

## What patterns of postpartum psychological distress are associated with maternal concerns about their children's emotional and behavioural problems at the age of three years?

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Mothers experiencing psychological distress in the postpartum period may have difficulties parenting their children. Inconsistent and unresponsive parenting may increase the risk of later emotional and behavioural problems in children. The purpose of this study was to identify how maternal psychological characteristics cluster at eight weeks postpartum, and whether these clusters were associated with maternal-reported child emotional and behavioural problems at the age of three years, as measured by the Parents' Evaluation of Developmental Status (PEDS) questionnaire. In a longitudinal pregnancy cohort ( $N=647$ ), three clusters of postpartum psychological characteristics were identified. Contrary to expectations, mothers with the greatest psychological distress did not report concerns about their child's emotional and behavioural problems; rather, they reported concerns about global developmental delay. These findings suggest that infants of mothers experiencing postpartum psychological distress should receive additional follow-up to reduce the risk for global developmental delay.

**Keywords:** psychological distress; postpartum; preschool children; child behaviour; screening; longitudinal studies

In Canada, approximately 20% of children have one or more emotional (e.g. anxiety, withdrawal) and behavioural (e.g. aggression, hyperactivity) problems before they reach school age (Willms, 2002). Over their life course, children with these problems are more likely to have poor academic and occupational success, experience depression and addictions, interact with the justice system, and rely on government for services and programmes (Carter, Briggs-Gowan, & Ornstein Davis, 2004; Knudsen, Heckman, Cameron, & Shonkoff, 2006; Mustard & Eming Young, 2007). The lifetime cost of addressing the outcomes of emotional and behavioural problems is \$1.1 million dollars per child (Escobar Doran, Jacobs, & Dewa, 2012). This does not include the emotional costs to families or caregivers that are associated with the challenges of managing difficult emotional and behavioural problems. The cost of remediating

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emotional and behavioural problems identified in early childhood is substantially less than the cost of mental illness in adulthood (Heckman, 2006; Knudsen et al., 2006).

Years of research have identified that the home is one of two environments associated with behavioural and emotional development of children; the other environment being out-of-home childcare. Canadian mothers with children under the age of five years reported working 67.5 hours per week on unpaid childcare, more than double what fathers reported (30.2 hours; Statistics Canada, 2011). As such, the mental health of mothers is of great importance to provide an optimal environment for early childhood development. Risk for poor mental health can be distilled into distal (e.g. maternal education) and proximal (e.g. maternal depression) factors. To gain a clearer understanding of the processes by which the risks affect young children, using proximal risk factors is preferred (Trentacosta et al., 2008). The relationships between maternal psychological factors (i.e. maternal depression, maternal anxiety, somatic symptoms, hostility, relationship tension, relaxation, contentment, physical well-being, friendliness, and self-efficacy) and children have been well-studied (Benzies, Keown, & Magill-Evans, 2009; Burton & Davis, 1992; Campbell, Shaw, & Gilliom, 2000; Connell & Goodman, 2002; Qi & Kaiser, 2003; Letourneau, Fedick, Willms, Stewart, & White, 2007; Letourneau & Joschko, 2013; Letourneau, Salmani, & Duffett-Leger, 2010; Letourneau, Tramonte, & Willms, 2013; Magill-Evans & Harrison, 2001; Mistry, Benner, Biesanz, Clark, & Howes, 2010; NICHD Early Child Care Research Network & Arsenio, 2004; Paolucci & Violato, 2004; Thompson Gershoff, 2002; Yeung, Linver, & Brooks-Gunn, 2002). From this research, it has been determined that risk factors do not necessarily present in isolation and there is an additive risk with multiple factors (Appleyard, Egeland, van Dulmen, & Sroufe, 2005). Furthermore, the relationship between factors may be reciprocal. For example, depression is associated with relationship tension (RT) and vice versa (O'Mahen, Beach, & Banawan, 2001). Together, the negative psychological factors can create an environment of psychological distress, providing the foundation for an adverse environment that affects parenting and the development of subsequent emotional and behavioural problems. As these associations have already been established, of interest to this study is how the risk factors cluster at eight weeks postpartum to provide a basis of concern for emotional and behavioural problems at the age of three years. What follows is a brief summary of the research on maternal psychosocial distress and the effect on child outcomes.

Maternal depression has been linked to poor child developmental trajectories (for a review see Goodman et al., 2011). Prenatal depression and postpartum depression consistently predict internalising and externalising behaviour problems in toddlers (Dietz, Donahue Jennings, Kelley, & Marshal, 2009; Weissman et al., 1986). Children living in households with a parent who is depressed are at greater risk for developing conduct disorders (Chronis et al., 2007), along with emotional, somatic, behavioural, and adjustment problems (Low & Stocker, 2005). Mothers with depression are more likely to have compromised parent-child relationships due to irritability, withdrawal, and self-absorption (Goodman et al., 2011). Mother-child relationships are compromised in 10–25% of women referred to psychiatrists after birth; depression being but one cause of this relationship dysfunction (Brockington, 1996).

Generalised anxiety disorder occurs more often in postpartum women than in the general population (Wenzel, Haugen, Jackson, & Brendle, 2005). Mothers suffering from pre- and postnatal anxiety reported more behavioural and emotional problems in four-year-old children; disproportionately affecting boys (O'Connor, Heron, Golding, Beveridge, & Glover, 2002). Anxiety disorders and depression often

co-occur. However, even when maternal depression was controlled for, mothers with anxiety reported the same child outcomes (O'Connor, Heron, & Glover, 2002). High anxiety levels and parental externalising symptoms had an additive effect on the prediction of child emotional problems (Burstein, Ginsburg, & Tein, 2010). A significant amount of evidence exists to support that prenatal and postpartum anxiety can have deleterious effects on children and the parent-child relationship (Austin, Hadzi-Pavlovic, Leader, Saint, & Parker, 2005; Van den Bergh, Mulder, Mennes, & Glover, 2005; Wenzel, Haugen, Jackson, & Brendle, 2005; Wenzel, Haugen, Jackson, & Robinson, 2003). In addition to a compromised parent-child relationship, anxiety creates lower marital/partner relationship quality (Wenzel et al., 2005).

Marital hostility can affect child behavioural and emotional development through modelling. Children may perceive hostile interactions as an appropriate way to express themselves and interact with others. Problems such as aggression and poor peer interactions were strongly associated with lower parental relationship satisfaction (Linville et al., 2010) and increased parental hostility (Dierckx et al., 2011; Halligan, Cooper, Healy, & Murray, 2007). Preschool children whose parents had hostile and detached communication styles exhibited more negative affect and non-compliance during play sessions with same-sex best friends. Additionally, these children showed greater externalising behaviour problems than children whose parents had more positive communication styles (Katz & Woodin, 2002). Katz and Woodin (2002) also identified that parents employing hostile parenting practices tended to exhibit less playfulness and cohesion with their children. Hostility also impacts child emotional security as a result of not being witness to warmth and intimacy (Cummings & Davies, 1994; Katz & Woodin, 2002).

Hostile parenting attributions induce parental anger and harsh disciplinary practices (Snyder, Cramer, Afrank, & Patterson, 2005). Such practices are often ineffective, causing the child's behaviour to continue, leading to greater hostility and further ineffective disciplinary practices. Hostility and ineffective discipline predicted aggression in kindergarten and first-grade children (Benzies et al., 2009; Snyder et al., 2005).

In contrast to these risk factors, however, protective factors such as maternal contentment and a sense of well-being were associated with decreased risk of mental-health problems in young children and actually predict positive developmental trajectories (Berger & Spiess, 2011; Chronis et al., 2007; Tough et al., 2008). These outcomes are directly affected by the quality of parental investment, as determined by parental subjective well-being (Belsky, 1984). While the negative effects of maternal psychological distress on child outcomes are well documented, the positive effects of well-being have only recently been under examination. Furthermore, the majority of this research pertains to maternal well-being and employment role satisfaction, not satisfaction with parenting.

Related to well-being is a sense of parental self-efficacy: the knowledge of appropriate parenting behaviours and confidence to engage in these behaviours (Bandura, 1989). High maternal self-efficacy is related to positive parenting practices (Coleman & Karraker, 1997; Jones & Prinz, 2005), whereas low maternal self-efficacy is linked to maternal depression, poor school performance, and child emotional and behavioural problems (Jones & Prinz, 2005). Bandura (1982) postulates that those with low self-efficacy tend to give up easily and internalise failure, leading to a lower sense of role satisfaction.

Adversity in the family environment is typically complex with multiple co-occurring patterns of factors. Isolating specific clusters of vulnerability in the postpartum period

and linking those clusters to the development of child outcomes could be used to identify and support children and their families who would benefit the most from early intervention. In a recent systematic review, the composition of these clusters and measurement of variables was highly inconsistent across studies (Jacobs, Agho, Stevens, & Raphael, 2012). This inconsistency limits the efficacy of pattern identification for maternal psychological distress, which places infants at greatest risk of developing later emotional and behavioural problems. Except for a few (see, for example Benzies et al., 2009), the majority of studies predicting child emotional and behavioural problems from postpartum characteristics have been conducted with at-risk samples (Johnson, 2006; Lyons-Ruth & Melnick, 2004), again limiting the generalisability of the results to the other populations. Identification of a stable cluster of postpartum psychological characteristics that predict later emotional and behavioural problems would create opportunities for early identification and intervention.

The purpose of this study was to identify the patterns of postpartum psychological characteristics that best predicted maternal concerns about their child's emotional and behavioural problems at the age of three years. The hypothesis tested stated that self-reported maternal psychological distress (defined as high levels of anxiety, depression, somatic symptoms, hostility, and relationship tension, in combination with low levels of relaxation, contentment physical well-being, friendliness, and self-efficacy) at eight weeks postpartum would be associated with maternal concerns about their children's emotional and behavioural problems as measured by the Parent Evaluation of Developmental Status (PEDS) questionnaire (Path C) at the age of three years.

## **Methods**

### ***Participants***

A secondary analysis of the Community Perinatal Care (CPC) data collected between April 2001 and July 2004 in Calgary, Canada (Tough et al., 2006, 2008) was conducted. The CPC study was a randomised controlled trial (RCT) designed to examine the effects of additional supports for women from early pregnancy until eight weeks postpartum. Eligible women were allocated to one of three study groups: (a) standard care, (b) standard care plus consultation with a nurse, and (c) standard care plus consultation with a nurse, plus consultation with a paraprofessional home visitor. There were no significant differences between the RCT study groups on maternal mental health, including postpartum depressive symptoms (Tough et al., 2006).

The follow-up study was conducted between 2005 and 2006 when the children were at the age of three years. Women were excluded from follow-up if they had miscarried, did not speak English, did not currently reside in the health region, or had an incorrect telephone number. Of the 1737 women who completed the initial mailed questionnaire, 1629 (94%) consented to participate in a follow-up study. Of these women, 1147 were contactable and 791 completed the follow-up when their children were three years of age, resulting in a 69% participation rate. Complete data were available for 647 of these women. Compared to eligible women who participated in the follow-up study, those who did not were significantly more likely to (a) be under 25-years old, (b) smoke prior to and during pregnancy, (c) use the food bank within the 12 months prior to pregnancy, and (d) have low self-esteem (Tough, Siever, & Johnston, 2007). See Table 1 for socio-demographic characteristics of the participants.

Table 1. Socio-demographic characteristics of mothers at eight weeks postpartum and their children.

	<i>n</i> <sup>a</sup>	Mean (SD)	Frequency (%)
Mother's age (years)	647	30.34 (4.43)	
Father's age (years)	645	32.22 (5.02)	
Gender of infant (male)	647		313 (48.4)
Number of siblings (% one sibling)	647		350 (54.1)
Marital status (% partnered)	647		629 (97.2)
Mother's education (% with high school or greater)	646		625 (96.7)
Father's education (% with high school or greater)	643		620 (96.4)
Mother employed (full or part time)	647		473 (73.1)
Father employed (full or part time)	645		596 (92.4)
Household income (% < \$40,000CDN)	619		88 (14.2)
Birth country (% Canada)	647		533 (82.4)

Note: <sup>a</sup>Sample size varies due to missing values.

### ***Measures of maternal psychological distress at eight weeks postpartum***

#### *Parental Expectations Survey*

The Parental Expectations Survey (PES) is a 20-item scale designed to assess parental perceptions of their abilities to care for an infant (self-efficacy; (Reece, 1992). Mothers respond to the phrase, 'I can ...' (e.g. keep my baby from crying) on an 11-point Likert scale from 0 (*cannot do*) to 10 (*certain can do*). Scores are summed and divided by the total item number (20) to generate a mean PES score; higher scores indicate greater parenting self-efficacy. Cronbach's  $\alpha$  for the PES ranged from .86 (three months postpartum) to .91 (1 month postpartum). PES scores at three months predicted perceived stress at one year, ( $r = -.28$ ). The PES has concurrent validity with the Evaluation subscale of What Being the Parent of a Baby is Like questionnaire (Pridham & Chang, 1989;  $r = .64$ ). In this study, the PES mean score was used.

#### *Kellner Symptom Questionnaire*

The Kellner Symptom Questionnaire (KSQ) is a 92-item, self-rated questionnaire that measures psychiatric and somatic symptoms as well as well-being over the past week (Kellner, 1987). Respondents rated each item as 0 (*no or false*) or 1 (*yes or true*) on four symptom subscales: anxiety, depression, somatic symptoms, and hostility; and four well-being subscales: relaxation, contentment, physical well-being, and friendliness. Items are summed to create subscale scores; higher scores indicate more of each characteristic. Test-retest reliability for the anxiety, depression, somatic symptoms, and hostility subscales were,  $r = .71$ ,  $.95$ ,  $.77$ , and  $.82$ , respectively. The correlation between the KSQ and the Hamilton Depression subscale was  $r = .66$ ; and between the Hamilton Anxiety subscale and KSQ was  $r = .69$ . The KSQ can discriminate between subgroups of psychiatric patients and between subgroups of normal study participants. In this study, the KSQ subscale scores were used.

#### *Edinburgh Postnatal Depression Scale*

The Edinburgh Postnatal Depression Scale (EPDS) is a 10-item, self-reported scale designed to measure depressive symptoms over the past week in women of infants

up to the age of one year (Cox, Holden, & Sagovsky, 1987). Mothers rate their symptoms on a 4-point Likert scale (0–3) with variable response options appropriate to the questions. Scores are summed to create a total score; higher scores indicate more depressive symptoms. A score of 13 or greater on the EPDS is suggestive of postpartum depression. Cronbach's  $\alpha$  has been reported at 0.87. The EPDS has demonstrated good sensitivity (86%) and specificity (78%) in community samples. The EPDS total score was used.

#### *Relationship tension*

RT was measured by the investigator-designed item, 'In general, how would you describe the relationship with your partner?' Respondents were asked to rate their RT on a 3-point scale from 1 (*a lot of tension*) to 3 (*no tension*).

#### *Demographic data*

Maternal and child socio-demographic, lifestyle, and health information was measured using investigator-designed items. This information was used to report characteristics of the sample.

### **Measure of child development at the age of three years**

#### ***Parent Evaluation of Developmental Status***

The PEDS is a 10-item parent-reported surveillance and screening tool designed to identify risk for school problems and developmental and behavioural disabilities in children from birth to the age of eight years (Glascoe, 1998). Described as a highly accurate and valid tool (PEDStest, 2012), the PEDS elicits parental concerns that are categorised into one of five developmental paths. Path A comprises children whose parents reported two or more significant concerns about development. Fifty-two per cent of children in Path A meet criteria for special education services, and these children are at 20 times the risk for a disability (Glascoe, 1999, 2000). The recommended action for children in Path A is referral to an appropriate specialist or practitioner for further assessment. Path B comprises children whose parents reported a single significant concern. These children have a moderate risk for delay and often show below average achievement. The recommended action for children in Path B is the administration of a second-stage developmental screen (Glascoe, 1999, 2000). Path C (the PEDS Path of interest in the present study) encompasses children whose parents have non-significant concerns that are related to emotional and behavioural problems. These children are at low risk for developmental delay, but may require additional screening for mental-health concerns. The recommended action for children in Path C is referral to parenting classes, informational handouts, or brief parent education (Glascoe, 1999, 2000). Parents in Path D expressed no concerns about their children, but the possibility exists of communication barriers between parents and the administrator of the PEDS. The recommended action for children in Path D is additional screening because their risk for developmental delay may not be captured using parent report. Path E comprises children whose parents have no communication barriers or concerns about their children's development. These children are at extremely low risk of disabilities or below-average achievement (Glascoe, 1999, 2000); the recommended action is usual surveillance.

Internal consistency reliability of the PEDS was satisfactory, Cronbach's  $\alpha = .81$  (Glascoe, 2002). Inter-rater reliability was 88% for concerns elicited by examiners and 95% for categorisation of concerns. Test-retest reliability was 88% over eight weeks. The Eyberg Child Behavior Inventory (Eyberg & Ross, 1978) Frequency subscale scores are correlated with the PEDS self-help concerns ( $r = .35$ ) and global cognitive concerns ( $r = .82$ ; Glascoe, 2002).

## Procedures

The Conjoint Health Research Ethics Board (E-ID 15763) approved the study. At eight weeks postpartum, specially trained interviewers conducted computer-assisted telephone interviews (CATI) from a population research laboratory that has extensive experience and excellent success. When the children were at the age of three years ( $\pm 7$  months), CATI was used to capture maternal concerns about child development as measured by the PEDS.

## Data analysis

### *Cluster analysis*

Cluster analysis was used to generate distinct profiles of maternal psychological characteristics at eight weeks postpartum. The clustering method is a statistical procedure that empirically groups highly similar entities by creating relatively homogeneous clusters (Aldenderfer & Blashfield, 1989). Through statistical processing, cluster analysis combines analogous characteristics to derive groups of people with similar profiles (Mackert & Walker, 2011). Clustering is based upon four assumptions: (a) each cluster contained at least one person, (b) each person belonged to only one cluster, (c) there were not more clusters than there were people, and (d) a cluster did not consist of only an outlier individual. Using SPSS 19, a hierarchical cluster analysis of scores on the PES, KSQ subscales, EPDS, and RT collected at eight weeks postpartum was conducted. A final solution containing three clusters was specified, which is within the range of the two to seven clusters found by Jacobs et al. (2012) in their systematic review of childhood adversities.

### *Associations between clusters and PEDS paths*

Pearson's  $\chi^2$  was used to test whether or not there were significant associations between the clusters of maternal psychological characteristics and the expected and actual number of children in a given PEDS Path.

## Results

The clusters yielded three distinct groups of mothers based on maternal psychological characteristics at eight weeks postpartum. See Table 2 for cluster centre z-scores and Figure 1 for a graph. Cluster 1 contained 60% ( $n = 389$ ) of the mothers and was characterised by positive psychosocial health and well-being. Mothers in Cluster 1 had appropriate perceptions about their ability to care for their child and the lowest levels of anxiety, depression, somatic symptoms, hostility, and relationship tension, while maintaining the highest levels of relaxation, contentment, physical well-being, and

Table 2. Z-scores for final cluster centres.

	PES	KSQ anxiety	KSQ relaxed	KSQ depressed	KSQ content	KSQ somatic	KSQ well-being	KSQ hostility	KSQ friendly	EPDS	RT
Cluster 1	0.345	-0.561	0.247	-0.548	0.188	-0.425	0.379	-0.518	0.131	-0.536	-0.352
Cluster 2	-0.468	0.769	-0.163	0.653	0.003	0.554	-0.480	0.726	0.007	0.681	0.464
Cluster 3	-1.634	1.581	-3.301	2.166	-4.380	1.141	-1.671	1.629	-3.79	2.216	1.034

Note: PES, Parental Expectations Survey; KSQ, Kellner Symptom Questionnaire; EPDS, Edinburgh Postnatal Depression Scale; and RT, Relationship Tension.

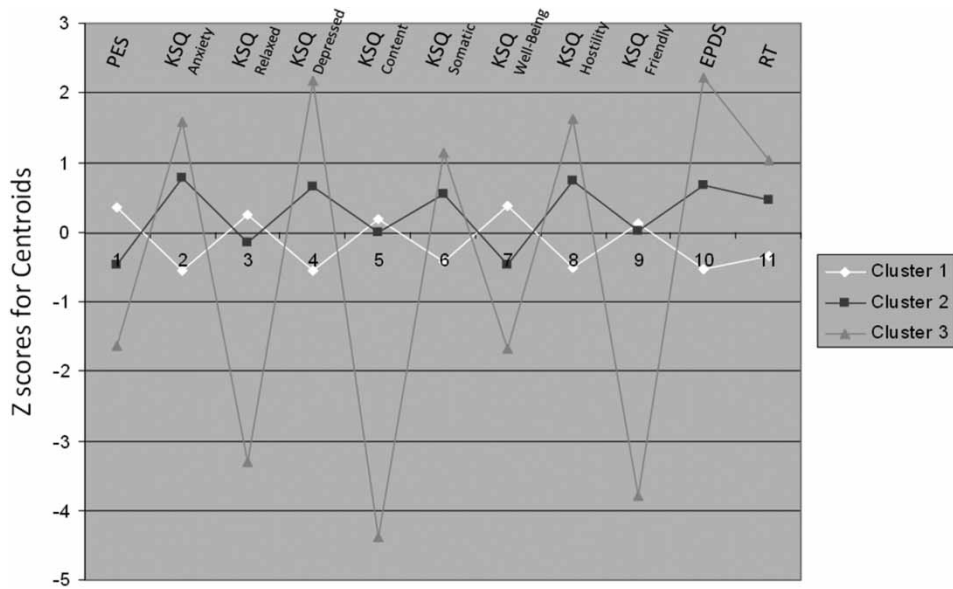


Figure 1. Illustrative representation of cluster profiles generated from the maternal characteristics.

friendliness. Mothers in Cluster 1 were characteristic of a group with limited psychological distress.

Cluster 2 contained 37% ( $n = 239$ ) of the mothers and represented a group with mild-to-moderate levels of psychological distress. Characteristics common to mothers in Cluster 2 were higher levels of anxiety, depression, somatic symptoms, hostility, and RT than mothers in Cluster 1. Also, mothers in Cluster 2 reported lower levels of relaxation, contentment, physical well-being, friendliness, and perceived ability to care for their infant than mothers in Cluster 1. Although mothers in Cluster 2 generated a profile opposite to mothers in Cluster 1, they represented a middle-range group with average, or slightly below average, scores.

Cluster 3 contained 3% ( $n = 19$ ) of mothers, and this cluster was associated with the highest psychological distress. Mothers in Cluster 3 reported the highest levels of anxiety, depression, somatic symptoms, hostility, and relationship tension. Also, these mothers reported the lowest levels of relaxation, contentment, physical well-being, and friendliness, and perceived themselves as less able to care for their infants.

Table 3. PEDS path frequencies by number of clusters.

	Number of clusters			Total
	1	2	3	
PEDS path	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)
Path A	35 (9)	30 (13)	6 (32)	71 (11)
Path B	125 (32)	69 (29)	5 (26.32)	199 (31)
Path C	85 (22)	62 (26)	2 (11)	149 (23)
Path E	144 (37)	78 (33)	6 (32)	228 (35)
Total	389	239	19	647

Note: In this study, none of the children were coded in PEDS Path D.

Table 4. Associations between PEDS paths and clusters.

	# Expected	# Actual	Pearson's $\chi^2$	<i>p</i> -Value
Path A $\times$ Cluster 1	42.7	35	3.90	0.048
Path A $\times$ Cluster 2	26.2	30	0.97	0.325
Path A $\times$ Cluster 3	2.1	6	8.51	0.004
Path C $\times$ Cluster 1	89	85	1.55	0.461
Path C $\times$ Cluster 2	54.7	62	2.13	0.344
Path C $\times$ Cluster 3	4.3	2	2.63	0.269

At the age of three years, 71 (11%) of the children were categorised in PEDS Path A with two or more significant maternal concerns about their child's development and 199 (31%) were categorised in PEDS Path B with one significant concern. Of most relevance to this study, mothers of 149 (23%) children reported concerns regarding behavioural and emotional problems (Path C). None of the children in this study were classified into PEDS Path D. For 228 (35%) children, mothers had no concerns about developmental problems, and they were classified into PEDS Path E (see Table 3).

Contrary to expectations, no association was found between mothers with high levels of psychological distress (Cluster 3) at eight weeks postpartum and maternal concerns about their child's behavioural and emotional problems (PEDS Path C) at the age of three years. Indeed, no significant associations were found between any of the maternal clusters and PEDS Path C. Instead a significant *positive* association was found between mothers with the greatest psychological distress (Cluster 3) and children with the greatest risk of developmental problems (PEDS Path A). In contrast, a significant *negative* association was found between mothers with the lowest levels of psychological distress (Cluster 1) and children with the greatest risk of developmental problems (PEDS Path A; see Table 4).

## Discussion

In this community sample, it was expected that mothers who reported higher levels of psychological distress at eight weeks postpartum would express concerns about their children's emotional and behavioural problems at the age of three years. Contrary to these expectations, mothers who reported higher levels of postpartum psychological distress expressed two or more significant concerns about their preschool child's

global development. The findings from this study were unexpected given previous research that has demonstrated a positive association of maternal psychological distress with hostile/inconsistent parenting, and subsequently child emotional and behaviour problems (Benzies et al., 2009; Brand & Brennan, 2009; Grace, Evindar, & Stewart, 2003; Shonkoff, Garner, Committee on Psychosocial Aspects of Child and Family Health, Committee on Early Childhood Adoption and Dependent Care, & Section on Developmental and Behavioral Pediatrics, 2012). Several possible explanations can be suggested for these findings. First, mothers with high levels of psychological distress may be poor interpreters of their children's behaviour and consequently under-report concerns. However, past literature indicates that mothers with high levels of psychological distress tend to over-report child behavioural problems rather than under-report, and specifically over-report externalising problems in boys and internalising problems in girls (Fergusson, Lynskey, & Horwood, 1993; Gartstein, Bridgett, Dishion, & Kaufman, 2009; Webster-Stratton & Hammond, 1988).

While emotional and behavioural concerns were lower than expected in this sample, developmental concerns were higher than expected. Another study using the PEDS reported similar findings, stating that parents over-reported perceived developmental delays when told that they were participating in a study to identify children's developmental status (Sices et al., 2008). In addition, this same study showed that parents who were given developmental information prior to completing the PEDS raised more questions about development during a physician visit than parents who did not receive this information. It is, therefore, possible that women in the current study believed that their children had more developmental problems than in reality simply due to the fact that they were being asked the questions.

Another possibility for fewer-than-expected children identified with behavioural and emotional problems by mothers with severe psychological distress is that the PEDS is insufficiently sensitive to differentiate between emotional and behavioural problems and other developmental delays. Prior research has demonstrated that parent worries are insufficient for screening and identification of social-emotional problems in children (Weitzman, Edmonds, Davagnino, & Briggs-Gowan, 2011). Glascoe (2003) reported that 26% of parents failed to report concerns when their children had mental-health problems that were detected with the Eyberg Child Behavior Inventory and the Parent Problem Checklist. When comment fields were used in conjunction with the PEDS answers, it was found that there were often mismatches between what the question was asking and the comments provided, and that there was a general lack of understanding about developmental milestones, leading to inappropriate concerns (Cox, Huntington, Saada, Epee-Bounya, & Schonwald, 2010).

It is common for young children who present with a developmental delay to have comorbid socio-emotional problems (Valtonen, Ahonen, Lyytinen, & Lyytinen, 2004). Indeed, children with developmental delays are four to five times more likely to have socio-emotional deficits than children not presenting with developmental disabilities (Merrell & Holland, 1997). Glascoe (2003) asserts that the PEDS questionnaire may produce overlap between child emotional and behavioural problems and problems in other developmental domains. For example, children in PEDS Path C have only a 7% risk of developmental problems; however, analyses failed to indicate what proportion of children in PEDS Path A actually exhibit emotional and behavioural problems (Glascoe, 2000). As such, children in this study who were identified in Path A could simultaneously belong in Path C. As noted by the PEDS website, it is preferred that Path A override Path C (PEDStest, 2012).

Administration of the PEDS via telephone has been validated on a Canadian sample using the same CATI system as in this study (Ng et al., 2010). It was found that, while not significant, the CATI interviewers classified 8.6% of the children at lower risk for delay than did the PEDS expert. Furthermore, a comparison of phone interviews to the written PEDS completed within two weeks of the phone interview yielded a difference of at least one risk level in 10.6% of children, where children in the phone interview were more likely to be coded in a lower risk level than on the written PEDS (Ng et al., 2010). It is therefore possible that the lower-than-expected number of children identified in Path C in the current study was due to the method of survey delivery.

Finally, the limited sensitivity of the PEDS questionnaire may be related to the age at testing. Although the parent-reported screen is described as being useful for children from birth to the age of eight years, Glascoe (2003) has acknowledged that its sensitivity to mental-health problems is reduced with younger children. Evidence suggests that the PEDS is most effective for parents reporting behavioural and emotional concerns in children four-and-half years of age and older (Glascoe, 2003). Given that the children in this study were on average age three years old, it is possible the PEDS does not easily distinguish between children at risk for developmental problems compared to mental-health problems in younger children.

A limitation to this study was the inability to complete an observational assessment of the children, and diagnostic measurement of emotional and behavioural problems was unavailable. Based upon the breadth of literature regarding high-risk child populations (i.e. Path C), between 17% and 30% (Qi & Kaiser, 2003; Skovgaard et al., 2007) of children would be expected to exhibit significant internalising and externalising problems. However, in this study, only 11% were classified in Path C following parent report. Given that this study was a secondary analysis of an existing dataset, theoretically important variables such as attachment and temperament could not be included in our analyses. This study was limited by differential attrition. There were significant differences in maternal age, smoking, and self-esteem between mothers who dropped out between the birth of their children and their children's age of three years and those who were retained in the study. Finally, this study did not include a measure of change in maternal psychological distress between postpartum and when the children reached three years of age. Thus, mothers may, or may not, have experienced psychological distress at the time they were reporting risk of developmental delay children.

## Conclusions

Contrary to expectations, there were no significant associations between maternal postpartum psychological distress and children who were screened and found at risk for behavioural and emotional problems on the PEDS at the age of three years. Although results from this study did not support the hypothesis, in previous studies the PEDS has been shown to be useful to initiate conversations between parents and physicians regarding child mental-health concerns (Schonwald, Huntington, Chan, Risko, & Bridgemohan, 2009). Similar to recommendations from other studies (Wake, Gerner, & Gallagher, 2005), the PEDS may be a reasonable tool for the general identification of children requiring further attention rather than identification of risk for delay in a specific developmental domain. Finally, our findings suggest that infants of mothers

experiencing postpartum psychological distress should receive additional follow-up to reduce the risk for global developmental delay.

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### Notes on contributors

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