterns of behavioural self-regulation may predict the frequency and quality of their later peer relations. As children transition from preschool to kindergarten, behavioural self-regulation becomes a key component of successful peer relations (Fabes et al., 2009). Over time, children who are better at self-regulating their behaviour may continue to show more positive peer relations, such as being more accepted and sociable and experiencing less conflict and rejection, because they are able to remember rules and inhibit behaviours that would not be appropriate in peer or classroom contexts (Fabes et al., 2009).

Children are less likely to be accepted by their peers when they display behaviours that are associated with limited behavioural self-regulation, such as impulsivity (Coplan & Arbeau, 2009; Fabes et al., 2009) and more likely to be accepted when they regulate their behaviour to

comply with group norms (Diamond, 2001). Furthermore, as children move through their preschool year, incidents of peer conflict are often sparked by differences in behaviours or ideas as opposed to concrete issues, such as the distribution of toys or other classroom resources (Chen et al., 2001). These conflict-generating behavioural differences may be related to disparities in children's behavioural self-regulation competence. Young children's ability to regulate their behavior may therefore be critical for their ongoing positive peer relations during preschool and kindergarten (Ramani, Brownell, & Campbell, 2010).

Fabes et al. (1999) examined effortful control and social competence in a sample of 135 preschool children for three months. Effortful control includes integrating attention and inhibitory control and is related to behavioural self-regulation (Fabes et al., 1999). Social competence refers to the ability to realize social goals, such as being well-liked (e.g., peer acceptance) and maintaining friendly, positive interactions (e.g., peer sociability; Fabes et al., 1999). Children who were high in effortful control demonstrated more social competence than those who struggled with effortful control, especially when they were engaged in peer relations that were highly negative or emotional.

Ramani et al., (2010) proposed that positive peer relations in preschool are related to competent behavioural self-regulation and that negative peer relations may be related to a limited ability to self-regulate behaviours, contributing to inappropriate social responses. They examined a sample of 435 preschool children over a one-and-a-half-year period from when the children were three and four-and-a-half years old to test whether behavioural self-regulation was associated with prospective peer relations. The results indicated that more competent behavioural self-regulation at age three predicted more peer sociability by age four-and-a-half. Overall, although preschool and kindergarten are a period of rapid development in both behavioural self-

regulation and peer relations, few studies have examined the associations between early behavioural self-regulation and children's peer relations across preschool and kindergarten.

Gender Differences in Behavioural Self-Regulation and Peer Relations

In preschool and kindergarten, boys have been found to score lower than girls on measures of behavioural self-regulation (Ponitz et al., 2008; Størksen et al., 2015). Ready et al. (2005) examined inhibitory control data from the Early Childhood Longitudinal Study of 16,883 kindergarteners. Inhibitory control is a component of behavioural self-regulation that allows children to override an impulsive behaviour in favour of more appropriate behaviours. Ready et al. (2005) found that girls had stronger inhibitory control, persistence, and more adaptive classroom behaviours, indicative of their ability to pay attention to tasks such as classwork and to hold classroom rules and instructions in their working memory.

Gender differences in children's early peer relations have also been found. For example, in early childhood girls are typically more well-liked, or accepted, and have more friendly interactions, or are more sociable, than boys (Fabes et al., 1999). A study of 610 kindergarten children found that girls typically display more teacher-rated social skills, such as sociability, than do boys (Beheshteh, 2010). In their review, Rose and Rudolph (2006) found that, as early as preschool, girls demonstrated stronger interpersonal engagement than boys. This suggests that girls are more sociable than boys, based on standard assessments. Girls were also found to be more concerned with their social status and their peers' perceptions of them (Rose & Rudolph, 2006). These concerns may motivate girls to try harder to be well-liked, which may manifest as girls being more accepted by their peers than are boys.

Rose and Rudolph (2006) also found that boys focus more on achieving their own goals, such as social dominance, in peer relations, than girls do. This may be related to the finding that

preschool boys are more likely than girls to be exposed to direct physical and verbal aggression by their peers (Rose & Rudolph, 2006). These gender differences in behavioural self-regulation and in peer relations, such as acceptance, sociability, rejection, and conflict, indicate the possibility of mean level differences in these constructs between girls and boys.

Limitations of Existing Literature

Studies of children's behavioural self-regulation have typically focused on average developmental trends in these self-regulation skills (e.g., McClelland et al., 2007; Ponitz et al., 2008). Few studies have examined whether there are qualitatively distinct developmental patterns of behavioural self-regulation. Investigation of qualitatively distinct developmental patterns will further inform knowledge of what might represent typical developmental patterns of behavioural self-regulation across early childhood and what developmental patterns diverge from this typical pattern. It will also allow for the description of how qualitatively distinct developmental patterns of behavioural self-regulation unfold across early childhood, proportions of children who may follow different patterns of behavioural self-regulation in early childhood, and what contextual factors that may relate to differences in these developmental patterns.

Most studies that have examined distinct developmental patterns of behavioural self-regulation have examined demographic predictors of behavioural self-regulation development, such as child age, child language skills, mother's education level, and family socioeconomic status (Montroy et al., 2016; Wanless et al., 2016). There may be other important relational predictors and outcomes of behavioural self-regulation development in the school setting, such as children's peer relations, which have not been examined. As well, previous research has not examined potential outcomes of differences in developmental patterns of behavioural self-

regulation. These developmental patterns may have immediate and long-term associations with children's peer relations.

The Current Study

The current study examines heterogeneity in the developmental trajectories of behavioural self-regulation in early childhood, from the start of preschool to the end of kindergarten. The current study further investigates how children's behavioural self-regulation trajectories are associated with their early peer relations, including acceptance, sociability, rejection, and conflict (see Figure 1). Gender differences in mean levels of behavioural self-regulation and peer relations are examined. The research questions are: (1) Does children's behavioural self-regulation show qualitatively distinct developmental patterns in early childhood, from preschool to kindergarten? (2) Do children's early peer relations differentiate between these developmental patterns of behavioural self-regulation? (3) Do children's developmental patterns of behavioural self-regulation predict later peer relations?

In alignment with previous research (Montroy et al., 2016; Wanless et al., 2016), it is expected that there will be heterogeneity in the developmental patterns of children's behavioural self-regulation across preschool and kindergarten, with three qualitatively distinct trajectories: early developers, typical developers, and late developers trajectories (see Figure 2). Children classified in the early developers trajectory are expected to show more competent behavioural self-regulation at the start of preschool relative to children classified in the other two trajectories and to show rapid increases in behavioural self-regulation across preschool and kindergarten. Children classified in the typical developers trajectory are expected to be indistinguishable at the start of preschool from children classified in the late developers trajectory, with children in both trajectories showing limited behavioural self-regulation. Children in the typical developers

trajectory are further expected to show rapid gains in behavioural self-regulation during the preschool year so that by the end of kindergarten they will catch up with children classified in the early developers trajectory. In contrast, children classified in the late developers trajectory are expected to only begin to show increases in behavioural self-regulation by the end of kindergarten.

Children's peer relations at the start of preschool are expected to predict their developmental patterns of behavioural self-regulation. Consistent with research indicating that positive peer relations provide children with opportunities to practice regulating their behaviour (Coplan & Arbeau, 2009), it is expected that positive peer relations at the start of preschool, including acceptance and sociability, will predict classification in the early and typical developers trajectories. It is also expected that negative peer relations at the start of preschool, including rejection and conflict, will interfere with children's early development of behavioural self-regulation and predict classification in the late developers trajectory (Hay, 2005).

In turn, children's developmental patterns of behavioural self-regulation are expected to predict their peer relations at the end of kindergarten. Classification in the early and typical developers trajectories is expected to predict more peer acceptance and sociability at the end of kindergarten (Diamond, 2001; Denham, 2001; Ramani et al., 2010). Classification in the late developers trajectory is expected to predict more peer rejection and conflict (Chen et al., 2001; Hay, 2004) at the end of kindergarten, as these children have more difficulty matching their peers' behaviours and relating appropriately to peers.

Given that gender differences in children's behavioural self-regulation and peer relations have been found, gender differences in children's developmental patterns of behavioural self-regulation and in the peer relations constructs will be examined. It is expected that girls will be

more likely to be classified in the early increasing or typical increasing trajectories relative to the late increasing trajectory (Montroy et al., 2016). It is also expected that girls will experience more acceptance and sociability and less rejection and conflict than boys at the start of preschool and the end of kindergarten (Rose & Rudolph, 2006).

Method

Participants

The data are from a two-year longitudinal study that followed two cohorts of children ($N = 443$, 47.9% girls; $M = 4.08$ years, $SD = 0.34$) from the fall of preschool to the spring of kindergarten. Children were recruited for the study in fall 2014 (cohort one, $n = 232$) and fall 2015 (cohort two, $n = 211$) from 44 preschool classrooms in nine early learning sites. The early learning sites were run by one of two early learning programs, program A and program B. The programs were free for families who qualified based on low-income. In program B, families who did not qualify for a free program based on income could also pay to enrol their child. Both early learning programs had a three-hour morning and three-hour afternoon session. Both programs used comparable activities to support children's social, emotional, and cognitive learning.

Parent reported data indicated that the sample of participating children was ethnically diverse: 33.0% Canadian/European (cohort one, 42.3%; cohort two, 20.0%), 18.4% South Asian (cohort one, 14.3%; cohort two, 24.4%), 10.1% Arab/West Asian (cohort one, 6.5%; cohort two, 15.0%), 7.6% Black/African Canadian (cohort one, 5.4%; cohort two, 10.8%), 7.3% South East Asian (cohort one, 5.4%; cohort two, 10.0%), 5.2% East Asian (cohort one, 4.8%; cohort two, 5.8%), 3.8% Aboriginal (cohort one, 3.0%; cohort two, 5.0%), 3.5% Latin (cohort one, 4.2%; cohort two, 2.5%), and 11.1% reported multiple ethnicities (cohort one, 14.3%; cohort two, 6.7%).

According to parent-reported data, 49.5% of participating children were not born in Canada (cohort 1, 51.8%; cohort 2, 46.1%). Parent reported data indicated that 33.4% of children lived in households where English was spoken all the time (cohort one, 31.7%; cohort two, 35.7%), 27.3% lived in households where English was spoken more than half of the time (cohort one, 30.1%; cohort two, 23.8%), 11.7% lived in households where English was sometimes spoken (cohort one, 9.8%; cohort two, 14.0%), 8.0% lived in households where English was spoken once in a while (cohort one, 8.2%; cohort two, 7.7%), and 19.6% lived in households where English was never spoken (cohort one, 20.2%; cohort two, 18.9%).

Parent reported data also indicated that 14.7% of mothers (cohort one, 12.9%; cohort two, 17.0%) and 20.7% of fathers (cohort one, 17.7%; cohort two, 24.6%) did not complete high school; and 46.2% of mothers (cohort one, 46.0%; cohort two, 46.4%) and 25.4% of father (cohort one, 29.9%; cohort two 21.0%) were not employed. Of the participating children, 18.4% lived in single parent households (cohort one, 16.0%; cohort two, 21.4%) and all children lived in households that were below the Statistics Canada low-income poverty threshold.

Procedures

Following University Research Ethics approval, consent packages were sent home in the predominate languages spoken by families (e.g. English, Bengali, Arabic) to all parents of children enrolled in the participating early learning centers. The consent packages provided parents with information about the study and sought active consent for their participation as well as their child's. Researchers also attended parent meetings held at the early learning sites to inform parents about the research activities and to answer any questions. Of all eligible preschool children, the overall return rate of the consent forms was 68.5% (cohort one, 72%; cohort two,

65%; range = 28% - 94% across classrooms). In total, the active consent rate was 59.3% (cohort one, 60.5%; cohort two, 58%).

Baseline data were collected in the fall and early winter of preschool (wave 1). Follow up data were collected in the spring of preschool (wave 2), fall of kindergarten (wave 3), and spring of kindergarten (wave 4). Each data collection period lasted two to three months, with approximately four to five months between data collection periods. Data collection visits were rescheduled within a two-week period for absent children. At each wave, trained research assistants completed behavioural assessments and structured observations of each participating child to assess their behavioural self-regulation and peer relations. Teachers also completed surveys rating the peer relations of each participating child in their classroom in the fall of preschool and spring of kindergarten.

Measures

Behavioural Self-Regulation. Children's behavioural self-regulation was assessed using the Head-Toes-Knees-Shoulders task (HTKS; Pointz et. al., 2008). Trained research assistants completed the HTKS with each child individually. Children were asked to play a game where they were instructed to do the opposite of what the research assistant said. For example, in part one of the task when the research assistant asked children to touch their head (or their toes), children were required to do the opposite and touch their toes (or their head). There were four practice trials for part one, during which the instructions could be repeated to children up to three times. After the practice trials, 10 test trials were administered for part one.

Part two of the task was administered to preschool children who responded correctly to at least five items during part one and to all kindergarten children. In part two, when children were asked to touch their shoulders (or their knees), they were supposed to do the opposite and touch

their knees (or their shoulders). There were also four practice trials for part two, during which the instructions could be repeated to children up to three times. There were also 10 test trials for part two that included both sets of opposites: head/toes and knees/shoulders. Children's responses on each trial were scored on a three-point scale: 2 (correct response), 1 (self-corrected response), and 0 (incorrect response). A response was considered self-corrected when children initially motioned toward an incorrect response but immediately corrected themselves. The range of possible scores across all 20 trials was 0 (no correct responses) to 40 (all correct responses).

Peer Relations. Children's peer relations were assessed using two subscales of the Preschool Social Behaviour Scale- Teacher Form (PSBS-TF; Crick, Casas, & Mosher, 1997) and the Peer Interactions domain of the Individualized Classroom Assessment Scoring System (inCLASS; Downer et al., 2012). Teachers reported on children's *peer acceptance* (e.g., "is well liked by children of the same-sex", "is well liked by children of the opposite-sex"; 2 items) and *peer rejection* (e.g., "is disliked by children of the same-sex", "is disliked by children of the opposite-sex"; 2 items). Teachers rated each statement on a four-point scale; 0 (*Never*) to 3 (*Always*). These two subscales showed adequate reliability at wave 1 and wave 4: peer acceptance, $r_s = .77$ and $.78$, respectively; and peer rejection, $r_s = .81$ and $.63$, respectively.

Children's peer relations were also assessed using the inCLASS; Downer et al., 2012). The inCLASS is a standardized observational measure developed to assess three-to-five-year-old children's adjustment in three broad domains: Peer Interactions, Teacher Interactions, and Task Orientation. Each domain includes three to four dimensions. Children's peer relations were measured with two dimensions from the peer interactions domain: peer sociability and peer conflict. Peer sociability measures how frequently children show positive emotions and behaviors with their peers, such as successful initiation of friendly peer interactions. Peer conflict

measures how often children experience negative interactions with their peers, such as tension or resistance from peers.

Observers completed a two-day training session on the inCLASS observation tool that was led by a certified inCLASS trainer. Observers were required to pass a reliability test at the end of the two-day training session to ensure that they were qualified to conduct observations of children. Each participating child was observed by a trained observer for a 60-minute period in their classroom. This 60-minute period included four 15-minute cycles, with 10 minutes of observation and 5 minutes of coding. Observers rotated between observing two to three children in the classroom over a two to three hour period. Observers made notes during each observation cycle to record how frequently the relevant behaviors occurred. During the coding portion observers compared their notes to the inCLASS manual to code each dimension on a seven-point scale; 1 (*Low*) to 7 (*High*). This scale was recoded to 0 (*Low*) to 6 (*High*) for a meaningful zero.

Approximately 10% of children were simultaneously observed by two observers at each wave to assess inter-rater reliability. Scores from these double-coded sessions were averaged across observers. These double-coded observations showed good interrater reliability at wave 1, with an average of 91.9 % observer agreement for peer sociability (range = 88.6% to 97.3%) and an average of 97.3% observer agreement for peer conflict (range = 94.7% to 100.0%). These observations also showed good interrater reliability at wave 4, with an average of 93.7% (range = 91.7% to 100.0%) observer agreement for peer sociability and an average of 100.0% observer agreement for peer conflict.

Demographic Covariates. Demographic covariates included child gender (boys = 0, girls = 1), child age in months, and the program the child attended (Program A = 0, Program B = 1). Gender and program differences in the behavioural self-regulation latent class trajectories are

examined to ensure comparability of the extracted latent class trajectories across gender and program. Child gender, age, and program are also included in the multinomial logistic regression models testing demographic differences in the behavioural self-regulation latent class trajectories. Other demographic factors, such as mothers' education and mothers' employment, were tested but were excluded from the table because they were not significant.

Data Analytic Plan

Data analyses are presented in four sections. First, descriptive statistics for each construct, and the bivariate correlations among the constructs are presented. Gender differences in these descriptive data are also examined. Second, latent growth mixture modeling (LGMM) was used to identify whether there are qualitatively distinct subgroups of children who follow different latent class trajectories of behavioural self-regulation from preschool through kindergarten. These models were conducted using Mplus 7.4 (Muthén & Muthén, 2011). LGMM is a person-oriented approach that relaxes the single population assumption of latent growth modeling and allows distinct subgroups of individuals to vary around different mean curves (Bauer & Curran, 2003). This is accomplished through the addition of a latent categorical classification variable that influences the growth factors rather than a priori decisions used to categorize individuals into separate groups. LGMM starts by extracting one latent class trajectory and sequentially extracts more latent class trajectories to determine how many classes best represent observed patterns in the data. Model fit precision was assessed using the following criteria: (a) the Akaike information criterion (AIC); (b) the Bayesian information criterion (BIC); (c) entropy; (d) the Lo-Mendell-Rubin adjusted likelihood ratio test (LMR-LRT); (e) a conceptually clear model; and (f) a model with a sufficient number of members in each group to be able to examine group differences.

The AIC and BIC are commonly used fit indices where lower values indicate better fitting models that can be carried forward and examined further (Ram & Grimm, 2013). Entropy is an increasingly used indicator of classification accuracy and can range from 0.00 to 1.00. High values of entropy (> 0.80) indicate clear separation between the latent classes and greater precision in predicting class membership (Ram & Grimm, 2013). The LMR-LRT indicates whether a model with C classes is a significantly better fit than the previous model with $C - 1$ classes (Ram & Grimm, 2013). Consistency of the latent trajectory classes between girls and boys and between children in preschool programs A and B was also assessed to ensure that it was appropriate to combine the data across gender and program.

Third, multinomial logistic regression was used to identify whether the demographic covariates and the peer relations constructs at baseline discriminated between the behavioural self-regulation latent class trajectories. Fourth, multivariate analysis of variance (MANOVA) was used to identify whether the latent class trajectories predicted the peer relations constructs at the end of kindergarten while controlling for the baseline peer variables. Full information maximum-likelihood estimation was used to account for missing behavioural self-regulation data.

Missing Data

For the behavioural self-regulation data, 37.9% ($n = 168$) of children had data at all four waves, 26.9% ($n = 119$) of children had data at three waves, 19.2% ($n = 85$) of children had data at two waves, 11.7% ($n = 52$) of children had data at one wave, and 4.3% ($n = 19$) of children did not have data at any waves. For teacher-reported peer data, 56.9% ($n = 252$) of children had data at waves one and four, 35.7% ($n = 158$) of children had data at either wave one or wave four, and 7.4% ($n = 33$) of children did not have data at either wave. For observed peer data, 52.4% ($n =$

232) of children had data at waves one and four, 36.8% ($n = 163$) of children had data at either wave one or wave four, and 10.8% ($n = 48$) of children did not have data at either wave.

There were 10 participants who were missing all data at all waves and were excluded from the sample. In addition to these, nine participants were excluded because they had no behavioural self-regulation data at any wave and therefore could not be classified in a developmental trajectory. At wave one, 34 participants were excluded because they were missing the teacher-reported and observed peer data predictors. At wave four, 117 participants were excluded because they were missing the teacher-reported and observed peer data outcomes.

Independent samples t-tests were used to compare children who had data at all four waves and children who were missing data at any wave. Children who had behavioural self-regulation data at all four waves were older at baseline ($M = 4.1$ years, $SD = 0.36$) than children with missing behavioural self-regulation data at any wave ($M = 4.0$ years, $SD = 0.32$, $t = 3.26$, $p < 0.01$). Children who had behavioural self-regulation data at all four waves were more likely to attend program B ($M = 0.41$, $SD = 0.49$) and be in a morning preschool class ($M = 0.40$, $SD = 0.49$) compared to children with missing behavioural self-regulation data at any wave ($M = 0.28$, $SD = 0.45$, $t = 2.92$, $p < 0.01$; and $M = 0.51$, $SD = 0.50$, $t = -2.26$, $p < 0.05$ respectively). Children who had behavioural self-regulation data at all four waves did not differ from children with missing behavioural self-regulation data in terms of gender, immigration status, or cohort membership.

Children who had teacher-reported peer data at all four waves were older at baseline ($M = 4.1$ years old, $SD = 0.35$) than children with missing teacher-reported peer data at any wave ($M = 4.0$ years old, $SD = 0.32$, $t = 2.37$, $p < 0.05$). Children who had teacher-reported peer data at all four waves were more likely to attend program B ($M = 0.40$, $SD = 0.49$) than children with

missing teacher-reported peer data at any wave ($M = 0.23$, $SD = 0.42$, $t = 3.80$, $p < 0.01$).

Children who had teacher-reported peer data at all four waves did not differ from children with missing teacher-reported peer data in terms of gender, immigration status, cohort membership, or whether they attended morning, afternoon, or full-day preschool programs.

Children who had observed peer data at all four waves were older at baseline ($M = 4.1$ years old, $SD = 0.36$) than children with missing observed peer data at any wave ($M = 4.0$ years old, $SD = 0.31$, $t = 2.25$, $p < 0.05$). They were also more likely to attend program B ($M = 0.40$, $SD = 0.49$) and to be in cohort 1 ($M = 1.42$, $SD = 0.50$) than children with missing observed peer data ($M = 0.25$, $SD = 0.44$, $t = 3.26$, $p < 0.01$; and $M = 1.53$, $SD = 0.50$, $t = -2.34$, $p < 0.05$ respectively). Children with no missing observed peer data did not differ from children with missing observed peer data in terms of gender, immigration status, or whether they attended morning, afternoon, or full-day preschool programs.

Results

Descriptive Data

Descriptive Statistics. Descriptive statistics are presented in Table 1. On average, children showed moderate levels of behavioural self-regulation at each wave. Although there are not specific benchmarks for these scores, on average, preschool children scored high enough to have part two administered (responded correctly to five or more items) and kindergarten children responded correctly to approximately half of the forty total items. Children also showed moderate teacher-reported peer acceptance and low teacher-reported peer rejection at waves one and four. These interpretations are based on the labels assigned to the scale values within the teacher report. On average, children showed low to moderate levels of observed peer sociability and low levels of observed peer conflict at waves one and four. These interpretations are based

on the labels assigned within the inCLASS observation manual. Significant mean-level gender differences were found in peer rejection and peer conflict at the start of preschool (wave 1) and in peer sociability at the end of kindergarten (wave 4). Girls scored lower on peer rejection and conflict, and higher on peer sociability than boys (see Table 1). There were no gender differences in the other constructs.

Bivariate Correlations. Bivariate correlations are presented in Table 2. Behavioural self-regulation showed weak to moderate stability across all four waves of data collection.

Behavioural self-regulation at all four waves was positively but weakly correlated with peer acceptance at the start of preschool (wave 1). Behavioural self-regulation at the start of kindergarten (wave 3) and peer rejection at the start of preschool (wave 1) were positively but weakly correlated. Behavioural self-regulation at the end of kindergarten (wave 4) was positively but weakly correlated with peer sociability at the start of preschool (wave 1) and peer acceptance at the end of kindergarten (wave 4) and negatively correlated with peer conflict at the start of preschool (wave 1). Both peer acceptance and peer rejection showed stability from wave one to wave four, with a positive but weak correlation between the waves. Peer sociability and peer conflict did not show stability from wave one to wave four. Only one of the 66 correlations (1.5%) differed significantly by gender.

Latent Growth Mixture Modeling

Next, LGMM was used to identify qualitatively distinct subgroups of children who followed different latent class trajectories of behavioural self-regulation from preschool through kindergarten. The number of latent classes extracted was sequentially increased to identify the optimal number of latent class trajectories.

A five-class model was determined to be the best fitting model based on comparison of

the fit indices, theoretically justified classes that showed distinct trajectories, as well as the fact that all classes contained a standard minimum of five percent of the sample (see Table 3), which suggests that there were enough children classified in all five classes to provide reliable estimates of class-specific parameters. Quadratic change in these trajectories was tested. However, starting at the four-class model, the variance for both the linear and quadratic slopes had to be constrained for the model to run without errors. Although the model did run with these constraints, it resulted in no significant quadratic change or variation. Therefore, the quadratic parameter was removed from the models and linear change was tested with the intercept variance constrained to zero.

See Table 4 for the growth factor estimates for the five latent class trajectories and Figure 3 for a visual of the latent classes. Based on previous research and the developmental patterns, the five latent classes extracted were labeled: advanced developers (5.06%), early developers (15.45%), moderate developers (8.11%), typical developers (42.19%), and late developers (29.19%). The advanced developers trajectory demonstrated high behavioural self-regulation at the start of preschool (wave 1) and showed a stable high pattern until the end of kindergarten (wave 4) with no significant linear change. The early developers trajectory had high behavioral self-regulation at the start of preschool and showed significant positive linear change until the end of kindergarten. The moderate developers trajectory displayed moderate behavioural self-regulation at the start of preschool and showed significant positive linear change until the end of kindergarten.

The typical developers trajectory demonstrated limited behavioural self-regulation at the beginning of preschool but showed significant positive linear change until the end of kindergarten. This trajectory had the largest proportion of children were classified in this

trajectory and aligns with the typical developmental patterns of behavioural self-regulation identified in previous research (McClelland et al., 2007a; Ponitz et al., 2008). By the end of kindergarten, the early developers, moderate developers, and typical developers trajectories all demonstrated similar levels of behavioural self-regulation as the advanced developers trajectory.

Children who were classified in the late developers trajectory had very limited behavioural self-regulation at the start of preschool and showed some positive linear change until the end of kindergarten. At the start of preschool, the late developers trajectory was nearly indistinguishable from the typical developers group. However, unlike the typical developers trajectory, the late developers trajectory showed little growth in behavioural self-regulation by the end of kindergarten.

Consistency in class extraction by gender and preschool program was confirmed by running separate models for boys and girls and for programs A and B. These findings were consistent with the latent class models presented for the overall sample except that the moderate developers trajectory had a decreasing slope for boys. The logistic regression indicated that child gender did not significantly predict the intercept, slope, or class membership in the overall model. These tests suggest that it was appropriate to combine the data across gender and program.

Multinomial Logistic Regression

The multinomial logistic regression analyses are presented in Table 5. These analyses indicated that some aspects of positive and negative peer relations at the start of preschool (wave 1) predicted children's membership in the latent class trajectories. These regressions were conducted using SPSS 24 with the most likely class children were assigned to. Children who were accepted by their peers at wave one were more likely to be classified in the advanced

developers or early developers trajectories than in the late developers trajectory (see Table 5). For each one-point increase in teacher-rated peer acceptance, children were six times more likely to be classified in the advanced developers trajectory and more than twice as likely to be classified in the early developers trajectory relative to the late developers trajectory, if all other variables were held constant.

Although the chi-square was not significant overall, children who were older and showed less peer conflict were more likely to be classified in the typical developers than the late developers trajectory (see Table 5). Children who were accepted by their peers were also more likely to be classified in the advanced developers trajectory ($B = 1.48$, $SE = 0.56$, $OR = 4.38$) or early developers trajectory ($B = 0.57$, $SE = 0.29$, $OR = 1.77$) than in the typical developers trajectory (overall peer acceptance, $\chi^2 = 17.54$, $p < 0.01$). When all other variables were equal to zero, children were four times more likely to be classified in the advanced developers trajectory and nearly twice as likely to be classified in the early developers trajectory relative to the typical developers trajectory for each one-point increase in peer acceptance.

Multivariate Analysis of Variance

The multivariate analysis of variance (MANOVA) results are presented in Table 6. The typical and late developers trajectories were used as the referent groups as membership in these trajectories was most common. These analyses indicated that controlling for peer relations at baseline children's membership in the latent class trajectories predicted some aspects of positive and negative peer relations at the end of kindergarten (wave 4). The MANOVAs were conducted using Mplus 7.4 (Muthén & Muthén, 2011). Advanced developers experienced less peer rejection at wave 4 than late developers and were observed to be less sociable with their peers at wave 4 than typical developers ($\chi^2 = 7.05$; see Table 6). Early developers and typical developers

were more accepted by their peers at the end of kindergarten than late developers ($\chi^2 = 5.55$ and 7.18 respectively; See Table 6).

Discussion

The purpose of the current study was to examine qualitatively distinct developmental patterns of behavioural self-regulation in early childhood and examine early peer relations (acceptance, sociability, rejection, and conflict) as predictors and outcomes of these patterns. Five qualitatively distinct developmental trajectories of behavioural self-regulation were identified. Children's early peer relations at the start of preschool were related to these behavioural self-regulation patterns. These behavioural self-regulation patterns were also related to their later peer relations at the end of kindergarten. The results of this study make three main contributions to understanding developmental patterns of behavioural self-regulation in early childhood. First, the trajectories suggest that most children (about 95% of the current sample) are still developing behavioural self-regulation skills as they transition from preschool to kindergarten. This may help to explain teacher reports that, at entry to kindergarten, nearly half of children do not have the behavioural self-regulation required to do well in school (Rimm-Kaufman et al., 2000).

Second, the findings indicate that early peer relations in the school context are related to developmental patterns of behavioural self-regulation. In particular, peer acceptance predicted more competent behavioural self-regulation at the start of preschool (advanced developers, early developers) as well as gains in behavioural self-regulation across preschool and kindergarten (early developers). This suggests that peer acceptance in early education settings may help to support children's development of behavioural self-regulation.

Third, the data suggest that developmental patterns of behavioural self-regulation across preschool and kindergarten are related to children's peer acceptance, sociability, and rejection at the end of kindergarten. Advanced development of behavioural self-regulation was associated with less peer rejection at the end of kindergarten, but also less sociability. Classification in the early or typical developers trajectories of behavioural self-regulation was related to more peer acceptance than consistently limited behavioural self-regulation did. This suggests that supporting children's development of behavioural self-regulation in early education settings may also support their social development.

Heterogeneity in Behavioural Self-Regulation

This study identified five distinct developmental trajectories of behavioural self-regulation across preschool and kindergarten, three of which converge with previous research: the early developers trajectory (Montroy et al., 2016; Wanless et al., 2016), the typical developers trajectory (Montroy et al., 2016), and the late developers trajectory (Montroy et al., 2016; Wanless et al., 2016). Children who followed the late developers trajectory (29.19%) had the most consistent difficulty self-regulating their behavior. These children may require extra support to meet classroom expectations, such as remembering and following rules, in preschool and kindergarten.

The advanced developers trajectory and the moderate developers trajectory have not been found in previous research and represented the smallest number of children in the current study (5.06% and 8.1% respectively). The advanced developers trajectory did not show gains in behavioural self-regulation, but instead consistently demonstrated high behavioural self-regulation from the start of preschool through to the end of kindergarten. This suggests that this small group of children are at ceiling in their behavioural self-regulation by the start of

preschool, which may be due to having had different home experiences. It is also possible that these children are advanced in their executive function, which supports their ability to regulate their behaviours. The moderate developers trajectory fell between the typical and early developers during the preschool year, but by the end of kindergarten the three were similar. This suggests that, once they are in school, the moderate developers' behavioural self-regulation develops such that they are on par with the majority of their peers by the end of kindergarten.

In previous research, it is possible that the number of children who displayed developmental patterns of behavioural self-regulation consistent with the advanced developers and moderate developers trajectories was too small to form distinct latent classes. However, given that Montroy et al.'s (2016) and Wanless et al.'s (2016) samples were modest to large ($N = 1386$ and $N = 191$, respectively), further research may be needed to determine whether these continually emerge as distinct latent classes.

The five trajectories suggest that children may have varying abilities to self-regulate their behaviour in preschool and across the transition to kindergarten. However, all but the late developers may end up with similarly competent behavioural self-regulation by the end of kindergarten. Interestingly, although typical developers and late developers were nearly indistinguishable at the start of preschool, children classified in the late developers trajectory still demonstrated more limited behavioural self-regulation than all other trajectories at the end of kindergarten. This may be related to factors that were not measured in the current study such as, cognitive delays, anxiety, or English language learning. These differences highlight the importance of continuing to examine heterogeneity in children's development, rather than primarily focusing on developmental averages.

Peer Relations as Predictors and Outcomes of Behavioural-Self-Regulation

Peer acceptance at the start of preschool was found to be related to the latent class trajectories of behavioural self-regulation. Specifically, children who were accepted by their peers were more likely to demonstrate competent behavioural self-regulation at the start of preschool (advanced developers, early developers) relative to their peers who showed average developmental patterns (typical developers) or consistently displayed limited behavioural self-regulation competence (late developers). This finding provides empirical support for the theory that early peer relations may be associated with heterogeneity in the patterns of children's behavioural self-regulation development (Maccoby, 2007).

It has previously been suggested that peer relations and play encourage children to practice self-regulating their behaviour with peers (Coplan & Arbeau, 2009, Fabes et al., 2009). Children who are accepted, or well-liked, by their peers may have more opportunities to interact and play with other children and therefore have more chances to develop their behavioural self-regulation. However, the data suggest that it is not specifically important for children to initiate or lead these positive peer relations, as peer sociability was not associated with children's behavioural self-regulation development.

Peer rejection and conflict were not related to latent class trajectory membership. This finding suggests that being disliked by peers or experiencing negative peer relations may not have negative implications for heterogeneity in children's behavioural self-regulation. It may be that by assessing both early peer relations and behavioural self-regulation at the start of preschool we were unable to tease apart the mechanisms by which negative peer relations relate to heterogeneity in the trajectories of behavioural self-regulation. It could be that early patterns of behavioural self-regulation prior to preschool predict peer relations at the start of preschool.

Over time, as children interact more frequently with peers it may be that these peer relations come to predict heterogeneity in children's behavioural self-regulation across the early school years.

Children's membership in the behavioural self-regulation latent class trajectories was related to their peer acceptance, sociability, and rejection by the end of kindergarten. This finding supports previous conclusions that children's behavioural self-regulation acts as a building block for their peer relations (Hay, 2005; Maccoby, 2007; Ramani, 2010). At the end of kindergarten, children who consistently demonstrated high behavioural self-regulation (advanced developers) were observed to be less sociable than typical developers. It may be that advanced developers' high behavioural self-regulation makes them generally more inhibited in their peer relations than their peers who are still developing their regulatory abilities. This may prevent them from frequently initiating social interactions with their peers in the classroom context, and ultimately appearing less sociable.

However, advanced developers' ability to self-regulate their behaviour may also have reduced their likelihood of being disliked by their peers, as they were found to experience less peer rejection at the end of kindergarten than typical developers. Since advanced developers consistently demonstrated competent behavioural self-regulation, they may be the most skilled at adjusting their behaviour to meet the expectations of their peers and avoid rejection.

Early and typical developers were found to be significantly more accepted by their peers at the end of kindergarten than children who consistently struggled to self-regulate their behaviour (late developers). This aligns with previous research suggesting that children are more likely to be accepted by their peers when they regulate their behaviour to comply with group norms (Diamond, 2001) and less likely to be accepted when they display behaviours that are

associated with limited behavioural self-regulation (Coplan & Arbeau, 2009; Fabes et al., 2009). Interestingly, the typical and late developers trajectories had similarly limited behavioural self-regulation relative to the early developers trajectory at the start of preschool. However, the typical developers trajectory showed rapid gains across preschool and kindergarten and caught up to the early developers trajectory by the end of kindergarten. These rapid gains were not matched by the late developers trajectory. Since both the early and typical developers increased their ability to self-regulate their behaviour across preschool and kindergarten, they may have been able to apply these new abilities to their peer relations and be more well-liked by their peers as a result. In contrast, the late developers may have frequently displayed dysregulated behaviours such as impulsivity, making them less appealing to their peers.

Limitations

The current study has some limitations which may have implications for the conclusions that can be drawn from the data in some cases. Consent rates were moderate with just over half of all eligible preschool children consenting to participate in the study (cohort 1, 60.5%; cohort 2, 58.0%). It is possible that there were demographic differences between the children who did and did not consent to participate. It is also possible that attrition during the kindergarten year (waves 3 and 4) may make some findings more representative of older children, children who were members of cohort 1, children who attended a morning preschool class, and children who were enrolled in program B. Overall, these findings may not generalize to all children, but may generalize to ethnically diverse children who are from immigrant families and are living in Canada below the low-income poverty threshold.

The use of teacher-reported data on peer relations is another limitation of the current study. Teachers' interpretations of children's behaviour may be influenced by their personal

biases. Teachers may also have missed specific aspects of how some children related to their peers. However, teachers are often reliable observers of children's interactions with peers in the classroom setting. Peer nominations of children's peer relations may have provided a different perspective on how acceptance and rejection relate to their trajectories of behavioural self-regulation.

The use of the HTKS measure may limit conclusions that can be drawn about children's behavioural self-regulation at the end of kindergarten. It is possible that this measure did not reveal the full extent of variability in children's behavioural self-regulation at this time point, given that four of the five trajectories had similar scores. It may be that by the end of kindergarten the majority of children were at ceiling for this measures. A more difficult measure may have revealed more variability in children's behavioural self-regulation at the end of kindergarten.

The multinomial logistic regression suggests that some of the peer relations variables measured may be unreliable predictors of behavioural self-regulation development. Specifically, peer conflict and peer rejection were both found to have very low mean scores with little to no variability. This suggests that children, on average, may experience very little conflict and rejection at the start of preschool. Other aspects of peer relations that show more variability in early childhood may be better predictors of behavioural self-regulation.

Interpretation of peer relations as predictors and outcomes of behavioural self-regulation is also limited in that the data were both measured at the same time points (waves 1 and 4). Therefore, the direction of association remains unclear. It is also possible that the association between these is driven by a factor that was not measured in the current study (e.g., cognitive delays, anxiety, English language learning). Despite these limitations, the current study adds to

the understanding of heterogeneity in the developmental patterns of behavioural self-regulation in early childhood and provides insight into how peer relations may be related to these.

Conclusions and Future Directions

The current study suggests that there is heterogeneity in children's developmental patterns of behavioural self-regulation and that many children are still developing this competency in preschool and kindergarten. As a result, children may have difficulty regulating their behaviours in ways that align with classroom expectations. It is also important to understand how to best support children's development of behavioural self-regulation development and help them adjust to the school context.

The findings of this study suggest that positive early peer relations may be one way to support children's development of behavioural self-regulation from the start of preschool. Specifically, encouraging peer acceptance and liking among all children at the beginning of preschool may support children's development of behavioural self-regulation, particularly for children who struggle with regulating their behavioral self-regulation as they enter preschool. As children move through their preschool year and transition into kindergarten, their developmental patterns of behavioural self-regulation may set the stage for how peers continue to relate to them and help children become more accepted and liked by peers and may help children in their confidence in being sociable with peers in these early years. For children who struggle to follow age-appropriate expectations for their behavioural self-regulation it may come at a cost and increase risks for peer rejection.

Future research on heterogeneity in the developmental patterns of behavioural self-regulation that extends across the preschool through the early elementary years would help to inform whether trajectories are consistently identified and how they unfold past the kindergarten

years. Examination of diverse contextual predictors and outcomes associated with these developmental patterns would further help to illuminate the complexity of behavioural self-regulation and its associations with peer relations and other important aspects of children's lives. To understand the direction of association between peer relations at the start of preschool and developmental patterns of behavioural self-regulation, future research could also assess the developmental co-occurrence of behavioural self-regulation and indicators of peer relations. Building this body of research to better understand the developmental patterns of behavioural self-regulation and also predictors and outcomes of these developmental patterns may help.

Table 1

Descriptive Statistics for Behavioural Self-Regulation and Peer Relations

Variables	$\alpha / r / \%$	Overall Sample				Boys			Girls			<i>t</i>
		<i>N</i>	Mean	<i>SD</i>	Range	<i>n</i>	Mean	<i>SD</i>	<i>n</i>	Mean	<i>SD</i>	
Behavioural Self-Regulation	α											
Wave 1	0.77	326	6.83	10.00	0.00-39.00	168	6.42	9.61	158	7.26	10.36	-0.77
Wave 2	0.82	351	10.29	12.43	0.00-40.00	187	10.44	12.37	164	10.12	12.52	0.24
Wave 3	0.91	277	18.63	13.65	0.00-40.00	145	17.08	13.85	132	20.34	13.28	-2.00
Wave 4	0.99	297	23.46	14.00	0.00-40.00	158	23.77	14.23	139	23.11	13.76	0.41
Peer Relations												
Acceptance (TR)	r											
Wave 1	0.77**	386	1.91	0.73	0.00-3.00	204	1.88	0.73	182	1.95	0.74	-0.98
Wave 4	0.78**	276	2.15	0.77	0.00-3.00	147	2.12	0.75	129	2.10	0.79	1.10
Sociability (Obs)	%											
Wave 1	91.93	340	1.57	1.04	0.00-4.50	180	1.49	1.07	160	1.67	1.00	-1.66
Wave 4	93.78	287	1.34	1.09	0.00-5.00	158	1.25	0.99	129	1.46	1.20	-0.16*
Rejection (TR)	r											
Wave 1	0.81**	383	0.23	0.46	0.00-3.00	203	0.27	0.50	180	0.19	0.42	1.74**
Wave 4	0.63**	274	0.17	0.39	0.00-2.00	146	0.15	0.39	128	0.19	0.40	-0.70
Conflict (Obs)	%											
Wave 1	97.30	340	0.17	0.38	0.00-2.75	180	0.24	0.47	160	0.10	0.22	3.31**
Wave 4	100.00	287	0.03	0.13	0.00-1.50	158	0.03	0.10	129	0.04	0.16	-0.60

Note. α = Cronbach's alpha. r = correlation between items. % = percent inter-rater agreement. TR = teacher reported. Obs = Observed. * $p < .05$. ** $p < .01$.

Table 2

Bivariate Correlations between Behavioural Self-Regulation and Peer Relations

Variables	1	2	3	4	5	6	7	8	9	10	11
Behavioural Self-Regulation											
1. Wave 1											
2. Wave 2	.53**										
3. Wave 3	.37**	.52**									
4. Wave 4	.31**	.44**	.61**								
Peer Relations											
Acceptance (TR)											
5. Wave 1	.21**	.17**	.24**	.24**							
6. Wave 4	.07	.03	.11	.15*	.21**						
Sociability (Obs)											
7. Wave 1	.08	.11	.10	.15*	.30**	.11					
8. Wave 4	-.09	-.11	.04	-.02	.07	.09	.05				
Rejection (TR)											
9. Wave 1	-.06	-.10	-.16**	-.10	-.55**	-.13*	-.18**	-.04			
10. Wave 4	.02	-.03	.01	-.08	-.16*	-.45**	.01	.04	.13*		
Conflict (Obs)											
11. Wave 1	-.02	-.13	-.12	-.13*	-.08	-.02	.05	-.08	.11*	.11	
12. Wave 4	.03	-.03	.01	-.01	-.03	.01	-.11	.23**	.14*	.01	-.06

Note. TR = teacher reported. Obs = Observed. Stability coefficients are shown in boldface. * $p < .05$. ** $p < .01$.

Table 3

Latent Growth Mixture Model Fit Indices and Class Proportions for Behavioural Self-Regulation

Model	AIC	BIC	Entropy	LMR-LRT	Percent of children in each class (average class assignment probabilities)							
					1	2	3	4	5	6	7	
1-Class	9681.84	9710.19	-	-	100.00(1.00)	-	-	-	-	-	-	-
2-Class	9308.44	9348.94	0.90	359.69**	21.39 (0.96)	78.61 (0.98)	-	-	-	-	-	-
3-Class	9216.84	9269.49	0.90	92.50**	4.99 (0.94)	17.61 (0.91)	77.40 (0.97)	-	-	-	-	-
4-Class	9126.56	9191.36	0.80	91.26**	48.40 (0.86)	29.58 (0.84)	4.88 (0.96)	17.14 (0.90)	-	-	-	-
5-Class	9060.74	9137.68	0.80	68.07*	5.06 (0.94)	15.45 (0.88)	8.11 (0.89)	42.19 (0.84)	29.19 (0.83)	-	-	-
6-Class	9011.69	9100.79	0.82	52.17*	2.76 (0.91)	7.93 (0.89)	28.42 (0.82)	13.05 (0.86)	4.96 (0.96)	42.88 (0.85)	-	-
7-Class	8965.28	9066.52	0.79	49.68	16.53 (0.86)	25.42 (0.79)	2.96 (0.98)	4.69 (0.97)	31.15 (0.78)	6.52 (0.92)	12.73 (0.86)	-

Note. AIC = Akaike information criteria. BIC = Bayesian information criteria. LMR-LRT = Lo-Mendell-Rubin adjusted likelihood ratio test. Best fitting model is shown in boldface. * $p < .05$. ** $p < .01$.

Table 4

Growth Factor Estimates from the 5-Class Latent Growth Mixture Model for Behavioural Self-Regulation

Latent Trajectory Class	<i>n</i> (%)	Intercept		Linear Slope		Class Probability
		Est.	<i>SE</i>	Est.	<i>SE</i>	
C1: Advanced Developers	21 (5.06)	32.79**	1.06	0.43	0.52	0.94
C2: Early Developers	66 (15.45)	21.05**	0.43	2.85**	0.54	0.88
C3: Moderate Developers	34 (8.11)	9.16**	0.79	6.37**	1.35	0.89
C4: Typical Developers	179 (42.19)	0.92**	0.18	10.15**	0.22	0.84
C5: Late Developers	124 (29.19)	1.22**	0.27	1.13**	0.28	0.83

Note. C = Latent trajectory class. * $p < .05$. ** $p < .01$.

Table 5

Baseline Demographics and Peer Relations as Predictors of the Behavioural Self-Regulation Latent Class Trajectories

	Advanced Developers (<i>n</i> = 21, 5.06%)		Early Developers (<i>n</i> = 66, 15.45%)		Moderate Developers (<i>n</i> = 34, 8.11%)		Typical Developers (<i>n</i> = 179, 42.19%)		χ^2
	B (SE)	OR (90% CI)	B (SE)	OR (90% CI)	B (SE)	OR (90% CI)	B (SE)	OR (90% CI)	
Demographics									
Age	0.13 (0.08)	1.14 (0.98, 1.32)	0.07 (0.04)	1.08 (0.99, 1.18)	0.06 (0.06)	1.06 (0.94, 1.20)	0.07* (0.03)	1.07 (1.00, 1.14)	6.54
Gender	0.45 (0.61)	1.57 (0.48, 5.16)	-0.18 (0.38)	0.84 (0.40, 1.76)	-0.19 (0.52)	0.82 (0.30, 2.28)	0.21 (0.29)	1.37 (0.78, 2.40)	3.25
Program	-0.44 (0.62)	0.65 (0.19, 2.17)	-0.09 (0.39)	0.92 (0.43, 1.98)	0.22 (0.57)	1.25 (0.41, 3.83)	0.24 (0.31)	1.27 (0.69, 2.32)	1.97
Peer Relations									
Acceptance (TR)	1.82** (0.58)	6.19 (1.99, 19.23)	0.92** (0.31)	2.50 (1.36, 4.58)	0.23 (0.44)	1.26 (0.53, 2.95)	0.35 (0.24)	1.41 (0.89, 2.24)	17.54**
Sociability (Obs)	0.10 (0.28)	1.10 (0.63, 1.92)	0.08 (0.19)	1.08 (0.75, 1.56)	0.22 (0.26)	1.24 (0.75, 2.06)	0.21 (0.14)	1.23 (0.93, 1.63)	2.35
Rejection (TR)	-34.42 (0.00)	0.00 (0.00, 0.00)	0.27 (0.50)	1.32 (0.49, 3.52)	0.81 (0.51)	2.25 (0.82, 6.15)	0.14 (0.33)	1.15 (0.60, 2.20)	4.91
Conflict (Obs)	-1.83 (1.44)	0.16 (0.01, 2.71)	-0.46 (0.50)	0.63 (0.24, 1.67)	0.07 (0.51)	1.08 (0.40, 2.90)	-0.75* (0.38)	0.47 (0.23, 0.99)	6.42

Note. Late developers trajectory is the referent group (*n* = 124, 29.91%). Child Gender: Boys = 0, Girls = 1. Program: Program A = 0, Program B = 1. TR = teacher report. Obs = Observed. OR = Odds ratio. CI = Confidence Interval. **p* < .05. ***p* < .01.

Table 6

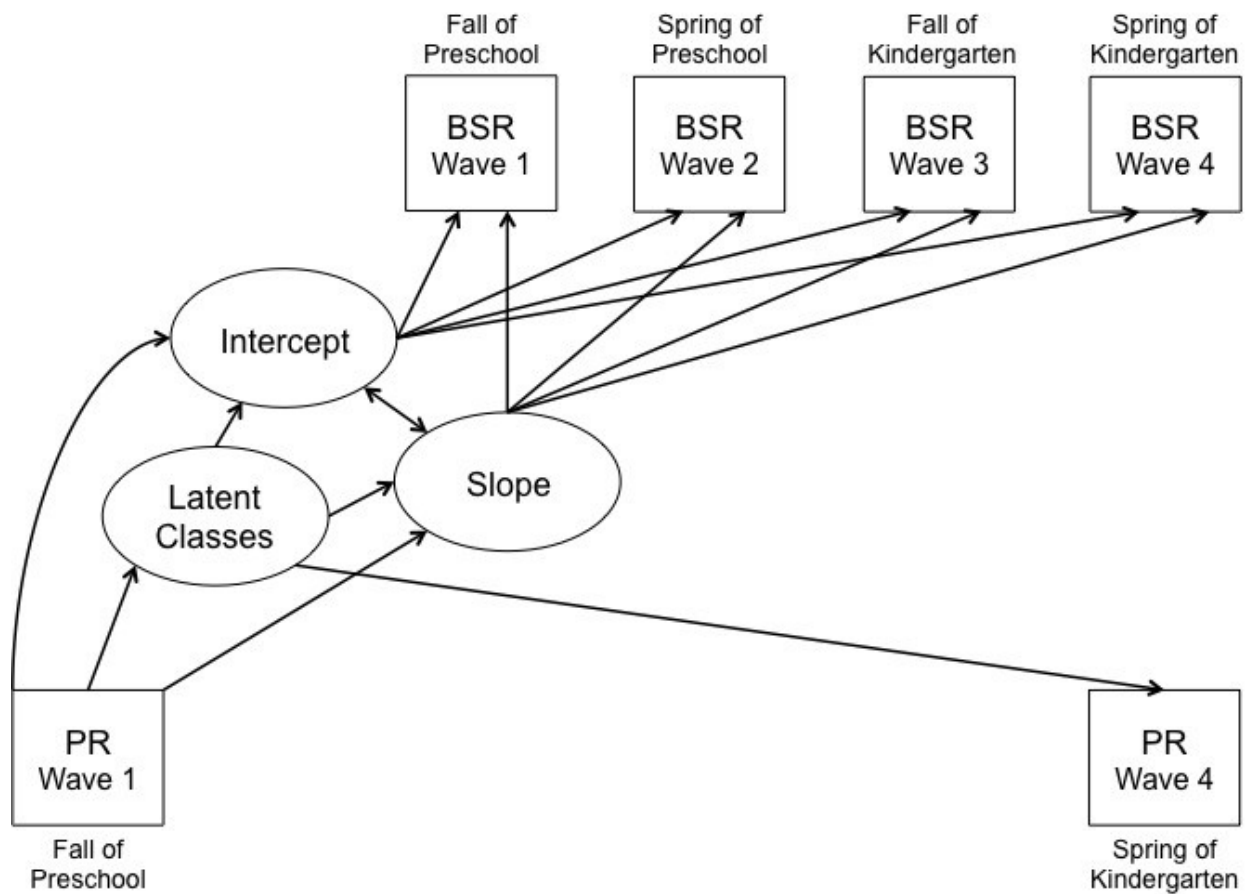
Behavioural Self-Regulation Latent Class Trajectories as Predictors of Peer Relations at Wave 4

	Advanced Developers (<i>n</i> = 21, 5.06%)		Early Developers (<i>n</i> = 66, 15.45%)		Moderate Developers (<i>n</i> = 34, 8.11%)		Typical Developers (<i>n</i> = 179, 42.19%)		Late Developers (<i>n</i> = 124, 29.91%)	
	<i>M</i>	<i>SE</i>	<i>M</i>	<i>SE</i>	<i>M</i>	<i>SE</i>	<i>M</i>	<i>SE</i>	<i>M</i>	<i>SE</i>
Peer Relations										
Acceptance (TR)	2.29	0.19	2.26 ^{*a}	0.12	2.12	0.17	2.33 ^{***a}	0.10	1.87 ^{**b}	0.12
Sociability (Obs)	0.98 ^{*b}	0.26	1.16	0.22	1.57	0.25	1.57	0.14	1.15	0.15
Rejection (TR)	0.04 ^{*a}	0.04	0.19	0.10	0.15	0.10	0.12	0.04	0.21	0.05
Conflict (Obs)	-0.00	0.00	0.03	0.02	0.14	0.10	0.02	0.01	0.02	0.01

Note. ^aMean values differ significantly from those in the late developers trajectory. ^bMean values differ significantly from those in the typical developers trajectory. TR = teacher report. Obs = Observed. **p* < .05.

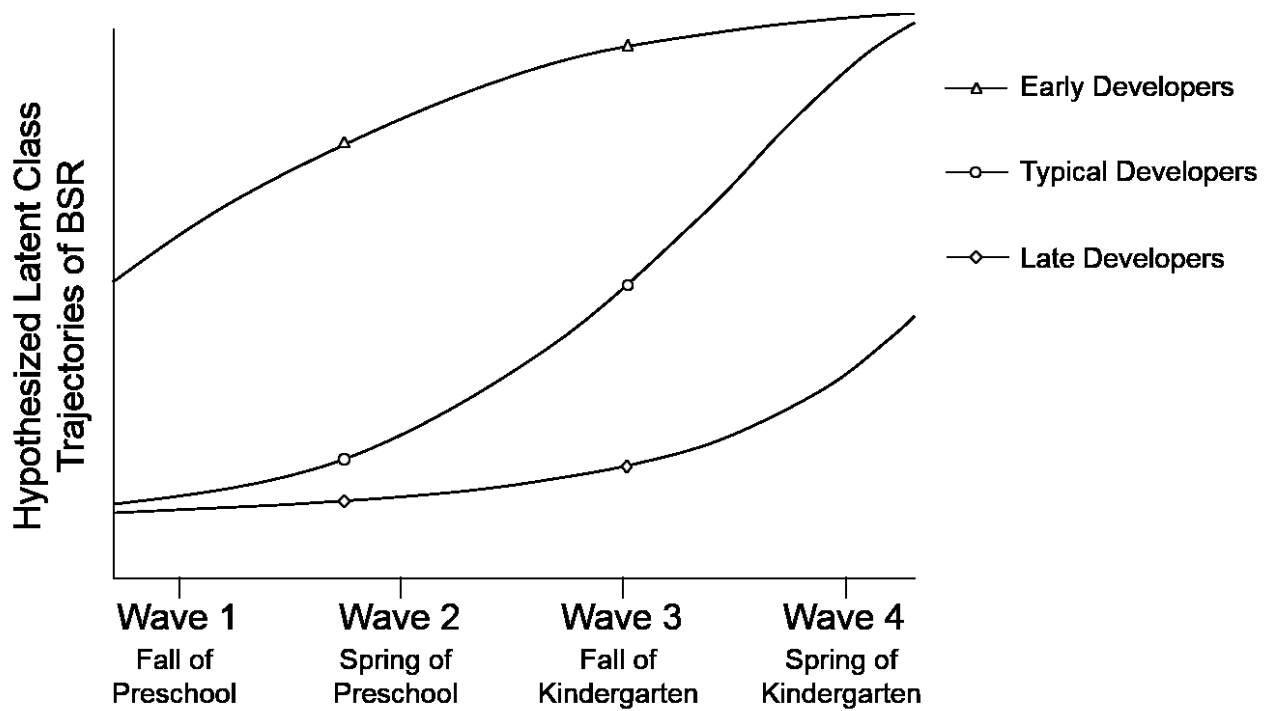
Figure 1

Heuristic of the Associations between the Behavioural Self-Regulation Latent Class Trajectories and Peer Relations



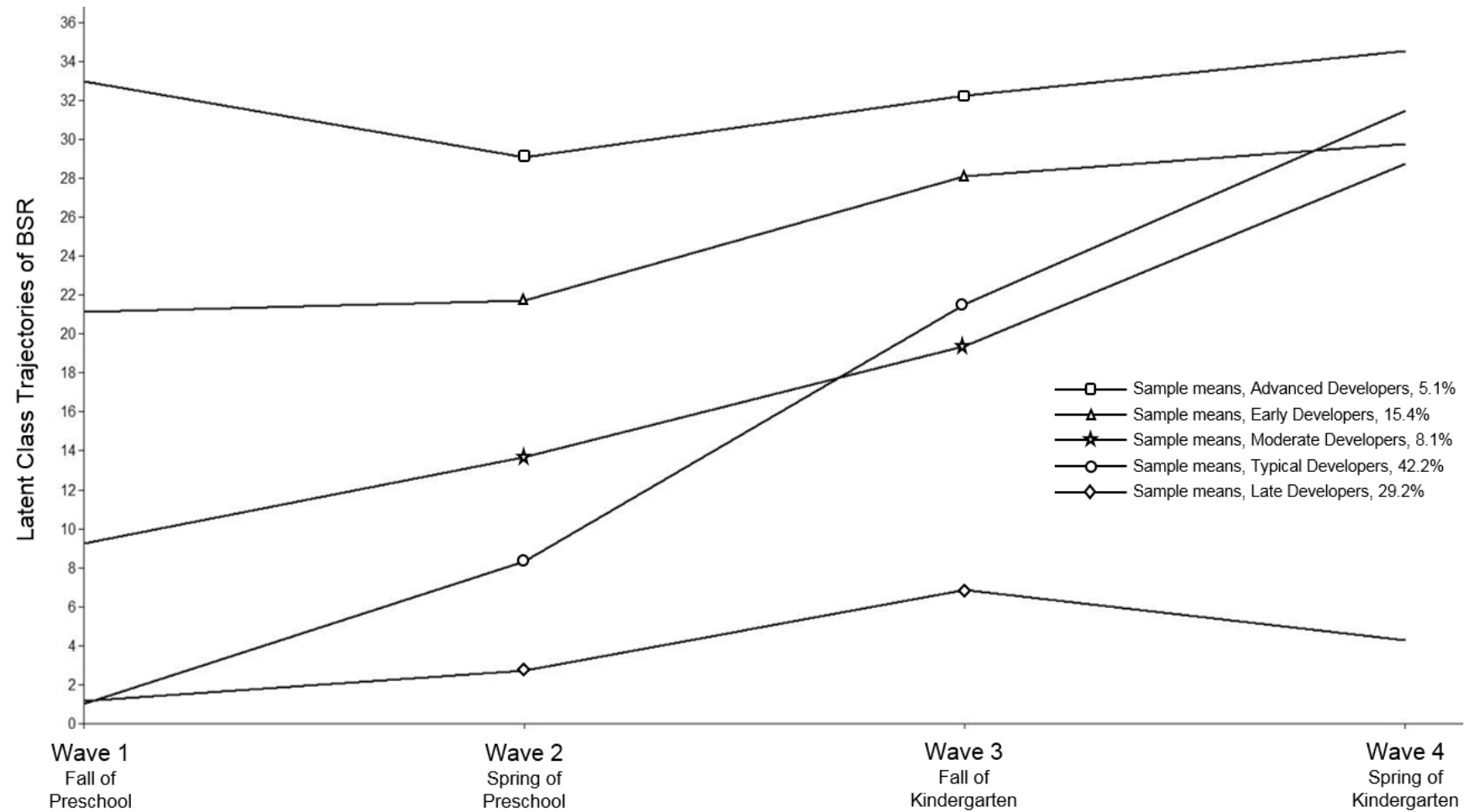
Note. BSR = Behavioural Self-Regulation. PR = Peer Relations.

Figure 2

Hypothesized Behavioural Self-Regulation Latent Class Trajectories

Note. BSR = Behavioural Self-Regulation.

Figure 3

Extracted Behavioural Self-Regulation Latent Class Trajectories

Note. BSR = Behavioural Self-Regulation.

References

- Bauer, D. J., Curran, P. J. (2003). Distributional assumptions of growth mixture models: Implications for overextraction of latent trajectory classes. *Psychological Method, 8* (3), 338-363.
- Beheshteh, A. (2010). Gender differences in social skills, problem behaviours and academic competence of Iranian kindergarten children based on their parent and teacher ratings. *Procedia - Social and Behavioral Sciences, 5*, 1175-1179.
- Chen, D. W., Fein, G., & Tam, H. P. (2001). Peer conflicts of preschool children: Issues, resolution, incidence, and age-related patterns. *Early Education and Development, 12*(4), 523-544.
- Coplan, R. J., & Arbeau, K. A. (2009). Peer interactions and play in early childhood. In K. H. Rubin, W. M. Bukowski, & B. Laursen (Eds.), *Social, emotional, and personality development in context. Handbook of peer interactions, relationships, and groups* (pp. 143-161). New York, NY, US: Guilford Press.
- Crick, N. R., Casas, J. F., & Mosher, M. (1997). Relational and overt aggression in preschool. *Developmental Psychology, 33*, 579-588.
- Denham S. A., Mason T., Caverly S., Schmidt M., Hackney R., Caswell C., & DeMulder, E. (2001). Preschoolers at play: co-socialisers of emotional and social competence. *International Journal of Behavioral Development, 25*, 290-301.
- Diamond A., Kirkham N., & Amso, D. (2002). Conditions under which young children can hold two rules in mind and inhibit a prepotent response. *Developmental Psychology, 38*(3), 352-362.

- Diamond, A. & Lee, K. (2011). Interventions Shown to Aid Executive Function Development in Children 4 to 12 Years Old. *Science*, 333(6045), 959-964.
- Downer, J., Booren, L., Hamre, B., Pianta, R., & Williford, A. (2012). The Individualized Classroom Assessment Scoring System (inCLASS). Charlottesville, Virginia: Center for Advanced Study of Teaching and Learning.
- Elias, C. L., & Berk, L. E. (2002). Self-regulation in young children: Is there a role for sociodramatic play. *Early Childhood Research Quarterly*, 17, 216-238.
- Fabes, R. A., Eisenberg, N., Jones, S., Smith, M., Guthrie, I., Poulin, R., Shepard, S., & Friedman, J. (1999). Regulation, emotionality, and preschoolers' socially competent peer interactions. *Child Development*, 70(2), 432-442.
- Fabes, R. A., Martin, C. L., & Hanish, L. D. (2009). Children's behaviors and interactions with peers. In K. H. Rubin, W. M. Bukowski, & B. Laursen (Eds.), *Social, emotional, and personality development in context. Handbook of peer interactions, relationships, and groups* (pp. 45-62). New York, NY, US: Guilford Press.
- Gilliam, W. S. & Shahar, G. (2006). Pre-kindergarten expulsion and suspension: Rates and predictors in one state. *Infants & Young Children*, 19(3), 228-245
- Gunnar, M. R., Sebanc, A. M., Tout, K., Donzella, B., & Dulmen, M. M. H. (2003). Peer rejection, temperament, and cortisol activity in preschoolers. *Developmental Psychobiology*, 43, 346-358.
- Hay, D.F. (2005). Early peer relations and their impact on children's development. *Encyclopedia on Early Childhood Development*, 1-4.
- Hay, D.F., Payne, A., & Chadwick, A. (2004). Peer relations in childhood. *Journal of Child Psychology and Psychiatry*, 45(1), 84-108.

- Kochanska, G., Coy, K., & Murray, K. (2001). The development of self-regulation in the first four years of life. *Child Development, 72*(4), 1091–1111.
- Lin, H. L., Lawrence, F. R., & Gorrell, J. (2003). Kindergarten teachers' view of children's readiness for school. *Early Childhood Research Quarterly, 18*, 225-237.
- Maccoby, E. (2007). Historical overview of socialization research and theory. In J.E. Grusec & P.D. Hastings (Eds.), *Handbook of socialization: theory and research* (13-41). New York, NY: Guilford Press.
- Martin, C. L., Fabes, R. A., Hanish, L., & Hollenstein, T. (2006). Social dynamics in the preschool. *Developmental Review, 25*, 299-327.
- McClelland, M. M., Cameron, C. E., Connor, C. M., Farris, C. L., Jewkes, A. M., & Morrison, F. J. (2007a). Links between behavioral regulation and preschoolers' literacy, vocabulary, and math skills. *Developmental Psychology, 43*(4), 947-959.
- McClelland, M.M., Cameron, C.E., Wanless, S., & Murray, A. Executive function, behavioral self-regulation, and social-emotional competence: Links to school readiness. O.N. Saracho, B. Spodek (Eds.), *Contemporary perspectives on social learning in early childhood education.*, Information Age, Charlotte, NC (2007b), pp. 113-137
- Montroy, J. J., Bowles, R. P., Skibbe, L. E., McClelland, M. M., & Morrison, F. J. (2016). The development of self-regulation across early childhood. *Developmental Psychology, 52*(11), 1744-1762.
- Muthén, L., & Muthén, B., (2011). *Mplus User's Guide* (3rd ed). Los Angeles, CA: Muthén & Muthén.

- Perry, D.F., Dunne, M.C., McFadden, L., & Campbell, D. (2008). Reducing the Risk for Preschool Expulsion: Mental Health Consultation for Young Children with Challenging Behaviours. *Journal of Child and Family Studies*, 17(1), 44-54.
- Ponitz, C. C., McClelland, M. M., Jewkes, A. M., Connor, C. M., Farris, C. L., & Morrison, F. J. (2008). Touch your toes! Developing a direct measure of behavioral regulation in early childhood. *Early Childhood Research Quarterly*, 23, 141-158.
- Ready, D., LoGerfo, L., Burkham, D. T., & Lee, V. E. (2005). Explaining girl's advantage in kindergarten literacy learning: Do classroom behaviors make a difference? *The Elementary School Journal*, 106, 21-38.
- Rimm-Kaufman, S. E., Pianta, R. C., & Cox, M. J. (2000). Teachers' judgements of problems in the transition to kindergarten. *Early Childhood Research Quarterly*, 15, 147-166.
- Størksen, I., Ellingsen, I., Wanless, S., & McClelland, M. (2014). The Influence of Parental Socioeconomic Background and Gender on Self-Regulation Among 5-Year-Old Children. *Norway Early Education and Development*, 26(5-6), 663-684.
- Wanless, S. B., Kim, K. H., Zhang, C., Degol, J. L., Chen, J. L., & Chen, F. M. (2016). Trajectories of behavioral regulation for Taiwanese children from 3.5 to 6 years and relations to math and vocabulary outcomes. *Early Childhood Research Quarterly*, 34, 104 -114
- Wanless, S. B., McClelland, M. M., Tominey, S. L., & Acock, A. C. (2011). The influence of demographic risk factors on children's behavioral regulation in prekindergarten and kindergarten. *Early Education & Development*, 22, 461-488.