

## **Quebec's Childcare Services: What Are The Mechanisms Influencing Children's Behaviors Across Quantity, Type and Quality of Care Experienced?**

The objective of this study was to examine how quantity, type and quality of care interact in predicting externalizing and internalizing behaviors of 36-month-old children attending Quebec's educational childcare from their first years of life. To do so, we examined two hypothesized models: (1) a mediation model where quantity, type and structural quality of care influences children's behaviors through process quality; and (2) a moderation model where process quality interacts with quantity, type and structural quality of care in influencing children's behaviors. The results of the current study were consistent with the moderation model. They suggest conditions under which several features of process quality are associated with a lower occurrence of externalizing and internalizing behaviors during an important period of behavioral development and before school entry.

*Keywords:* Childcare services, Quantity, Childcare center, Home childcare, Quality, Externalizing behaviors, Internalizing behaviors

In 1997, the Government of Quebec (Canada) created a universal network of regulated childcare services for children from birth to school entry. These services are now available to families at a cost of \$7 per child per day. Of the 441,700 children aged 0-4 years residing in Quebec (Institut de la statistique du Québec, 2013), 218,870 currently attend regulated childcare programs, 85,699 attend non-profit childcare centers (centers located in larger facilities designed for early childhood education and generally employing staff who hold a specialized degree in early childhood education; these programs typically separate children by age into groups, with a maximum ratio of five infants, eight toddlers or 10 preschoolers per educator) and 91,663 attend home childcare programs (homes programs offered in the homes of the educators coming from more diverse educational backgrounds, making these program resemble a child's home with an educator who cares alone for, at most, six children of varying age.(Ministère de la Famille, 2013). Both types of childcare are regulated and share a common educational program (curriculum framework).

For many children, childcare services provide the first transition between the family and an educational setting. Therefore, educators need to offer experiences that will support the development of appropriate behaviors allowing children to adapt to a group context. As a result, childcare attendance should prevent or lessen behavioral difficulties, whether externalizing (e.g., aggressive, destructive) or internalizing (e.g., anxious, withdrawn), from the moment they increase at approximately 24 months of age to the moment they start to decrease at approximately 36 months of age and to the preschool age, when most children should have integrated basic norms regarding appropriate behaviors (Campbell, 2002).

Generally speaking, childcare attendance has not been related systematically to fewer behavioral difficulties in children (Bigras et al., 2009; Lemay, Bigras, & Bouchard, 2012; Loeb, Bridges, Bassok, Fuller, & Rumberger, 2007). The relation appears to be better understood when examining some variables of the childcare experience, namely its quantity, type, structural and process quality (Jacob, 2009; Vandell, 2004). In the context of Quebec's regulated childcare network, this study explores the mechanisms influencing children's externalizing and internalizing behaviors during early childhood across quantity, type and quality of care experienced since infancy.

### ***Direct influence of childcare quantity, type and quality***

As the broadest childcare variable, *quantity of care* has been associated with children's behavioral difficulties, albeit inconsistently. Some studies have identified an association between spending a significant amount of time per week in childcare with an increase in externalizing and internalizing behaviors (NICHD Early Child Care Research Network, 1998, 2004), whereas other studies have not found a relation between quantity of care and those behaviors (Van Beijsterveldt, Hudziak, & Boomsma, 2005; Zachrisson, Dearing, Lekhal, & Toppelberg, 2013).

The discrepancy of these results could be explained by the lack of detailed information about the experiences offered to children during the hours they spent in childcare.

Further refining the childcare variable, some researchers have related the *type of care* attended to externalizing and internalizing behaviors, reporting more behavioral difficulties in children attending group childcare, such as childcare centers (Datta Gupta & Simonsen, 2010; Loeb et al., 2007). These studies also lack specific information about experiences offered to children in childcare, and they fail to consider the structural variables related to the type of care that could account for difference in behaviors. For instance, previous research has found centers to have higher child-to-adult ratios and homes to have fewer educators with specialized degrees in early childhood education (Bigras et al., 2010; NICHD Early Child Care Research Network, 2004).

Differences in *structural quality* regarding a higher child-to-adult ratio, as well educators with less training, have been related to children' behavioral difficulties (Bornstein, Hahn, Gist, & Haynes, 2006; NICHD ECCRN, 1999). This association is not as direct as it seems. Indeed, structural variables are associated with the quality of children's experiences, with higher process quality being observed when child-to-adult ratios are lower or when educators have a specialized degree in early childhood education and additional hours of ongoing training (for a review, see Huntsman, 2008). Hence, structural variables are generally considered because of their effect on process quality, the latter having been associated with child behaviors (NICHD Early Child Care Research Network, 2002).

High *process quality* has consistently been associated with fewer behavioral difficulties in children (Burchinal, Kainz, & Cai, 2011). Process quality is a multidimensional construct that refers to children's various direct experiences within childcare (Dowsett, Huston, Imes, &

Gennetian, 2008). In accordance with many international curriculum frameworks that are generally built around three major categories of practices that educators must take into account to provide a high-quality environment (organization of the physical setting, the content and nature of programming and the nature of interactions) (Jalongo et al., 2004; Keogh, 2003; NAEYC, 2009), Quebec's educational program *Meeting Early Childhood Needs* includes four specific categories of practices that educators must consider: physical setting, daily programming, interactions with children and interactions with children's parents (Gouvernement du Québec, 2007).

A high quality physical setting includes a classroom layout organized into activity zones (Maxwell, 2007; Trawick-Smith, 1992) and offering a variety of interesting and appropriate material (Frede & Ackerman, 2007; Maxwell, 2007). High quality daily programming refers to educators observing children in order to learn about their needs and interests and planning activities accordingly (Hohmann, Weikart, & Epstein, 2008), as well as ensuring that the daily schedule is predictable, fluid and well balanced between low and high energy activities in both large and small groups (Curby, Grimm, & Pianta, 2010; Lawry, Danko, & Strain, 2000). High-quality interactions with parents imply welcoming families and communicating with them (Corso, 2007; Lawry et al., 2000). Such organization of the environment fosters children's security, autonomy, motivation and engagement in activities and with others, which prevents fatigue, anxiety or frustration that may be expressed with behavioral difficulties (Corso, 2007; Lawry et al., 2000). In return, because educators are not overwhelmed with group management, they have more time to support children's behavioral learning with high-quality interactions, valuing their play, adopting a democratic intervention style and supporting their communication skills (Hyson et al., 2011; Lawry et al., 2000). Thus, the quality of the physical setting,

programming and interactions with children and with parents concern four specific dimensions of practices supporting children's behaviors that are aligned with Quebec's educational program (Gouvernement du Québec, 2007).

Although previous studies have consistently found associations between process quality and children's behaviors, the associations obtained are generally modest (Burchinal et al., 2011). This could be explain by the fact that studies have, for the most part, measured process quality as a one-dimensional construct (i.e., global process quality or quality of interactions), lacking specifics and aligned quality measures that cover all dimensions of educators' practices that are supportive of children's behaviors (Burchinal et al., 2011; Rusby, Jones, Crowley, & Smolkowski, 2013). By considering quality as a multidimensional construct and measuring it with an appropriate instrument, process quality should be more strongly associated with child outcomes than a global score of process quality has been (Burchinal et al., 2011).

However, observation scales that are widely used to measure global process quality, for example, the Environment Rating Scale Series (Harms, Cryer, & Clifford, 2007, 2009), do not include some of the practices recommended in educational programs such as observation and planning practices. Thus, it seems relevant to evaluate process quality with an observation scale designed to measure separately the application of the educational program in place, including each of the aforementioned dimensions.

That said, the literature previously mentioned has examined the main or direct influence of childcare quantity, type and quality on children's behaviors. Few studies have taken these variables into account simultaneously. Because it is possible to classify each child's childcare experience according to each of these three variables, it seems relevant to wonder whether they function together to influence behavior, and if so, how.

### ***Interactive influence of childcare quantity, type and quality***

A handful of studies have considered the interactive influence between some of these childcare variables. They highlighted, although still partly, mechanisms influencing children's behaviors.

Examining child behaviors, the quantity of care and process quality, Hausfather and his colleagues (1997) noted more appropriate behaviors in children who spent more time in high-quality childcare. These authors also identified more externalizing behaviors when children spent long hours in low quality childcare, a result recently corroborated by other research (McCartney et al., 2010). However, both studies measured process quality as a one-dimensional construct, the first with a global quality measure and the second with a measure of interaction quality.

Exploring type of care and process quality, Loeb and her colleagues (2004) found that in center- and home-based childcare, high-quality interactions predicted fewer behavior problems. As it also measured process quality as a one-dimensional construct, this study did not account for quantity of care that was found to interact with type of care in predicting children's behaviors.

Indeed, when considering both quantity and type of care, some authors have reported their combined influence. These studies associated spending a significant amount of time in a center with an increase in externalizing behaviors (Crockenberg & Leerkes, 2005; McCartney et al., 2010) and a smaller amount of time in the same setting with fewer internalizing behaviors (Crockenberg & Leerkes, 2005). Although underlying the interactive influence of quantity and type of care, those results did not account for process quality of care, which is the childcare variable most consistently associated with children's behaviors.

Finally, some studies have explored structural and process quality to explain children's behaviors. The child-to-adult ratio and educator's training were found to influence process quality, which was associated with children's behaviors (NICHD Early Child Care Research Network, 2002; Rusby et al., 2013). While the NICHD Early Child Care Research Network

(2002) study measured the quality of the interactions between educators and children, the study by Rusby and her colleagues (2013) was in line with recent empirical recommendations underlying the necessity of considering quality as a multidimensional construct (Dowsett et al., 2008) and measuring it with specific aligned measures (Burchinal et al., 2011). Conducted in the United States, the measure of process quality developed by Rusby and her colleagues (2013) is ecologic to the context studied which, however, is not totally aligned with Quebec's educational program.

All of these results indicate that very few studies have taken quantity, type and quality of care into account simultaneously to explain children's behaviors. This is especially true with a multidimensional understanding of process quality as measured with an instrument corresponding to the educational program in place. The next section presents theoretical and conceptual frameworks suggesting that the childcare attendance could influence children's behaviors through two types of interactive influence - mediation and moderation.

### ***Mechanisms of childcare influence on children's behaviors: mediation and moderation***

From a theoretical standpoint, Bronfenbrenner's ecological model of development (Bronfenbrenner, 1979; Bronfenbrenner & Morris, 1998) nests child development in the center of a multilayered ecological system, in which proximal and distal variables interact to shape developmental outcomes during the life course. Bronfenbrenner later refined his work by simplifying it to the elements of the Person-Process-Context-Time model (Bronfenbrenner, 2005).

Based on Bronfenbrenner's work, Mashburn and Pianta (2010) proposed three mechanisms through which childcare variables interact to influence child outcomes: 1) process quality is the direct mechanism influencing child development (direct); 2) the influence of

structural variables on children's development may be indirect, though they have a direct influence on process quality (mediation); and 3) structural variables are conditions that could determine the extent to which high process quality influences children's development (moderation). Mashburn and his colleagues (2010) have formulated these propositions to guide the elaboration of a training program. Thus, as far as we know, mediation and moderation influence mechanisms of childcare variables on children's behaviors, as conceptualized by Mashburn and Pianta (2010), have not been applied simultaneously to inform a complex research design.

Hence, knowledge about how or when childcare attendance is associated with children's behaviors remains fragmented. This lack of understanding of the childcare experience as a whole could bias educators' interventions, leading them to individualize their practices on an incomplete picture of one child's experience. This study attempts to provide a more complete understanding of the mechanisms that influence children's behaviors.

### ***The current study***

Building on the theoretical and conceptual propositions above, the current study explores the interactive influence of quantity, type and structural and process quality of care experienced from infancy on externalizing and internalizing behaviors in the preschool years with 1) a mediation model and 2) a moderation model. Both types of models are relevant since, as explained below, they highlight mechanisms having their own implications for childcare and child behaviors.

First, this study examines the possibility that the influence on children's behaviors of the quantity of time spent in a certain type of childcare with its different structural variables could be mediated through variation in process quality. Confirming a mediation model would mean that regulation regarding quantity of attendance, type of childcare offered and structural variables



would influence the quality of practices within the classroom, which directly influence children's behaviors—answering the question "how" or "why" childcare attendance influences children's behaviors (Kraemer, Kiernan, Essex, & Kupfer, 2008). Figure 1 shows the mediation model hypothesis. Accordingly, the first objective of this study is to explore a mediation model where quantity, type and structural quality of care influence children's behaviors through process quality. To achieve this objective, two hypotheses were formulated.

H1: The association between quantity and type of care and children's externalizing and internalizing behaviors is mediated by features of process quality.

H2: The association between structural quality and children's externalizing and internalizing behaviors is mediated by features of process quality.

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Insert Figure 1

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Second, the current study also examines the possibility that the link between process quality and children's behaviors may be moderated by quantity, type and structural quality of care. Confirming a moderation model would allow the identification of quantity, type and structural conditions of care under which some high quality practices within the classroom are associated with children's behaviors - answering the questions "when" or "for whom" childcare attendance influences behaviors (Kraemer et al., 2008). Figure 2 shows the moderation model hypotheses. Accordingly, the second objective of this study is to explore a moderation model where quantity, type and structural quality of care interact with process quality to influence children's behaviors. To achieve this objective, two hypotheses were formulated.

H3: The association between features of process quality and children's externalizing and internalizing behaviors is moderated by both quantity and type of care.

H4: The association between features of process quality and children's externalizing and internalizing behaviors is moderated by structural quality.

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Insert Figure 2

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## Method

The current study undertakes secondary analysis on data of the *Young children and their living environments (YCLE)* project, a longitudinal study concerned with the development of 188 children experiencing one of three types of care from their first year of life (child care center, home-based child care or parental care). Recruitment took place between 2004 and 2006 in the metropolitan area of Montréal (Québec, Canada). First, the parental care group was recruited from a random list of 1,200 parents of 5- to 12-month-old children obtained through Québec's public medical system. Of those, we were unable to trace the phone number of 279 families. Of the remaining families, each was called by phone to determine whether they were interested in participating in the project and, if so, to ensure the child's eligibility regarding the inclusion criteria. 481 families refused to participate and 409 accepted but were not eligible according to the criteria. In sum, 82 children were recruited in the parental care group. Second, the childcare groups were recruited by contacting all of the non-profit childcare centers and home-based childcare locations caring for children under 18 months of age. Each childcare center (N = 200) was contacted by phone and the 33 interested centers referred parents wishing to participate in the project. Parents were then called to ensure that the child met the inclusion criteria. Sixty children were recruited from 32 child care centers, attending 46 different groups. Then, each coordinating office of home-based childcare (N = 29) was solicited, and 66 interested home-based childcare providers referred parents wishing to participate in the project. Parents were then phoned to ensure that the child met the inclusion criteria. A total of 46 children were recruited

from 42 child care homes.

To be eligible to participate, children were required to be between five and 12 months old. Those in the childcare group must have started full-time attendance (more than 15 h per week) four to 12 weeks prior to recruitment. Those in the parental care group must have been cared for at home by a parent during the same period. Only children who remained in the same type of care for the duration of the project were retained for the study. At birth, all children must have been born at term, obtained a third Apgar of 7 or higher and weighed more than 2,500 g.

The participants were visited at home on five occasions, at 10, 15, 18, 24 and 36 months. An additional measure was added at 48 months and consisted only of mailing questionnaires.

### ***Participants***

Using data from the *YCLE* project, the current study included 70 children (37 boys, 33 girls) who attended childcare services for more than 15 h per week from the ages of 5-12 months ( $M = 10.68$  months,  $SD = 1.77$ ). They had attended the same center ( $N = 45$ ) or home ( $N = 25$ ) from their first to third year of life. The vast majority of children came from households with two parents (94.2%), who had attained at least a high school diploma (97.1%) and with a household income above Statistics Canada's low income threshold (87.0%) (Statistics Canada, 2011). Compared with the original sample of the *YCLE* project, participants in this subsample were significantly more likely to come from families with a household income above Statistics Canada's low income threshold ( $\chi^2(1, 188) = 14.10, p < 0.05$ ) and have mother who had attained a high school diploma ( $\chi^2(1, 188) p = 0.03$ ).

### ***Measures***

*Externalizing and internalizing behaviors.* Parents reported the behaviors of their 36-month-old children using the *Child Behavior Checklist 2/3* (Achenbach, 1992). This questionnaire has been found to present appropriate psychometric proprieties (Achenbach, 1992). It consists of 100 statements about children's concrete behaviors used to quantify the manifestation of behaviors with items relating to anxiety, social withdrawal, sleep, somatic complaints, aggression and destruction. Based on the two-month period prior to completing the questionnaire, parents gave a score for their child of 0 (the child never manifested this behavior), 1 (he sometimes did) or 2 (he often did) for each item. Two standardized scores (T-scores) were then calculated: externalizing behaviors (aggression and destruction) and internalizing behaviors (anxiety and withdrawal). A higher score indicates a greater occurrence of externalizing or internalizing behaviors. A standardized T-score of 28-59 is situated in the normal range, 60-63 in the borderline range and 64-100 in the clinical range.

*Quantity and type of care.* Parents reported their child's experience in childcare with a questionnaire developed by the researchers containing questions concerning the type of care attended, the stability of the care arrangement and the child's usual arrival and departure times. From the arrival and departure times indicated, we computed the mean weekly quantity of care.

*Process and structural quality.* Process quality was observed by trained research assistants with the *Educational Quality Observation Scale*, specifically the Preschool and Home Childcare versions (Bourgon & Lavallée, 2004a, 2004b). These observation scales have been designed to measure quality based on the recommended practices specific to Quebec's educational program for childcare services. Both versions consist of over 100 items, divided into four scales and nine subscales (see Table 1).

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Insert Table 1

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Each item was scored on a four-point scale: 1 (inadequate), 2 (minimal), 3 (good) and 4 (very good). The observation period lasted 5 h (7:45 am to 12:45 pm). A 20-min interview with the educator following the observation provided answers to 10 non-observable items. The scale also allow to compiled information on the observation context (child-to-adult ratio). The quality scores of each scale and subscale, in addition to an aggregate global score, were obtained by calculating the mean of all items composing it. A score under 2.5 indicates that a quality feature does not meet the minimal requirements of *Meeting early Childhood Needs* program. A score between 2.5 and 2.99 indicates that the requirement is minimally met. A score of 3 or more indicates that a requirement is fully met. Both have been found to have acceptable internal consistency (Drouin, Bigras, Fournier, Desrosiers, & Bernard, 2004).

Prior to the observation, the educator completed a self-administered questionnaire (Institut de la statistique du Québec, 2003a, 2003b) that solicited information about educator's structural variables (e.g., specialized degree in early childhood education, ongoing training).

### ***Procedure***

First, a telephone screening during recruitment identified the type of care attended (center or home). Additional data were collected when children were 24 and 36 months old. At 24 months of age, questionnaires were mailed to families (childcare experience) and childcare educators (childcare program's structural variables), followed by direct observations of the quality of the childcare environment. When the children reached the age of 36 months, parents received another questionnaire by mail to assess their children's behaviors.

### ***Data analysis***

Mediation and moderation hypothesis were planned to be tested in regression analysis according to the procedures outlined by Baron and Kenny (1986). To confirm the mediation hypothesis: a) the initial variable must be correlated with the outcome; b) the initial variable must be correlated with the mediator; c) the mediator must affect the outcome and d) the path between the initial variable and the outcome must be zero. To confirm the moderation hypothesis: a) childcare variables were entered in the first bloc, b) process quality was entered in the second bloc, c) the interaction of these variables was entered in the last step as the moderation effect. The moderator hypothesis is supported if the last step of the regression analysis is significant.

Each of the process quality features and interaction terms were explored in the analysis one at the time so there were never more than seven variables in the regression, to minimize type I error, maximize statistical power and prevent colinearity. To compensate for multiple comparisons in each set of regression analyses, we compared the  $p$ -value obtained to an adjusted  $p$ -value calculated with the Bonferroni correction. The model with the highest  $R^2$  was compared with the most severe threshold and so on until the lowest  $R^2$  was compared with the least severe criterion. Only  $p$ -values smaller than the corrected threshold were considered significant.

### **Results**

The results are presented in three main sections. The first section presents descriptive statistics. The second section presents the mediation model of childcare mechanisms influencing externalizing and internalizing behaviors of 36-month-old children. The third section presents the moderation model of childcare mechanisms influencing externalizing and internalizing behaviors of 36-month-old children.

### ***Preliminary analysis***

Before testing hypothetical models with hierarchical regression analysis, descriptive statistics for quantity, type, structural quality, process quality, and children's behaviors were examined (see Table 2) and the correlations between these variables were computed (see Table 3).

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Insert Tables 2 and 3

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Regarding child outcomes, children manifested similar normal rates of externalizing and internalizing behaviors in both types of care (mean under 59). The following analysis therefore explored childcare variables associated with children's behaviors as situated on a continuum of normal development - occurring more or less frequently. Concerning quantity of care, children were exposed to a similar amount of childcare weekly, regardless of whether they spent their time in centers or in homes. As for structural variables, complete datasets were only available for 50 of the participants. Thus, analyses verifying H2 and H4 included fewer subjects. Nonetheless, centers were found to have significantly higher child-to-adult ratios, while educators in both types of care had similar degrees and participated in similar amounts of ongoing education. In contrast, home programs scored lower with regard to process quality for most subscales, some even barely meeting the minimal requirements of *Meeting Early Childhood Needs* program (mean between 2.50 and 2.99). There was enough variance in scores for all of the continuous data to be normally distributed, as the descriptive statistics indicated. However, if the type of care significantly interacted with quantity and quality of care to explain behaviors, post-hoc analyses splitting data by type of care should be conducted.

### ***Mediation***

To test hypotheses 1 and 2, regarding whether process quality mediated the relationship between quantity, type and structural quality of care and children' behavioral outcomes using hierarchical

regression analysis, Pearson correlations were conducted. The correlations between the initial, mediator, and outcomes variables are provided in Table 3. As shown, quantity of care, type of care, child-to-adult ratio, the educator's ongoing training and the educator's degree were not associated with externalizing and internalizing behaviors. Because of the lack of correlation between the initial variables and behavioral outcomes, testing the mediation was not warranted (Baron & Kenny, 1986); thus, it was neither possible to confirm that features of process quality mediate the association between quantity and type of care and children's externalizing and internalizing behaviors (H1), nor that features of process quality mediate the association between structural quality and children's externalizing and internalizing behaviors (H2).

### ***Moderation***

To test hypotheses 3 and 4, i.e., whether the association between process quality and children's behaviors is moderated by quantity and type of care, as well as structural quality, the data were first centered and interaction terms were created.

*H3. The association between features of process quality and children's externalizing and internalizing behaviors is moderated by both quantity and type of care.*

Quantity and type of childcare were explored as potential moderators in the relationship between features of process quality and children's externalizing and internalizing behaviors, with two series of hierarchical regression analyses entering a) quantity and type of care; b) feature of process quality; c) two-way interaction between quantity, type and process quality; and d) three-way interaction between quantity, type and process quality. Table 4 shows the results.

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Insert Table 4

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The first step of the regression analysis revealed that quantity and type of care did not relate significantly to child externalizing behaviors,  $F(2, 67) = 0.021, p = .979$ , nor internalizing



behaviors,  $F(2,67) = 0.123, p = .885$ . The second step revealed that only the quality of the observation practices (subscale 2.2) significantly predicted externalizing behaviors,  $F(1, 66) = 14.967, p = .000$ , as well as internalizing behaviors,  $F(1, 66) = 8.472, p = .005$ . The third step of the regression analysis revealed that none of the two-way interactions between quantity and type of care and features of process quality significantly predicted child behaviors when considering adjusted  $p$ -values. The last step of the regression analysis showed that quantity and type of care moderated the association between externalizing behaviors and the quality of the physical setting (i.e., quality of the material,  $F(1, 62) = 10.198, p = .002$ ), the programming (i.e., quality of the schedule,  $F(1, 62) = 15.828, p = .000$ ; the quality of the activities,  $F(1, 62) = 9.114, p = .004$ ) and the interaction with children (i.e., quality of the educator's interventions,  $F(1, 62) = 15.190, p = .000$ ; quality of the support for communication,  $F(1, 62) = 16.797, p = .004$ ). It also showed that quantity and type of care moderated the association between internalizing behaviors and quality of the programming (i.e., quality of the schedule,  $F(1, 62) = 9.304, p = .003$ ) and the interactions with children (i.e., quality of the educator's interventions,  $F(1, 62) = 7.752, p = 0.007$ ).

To understand the interactions, we further explored by testing for slope differences among those seven three-way interactions. Table 5 presents the  $t$ -value for slope difference in the interaction between quantity of care (+1 standard deviation, mean, - 1 standard deviation) and features of process quality across type of care. Figure 3 presents the significant interactions predicting externalizing and internalizing behaviors.

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Insert Table 5

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For children spending less time in center-based childcare, material of higher quality is significantly associated with a higher occurrence of externalizing behavior (see Figure 3.a). For

those spending a greater amount of time in center-based childcare, increased quality of the educator's intervention style (Figure 3.b) and of her support for children's communication (Figure 3.c) were significantly associated with a lower occurrence of externalizing behavior.

For children spending less time in home-based childcare, high quality schedule (Figure 3.d), activities (Figure 3.e) and support for communication (Figure 3.f) were significantly associated with fewer externalizing behaviors, while a high quality schedule (Figure 3.g) was also significantly related to a lower occurrence of internalizing behaviors. For those spending more time in home-based childcare, a high quality schedule (Figure 3.d) was significantly associated with a higher occurrence of externalizing behavior, while an educator's democratic intervention style (Figure 3.h) was significantly linked to more internalizing behavior.

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Figure 3

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In sum, the hypothesis that quantity and type of care moderate children's externalizing and internalizing behaviors was confirmed for several features of process quality (the material, the schedule, the activities, the intervention style and the communication).

*H4: The association between features of process quality and children's externalizing and internalizing behaviors is moderated by structural quality*

Child-to-adult ratio, educator's ongoing training and degree in early childhood education were explored as potential moderators in the relationship between features of process quality and children's externalizing and internalizing behaviors with two series of hierarchical regression analyses entering a) structural variables (child-to-adult ratio, ongoing training hours, specialized degree); b) process quality features; and c) two-way interactions between structural variables and process quality. Table 6 shows the results of both hierarchical analyses testing the moderation hypothesis regarding structural quality.

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The first step of the regression analysis revealed that structural variables did not significantly relate to externalizing behaviors,  $F(3, 46) = 1.49, p = .229$ , nor to internalizing behaviors,  $F(3, 46) = 1.06, p = .479$ . The second step revealed that only quality of the observation practices (subscale 2.2) significantly predicted externalizing behaviors,  $F(1, 45) = 9.73, p = .003$ , as well as internalizing behaviors,  $F(1, 45) = 7.70, p = .005$ . The last step of the regression analysis revealed that none of the structural variables remained significant moderators of the association between features of process quality and children's behaviors once the corrected thresholds were considered. In sum, the hypothesis that structural quality moderates externalizing and internalizing behaviors could not be confirmed.

### **Discussion**

This study investigates the influence mechanisms of quantity, type, structural and process quality of care on the externalizing and internalizing behaviors of children attending Quebec's childcare services. The first objective of this study was to explore a mediation model where quantity, type and structural quality of care would influence children's behaviors through process quality features. The lack of correlation between variables limited the possibility of exploring the mediation model. Therefore, the hypothesis that process quality mediates the relationship between quantity and type (H1) and structural quality (H2), and externalizing and internalizing behaviors could not be tested. The second objective of this study was to explore a moderation model where quantity, type, and structural quality of care would modulate the relationship between process quality features and children's behaviors. The moderation hypothesis of quantity and type in H3 was confirmed for the relationship between several process quality features and

children's behavior, but the moderation hypothesis of structural quality in H4 could not be confirmed for the association between the process quality feature and children's behaviors.

For the moment, the results of this study fall short on proof for the mediation model, but they confirm a moderation model. The absence of associations between the distal variables, such as quantity of time spent in childcare, type of childcare attended and structural variables of a given setting, and children's behaviors could result from the context of Quebec's childcare network. The setting of this study differed from studies conducted in areas where the regulation of early childhood education varies. While previous research has suggested potential detrimental direct effects of high quantity (NICHD Early Child Care Research Network, 1998, 2004), center attendance (Datta Gupta & Simonsen, 2010; Loeb et al., 2007), higher child-to-adult ratio and educators with less training (NICHD ECCRN, 1999) on children's behavioral outcomes, the childcare settings involved in the current study are non-profit, publicly subsidized, regulated and monitored. The regulation regarding opening hours, the type of care offered, the child-to-adult ratio, and the educator's initial and ongoing training may have created a ceiling effect in that minimal contextual conditions necessary to ensure typical behaviors among all children attending childcare may have been in place in all of the settings. Indeed, only process quality, namely the quality of educator's observations practices (feature 2.2. in the EQOS), has been found to have a direct influence on children's behaviors in this study.

While decisions regarding quantity, type and structural quality of care were not related to children's outcome on their own, they appeared, however, to strengthen the relationship between several features of process quality and children's outcomes, as the confirmation of the moderation model suggests. Thus, although not procuring much information on "how" or "why" quantity, type and structural quality of care predicts children's behaviors with a mediation model,

this study indicated “when” or “for whom” process quality is more strongly related to children's behaviors with confirmation of the moderation model. If this study had found that quantity, type or structural quality of care was associated with process quality or children's behaviors, these three variables would have remained difficult to transform, requiring either modification of existing or implementation of new regulations. However, identifying conditions under which some high quality practices are associated with behavioral difficulties is more concretely related with practice. These results can help educators individualize some of their practices based on the amount of time children spend in either a center or a home program, which could improve the positive effects of their childcare attendance. These conditions are discussed in the following section.

### ***Quantity and type of care***

As predicted based on previous studies (Crockenberg & Leerkes, 2005; McCartney et al., 2010), quantity and type of care interacted to moderate the association between process quality and children's behavior. This result highlights the relevancy of studying the complex influences of childcare attendance on children's outcomes within an ecological perspective (Bronfenbrenner, 1979, 2005; Bronfenbrenner & Morris, 1998; Mashburn & Pianta, 2010). By doing so, many features of process quality have been found to relate more strongly to children's behaviors depending on the amount of time spent in center-based or home-based childcare.

When children spent more than 45 h per week in a center, an educator's high-quality intervention style and her support for communication appeared to be linked with a lower occurrence of externalizing behaviors. However, for children spending less than 35 h weekly in a center, high-quality materials was associated with more externalizing difficulties. When children spent less than 35 h per week in a home, a high-quality schedule, activities and the educator's

support for communication appeared to be associated with fewer children's externalizing behaviors, while a high-quality schedule was related with their internalizing behaviors. For children spending more than 45 h a week in a home, a high-quality schedule was associated with increased externalizing behaviors, and the educator's high-quality interventions were associated with more internalizing behaviors.

Compared with staying at home with their parents, children attending childcare are exposed to a structured educational setting; to toddlers learning to interact with others who may occasionally display aggressive, destructive or anxious behaviors; and to adults expressing demands in order for the group to function well (Fabes, Hanish, & Martin, 2003; Tout, de Haan, Campbell, & Gunnar, 1998). Young children may then use externalizing and internalizing behaviors as a strategy to respond to those demands (Ahnert & Lamb, 2003). On the one hand, when those demands accumulate for children attending childcare more than 45 h per week, center educators' intervention styles that allow children to decide and take initiative, as well as their support for children's communication skills, expression of emotions and interpersonal relationships seem to give children flexibility and equip them with strategies that foster their adaptation to the center. Home educator schedule shifting between group types and activities throughout the day and an intervention style that offers children opportunities to choose for themselves may lessen the possibility for older peers to act as models of appropriate behavior. When those demands are less regular for children attending childcare less than 35 h per week, home educators programming of a predictable schedule, flexible activities and support for children's communication skills and expression of emotions may offer the best balance between structure and freedom to promote children's adaptation to the home, while center educator offering a wide variety of materials may leave less time for children to adapt to it or to take their

turn with a given interesting toy which could lead to frustration. On the other hand, the bidirectional nature of the relationships according to the theoretical framework adopted implies that the opposite interpretation could be made. When children spend more time in center-based childcare or less time in home-based childcare, educators may be more able to adopt high-quality practices when children already exhibited less behavioral difficulties at 24 months-old. Those children might still exhibit fewer behavioral difficulties at 36 months-old. Nevertheless, these results underline some influential association between high quality practices and the externalizing behaviors of children spending more than 45 h per week in a center, a result that has been reported before (Hausfather et al., 1997). They also indicate some potential influential association between high-quality practices and behavioral difficulties for those spending less than 35 h per week in a home which is, to our knowledge, a novel finding.

More generally, these findings stress the importance of the quality of other dimensions of educators' practices, in addition to the quality of their interactions with the children. Educators could try to adapt the practices listed above to help reduce behavioral difficulties in a given setting. Positive interactions between educators and children, such as when educators react in a flexible manner to children's perspective and take on a democratic intervention style (feature 3.2 in EQOS) and when their practices support children's communicative skills (feature 3.3), appear to contribute to fewer troublesome behaviors. Nonetheless, the results indicated that educators may also have to consider the variety of the material offered (feature 1.2), pay attention to the daily schedule (feature 2.3) and organize activities children can choose and play an active role in (feature 2.4) to influence the occurrence of behavioral difficulties. Research has indicated that educators do not feel sufficiently prepared to intervene when children manifest behavioral

difficulties more frequently (Hemmeter, Santos, & Ostrosky, 2008). This study provides a first step pointing to precise practices associated with behavioral difficulties in children.

Those practices are commonly emphasized in educational programs (Hohmann et al., 2008; NAEYC, 2009). However, some quality measurement tools widely used in research do not include some of the practices recommended in Quebec's educational program. For example, the Environment Rating Scale Series (Harms et al., 2007, 2009) does not include items regarding the quality of educators' observation practices. The latter has been associated with children's behaviors in the current study. Because Quebec's educational program emphasizes this practice, as well as planning practices and interactions with parents that are not widely represented in existing measurement tools, it seems important to use an observation scale that is consistent with a given educational program to ensure coherence between the measure of process quality and practices included in its definition from a multidimensional perspective.

### *Structural quality*

The results suggest few associations between structural characteristics and children's behavior, none of which remains significant after adjusting the threshold for multiple comparisons. Child-to-adult ratio, educator's ongoing training and degree are regulated variables in Quebec's childcare. It is possible that unregulated variables on which educators show more variation have a stronger moderating effect on the relationship between process quality and children's outcomes.

A recent review pointed to a strong association between educators' beliefs of practices that need to be implemented and the practices they adopt, albeit admitting to a lack of empirical knowledge about those related to behavioral difficulties and classroom management (Kwon, 2010). Such knowledge could help in understanding, for example, the main effect of the quality of educators' observation practices on behaviors, higher quality being associated with increased



occurrence of behavioral difficulties. Further research could investigate unregulated variables on which educators vary more widely, such as their beliefs, to understand who is observing, how and why they are doing it and what the obstacles to implementing such practices are. That type of qualitative knowledge would allow researchers to better understand observation practices and increase their quality, which is relatively low.

## **Conclusion**

Even though this study presents innovative results based on Quebec's educational program multidimensional definition of childcare quality, it also has some limitations. First, our small sample was mostly composed of children from middle-high income families, and children did not manifest externalizing and internalizing scores in either the borderline or clinical range. This should be considered regarding the generalizability of our results. It must also be noted that because of its correlational nature, this study can only identify association even though mediation and moderation models are causal by definition. Because outcomes were theorized to result from bidirectional relationships based on the ecological systems theory underlying this study, we have tried to interpret and discuss the finding in such perspective. Omitted variables could also explain the results obtained in this paper, such as unregulated variables concerning the educator. This small-scale exploratory study aimed to contribute to the conceptualization and operationalization of the complex influence mechanisms of childcare attendance. We encourage further study to replicate ours with a larger sample and a multidimensional measure of childcare quality ecologically valid within the context studied.

Nonetheless, our results indicated that a moderation model seems to shed light on the influence of quantity, type, structural and process quality of care on children's behaviors. Therefore, the results of this study indicate “when” or “for whom” process quality is more

strongly related to children's behaviors. In the context of Quebec's regulated non-profit childcare programs, quantity and type of care have been found to moderate the association between several features of process quality and children's behavioral outcomes.

The comprehensive multidimensional exploration of children's educational experiences allowed this study to identify specific practices that seem to be associated with children's externalizing and internalizing behaviors under certain conditions, by finding 1) that the quality of observations is directly associated with children's behaviors across results; 2) that quality of the material, the schedule, the activities, the educator's intervention and support for children's communication have a stronger influence on children's externalizing behaviors depending on the quantity and type of care; and 3) that quality of the schedule and educator's interventions have a stronger influence on children's internalizing behaviors depending on the quantity and type of care. Revealing the specific association between the quality of educator's observation practices and children's behavioral outcomes, the current study suggests the relevance of a process quality measurement scale that is coherent with a given educational program.

In the end, all of these results support the ecological conceptualization of the influence mechanisms of childcare attendance on children's behaviors. In a context where the government is largely responsible for founding a universal network of educational childcare services that are expected to ensure child socialization, these results are relevant because they concern an important proportion of children attending these settings in an important period of behavioral development and before school entry.

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