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Intergenerational Transmission of Internalising and Externalising Behaviours Across Three Generations: Gender-Specific Pathways

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Abstract

Background—Few studies have examined gender specific pathways in the intergenerational transmission of internalizing and externalizing behaviours across three generations.

Aims—The current study considered both parental figures' internalizing and externalizing symptoms simultaneously and tested path models of the transmission of internalizing and externalizing symptoms from Generation 1 (G1) to Generation 2 (G2) and from G2 to Generation 3 (G3) by focussing on gender-specific pathways.

Methods—This study used data from the Oregon Youth Study of 206 young men and two associated studies of their intimate partners (Couples Study) and children (Three Generational Study) over 20 years.

Results—Findings indicated that, in general, mothers' internalizing behaviour showed robust influence on offspring's internalizing symptoms across three generations, regardless of gender of the child. G2 men's externalizing behaviour was further predicted by G1 mothers' internalizing as well as externalizing behaviour, albeit the latter was only marginally significant. G3 girls' internalizing and externalizing behaviour was predicted by their fathers' corresponding behaviour. Overall, fathers' influence on their sons was limited.

Conclusions—The findings shed important light on potential gender-specific mechanisms of intergenerational transmission of internalizing and externalizing behaviour.

Introduction

Studies of the intergenerational transmission of externalizing behaviour, including antisocial behaviour and conduct disorder, have been relatively consistent in finding crossgenerational associations (e.g., Capaldi *et al.*, 2003; Conger *et al.*, 2003; Thornberry *et al.*, 2003). Recent studies have indicated that parental antisocial behaviour is associated with a wide range of problem behaviours in their offspring, such as negative emotionality, high activity level, poor inhibitory control, and externalizing behaviour problems in early childhood (Capaldi, Pears, *et al.*, 2008; Jaffee *et al.*, 2006; Smith and Farrington, 2004). Albeit more limited, there is evidence from similar three-generational studies supporting intergenerational continuities in internalizing behaviour (e.g., Hammen *et al.*, 2004). Several potential mechanisms of such intergenerational transmission of psychopathology have been proposed, including genetic transmission, effects of maternal psychopathology and problem behaviours on prenatal development, maladaptive parenting behaviour (e.g., harsh and inconsistent discipline),

exposure to parent's depressive affect (Forbes *et al.*, 2004), and contextual stress (e.g., low socioeconomic status and poor neighbourhood characteristics; Connell and Goodman, 2002).

Few studies have simultaneously considered the intergenerational transmission of internalizing and externalizing behaviours, although these problems commonly co-occur (Brennan *et al.*, 2002). Furthermore, the role of gender in intergenerational transmission remains poorly understood. Studies of *internalizing* behaviour often focus only on maternal influence, whereas studies of *externalizing* behaviour typically focus on paternal influence. This approach fails to account for influences of both parents in the child's adjustment (Brennan *et al.*, 2002; Capaldi, Pears, *et al.*, 2008; Connell and Goodman, 2002). Connell and Goodman argue that ignoring the unique influence of each parent's psychopathology on their offspring is a serious omission, given that both parents contribute to the genetic and environmental context in which offspring develop, and may partially explain the relatively modest associations found in extant prospective intergenerational research. The current study examined the transmission of *both internalizing and externalizing* symptoms from Generation 1 (G1) to Generation 2 (G2) and from G2 to Generation 3 (G3) based on the parents' and offspring's gender, using over 20 years of prospective data from the Oregon Youth Study (OYS) and associated studies. According to the dynamic developmental systems (DDS) model (Capaldi, Kim and Owen, 2008; Capaldi, Pears *et al.*, 2008), both parents' risk characteristics and interpersonal interactions directly contribute to the family risk environment and therefore contribute to offspring adjustment. The DDS emphasizes the interplay among biologic systems (e.g., genetic influences), individual characteristics (e.g., psychopathology), contextual factors (e.g., neighbourhood and family resources), socialization experiences (especially within the family of origin, e.g., coercive processes), and social influence from both peers (e.g., Dishion *et al.*, 1995) and romantic partners (Capaldi, Kim and Owen, 2008) in explaining the development of risk behaviours. Therefore, the DDS model provides a comprehensive framework to explain the intergenerational transmission of psychopathology through various mechanisms, including genetic transmission, exposure to maladaptive parental interactions, and contextual stressors.

The importance of this approach has been shown in a recent work on the OYS sample. First, intimate partners' antisocial behaviour was shown to predict both the onset and persistence of men's arrests in early adulthood (Capaldi, Kim and Owen, 2008). In a second study, the men's poor and harsh discipline practices were predicted by the partners' problem behaviour (substance use and antisocial behaviour) and negative discipline practices (Capaldi, Pears, *et al.*, 2008). In addition to influences from one parent to another, interactive effects between parents have been found to affect offspring psychopathology. Kim *et al.* (2003) found that the interaction between paternal and maternal depressive symptoms was significantly associated with OYS men's depressive symptoms in early adolescence and with growth over time (Kim *et al.*). Taken together, these findings suggest that the influence of one parent's risk on psychopathology of the offspring cannot be fully understood without simultaneously considering that of the other parent.

There is little research on the relative influence of mothers and fathers, and the limited studies have not yielded consistent results (Currier *et al.*, 2006; Dierker *et al.*, 1999; D'Onofrio *et al.*, 2007). Dierker *et al.* found that maternal and paternal depression had similar effects on the offspring; similarly, Hicks *et al.* (2004) found no differences in the transmission of externalizing problems related to the gender of the parent. On the other hand, some studies have indicated higher rates of maternal than paternal transmission of internalizing behaviour such as mood disorders (Currier *et al.*; Luthar *et al.*, 1997). In their meta-analysis, Connell and Goodman (2002) concluded that maternal and paternal psychopathology had similar effects on the children's externalizing behaviour. Notably, however, maternal psychopathology was more closely related to children's internalizing problems than was paternal psychopathology, although the magnitude of this difference was relatively small. These findings, overall, do not

indicate substantial differences in the extent to which mothers' and fathers' psychopathology is transmitted to offspring.

The association between parents' and children's psychopathology may also vary as a function of children's gender. Thomas and Forehand (1991) found same-gender effects of parental depression on children's development. That is, maternal depressive symptoms were significantly related to daughters' internalizing behaviour, whereas paternal depressive symptoms were significantly related to sons' internalizing behaviour. In contrast, Ge *et al.* (1995) found that paternal depression was significantly related to daughter's depression, whereas maternal depression was predictive of sons' depression only. Recent studies have provided further evidence for gender specific mechanisms in the intergenerational transmission of problem behaviours (e.g., Sterba *et al.*, 2007; Verona and Sachs-Ericsson, 2005), although findings continue to be inconsistent and gender specific mechanisms remain unclear.

The Current Study

Building on prior findings on intergenerational continuity in externalizing behaviour across three generations (Capaldi *et al.*, 2003), we expanded the intergenerational model with separate pathways from mothers' and fathers' internalizing and externalizing behaviour. We first examined intergenerational prediction models that simultaneously consider internalizing and externalizing behaviour and cross-over effects (i.e., prediction of G2 externalizing behaviour from G1 internalizing behaviour). We then examined how such intergenerational transmission patterns would vary depending on parents' and offspring's gender.

In the current study, we examined broad internalizing and externalizing behaviour syndromes from G1 to G2, and from G2 and G3, rather than specific disorders such as conduct disorder or depression. Studies have indicated that intergenerational transmission of problem behaviours tend to be general rather than disorder-specific: parents pass 'a vulnerability to a spectrum of disorders' (Hicks *et al.*, 2004:926) to their offspring, rather than increased risk for a particular disorder. Thus, studying broad internalizing and externalizing syndromes has broader applicability to examining intergenerational associations in a community sample for young ages than would focussing on comorbidity between more specific forms of disorders. In addition, symptoms can be serious even when they do not meet diagnostic thresholds (Gotlib *et al.*, 1995), and accounting for such subthreshold conditions has been found to better account for patterns of familial transmission of psychopathology (Shankman *et al.*, 2008). In addition, G3 participated in assessments in early childhood, when specific disorders are less differentiated (Weiss and Catron, 1994).

On the basis of the DDS model of significant associations across partners for developmental risk, we hypothesized that mothers' internalizing and externalizing behaviours would be significantly related to those of fathers within each generation (G1 and G2). In addition, we hypothesized that both mothers' and fathers' internalizing and externalizing behaviours would play a significant role in intergenerational transmission of psychopathology risk. Given the paucity of research in this area and inconclusive findings as to gender specific pathways in the intergenerational transmission, *a priori* hypotheses about whether intergenerational transmission would depend on parents and offspring's gender were not developed.

Methods

Sample and Procedure

G2 men and their G1 mothers and fathers were originally recruited to the Oregon Youth Study (OYS). Data on G2 mothers of G3 children were taken from the OYS Couples Study. Data on G3 children (offspring of G2 mothers and fathers) were taken from the Three Generational

Study (3GS). The OYS is an ongoing multi-method and multi-agent longitudinal study of the G2 men, who were recruited from fourth-grade classes (aged 9–10 years) in higher crime areas of a medium-sized metropolitan region in the Pacific Northwest. Schools in areas with the highest rates of police-reported delinquent episodes by juveniles were randomly selected for recruitment to the study. Boys in all the fourth-grade classrooms in the selected schools were eligible for participation in the study. Of the 277 eligible families, 206 participated in the initial wave of data collection. The sample was representative of the geographic area: predominantly White (90%) and lower and working class (75%). At the first OYS assessment (Wave 1), the average age of the youths (G2 men) was 10.1 years and the average ages of G1 mothers and fathers were 33.7 (*SD* 4.6) and 36.2 (*SD* 6.7) years, respectively.

The young men (G2) and their parents (G1) were assessed annually. Assessments included structured interviews, questionnaires, telephone interviews, home observations, videotaped problem-solving interaction tasks, school data (e.g., teacher-report questionnaires and school-achievement test scores), and court records. Retention rates have been 94% or higher at each year over the 2 decades. There were 191 G2 men (94.1% of 203 living participants) who remained as part of the panel in the 21st year of assessment. Recruitment procedures and retention strategies are described in greater detail in Capaldi and Patterson (1987) and Capaldi *et al.* (1997). For the current study, variables for G1 were developed using data taken from the 9–10 years of age (Wave 1) and the 11–12 year of age (Wave 3) assessments, with the exception of the G1 antisocial scale from the Minnesota Multiphasic Personality Inventory (Hathaway and McKinley, 1951), which was given when G2 men were aged 10–11 years (Wave 2). In order to increase the reliability of the measures, each predictor was developed by taking a mean of the scores from the two waves. G2 men's internalizing and externalizing behaviours were measured in adolescence at ages 13–14 years (Wave 5), 15–16 years (Wave 7), and 17–18 years (Wave 9) a mean of the scores from the three waves was developed to indicate G2 men's internalizing and externalising behaviour. The analytic sample for the G1 to G2 model included a total of 204 G2 men and their biological parents (G1).

Most (85%) G2 mothers contributed data on their internalizing and externalizing behaviour during their participation as intimate partners of the G2 men in the Couples Study. The Couples Study was initiated when the G2 men were aged 17–18 years and included assessments of G2 men and their partners via interviews, questionnaires, and videotaped discussion tasks. Those G2 mothers who did not participate in the Couples Study completed assessments of internalizing and externalizing behaviour as part of their participation in 3GS.

The 3GS is a longitudinal study of the offspring of the OYS men and their mothers. All children and stepchildren of G2 men were originally recruited into the study. Participation was later limited to the first two children born to the G2 men per biological mother because of budgetary constraints. For the current study, data from assessments of G3, which occurred at ages 18–21 months and 3 years, were included. Because G3 children continue to be recruited to the study as they are born, G3 sample sizes vary by assessment year. As of April 2008, there were 326 G3 children (284 biological and 42 stepchildren) associated with 144 G2 fathers, including 48 children who did not participate in the 3GS because they could not be located or refused participation. In addition, 32 children were either too old or too young to be assessed at the time of assessment. Therefore, the analytic sample for the G2 to G3 model included a total of 122 G2 men, their partners (G2 mothers), and 230 biological G3 offspring (46.1% boys). Forty-four G2 men had a single participating child, 54 had 2 children, 19 had 3 children, 4 had 4 children, and 1 had 5 children. The mean age for G2 men, at ages 18–21 months of the 3GS, was 26.5 (*SD* 3.5). The 230 G3 offspring represented 150 biological G2 mothers, whose mean age at the first assessment of 3GS was 25.4 (*SD* = 4.0). The 3GS assessments included G2 mother and father interviews, standardized and internally developed questionnaires, and ratings

of structured parent-child interaction tasks. For more information on 3GS recruitment and procedures and assessments, see Capaldi, Pears, *et al.* (2008) and Capaldi *et al.* (2003).

Measures

Following the guidelines by Patterson and Bank (1986), indicators from multiple agents and methods were used to create measures for each theoretical construct. Few measures in this study were single scales. Two criteria were used as guidelines when building constructs: First, items included in the scale should show acceptable internal consistency (i.e., a Chronbach's α of .60 or higher and an item-total correlation of 0.20, $p < 0.05$), and, second, a scale should converge with other indicators designed to assess the same construct (i.e., the factor loading for a one-factor solution should be .30 or higher). To form the constructs described below, scales were created from instruments that contained relevant items. Scales that met the reliability criteria described above were standardized and then aggregated by computing the mean to form the construct score.

G1 mothers' and fathers' internalizing behaviours—The construct for G1 fathers' and mothers' internalizing behaviours included indicators from self-reports on the Center for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977) and the Caprara Irritability Scale (Caprara *et al.*, 1985), assessed when G2 men were aged 9–10 and 11–12 years. Correlations between the two indicators for G1 mothers and fathers ranged from 0.51 to 0.69 (all $p < 0.001$). The Cronbach α for the final construct was 0.71 for fathers and 0.76 for mothers.

G1 mothers' and fathers' externalizing behaviours—The construct for G1 father's and mother's externalizing behaviour was composed of three indicators measured when G2 men were aged 9–10 and 11–12 years, including self-report, official arrest records, and observers' impression ratings ($\alpha = 0.59$ and 0.55 for fathers and mothers, respectively).

G2 fathers' internalizing behaviour—The construct for G2 fathers' internalizing behaviour consisted of two indicators, including self-reports on either the Child Depression Rating Scale (Birleson, 1981) at age 13–14 years or the CES-D (Radloff, 1977) at ages 15–16 and 17–18 years, and parent-reports on the Child Behaviour Checklist measured at OYS ages 13–14 years' through ages 17–18 years' assessments. The Cronbach α for the construct was 0.74.

G2 fathers' externalizing behaviour—The construct was comprised of three indicators, including self-reports on the Elliott Behaviour Checklist (Elliott *et al.*, 1983) assessing delinquent behaviours and both parents' reports on the Child Behaviour Checklist (Achenbach and Edelbrock, 1983) that were assessed at the ages of 13–14, 15–16, and 17–18 years. In addition, for the G1 and G2 model, cumulative official arrest records of G2 men that were measured at ages 17–18 years were added to the construct to make G1 and G2 constructs comparable. The Cronbach α for the construct score was 0.79 for both versions.

G2 mothers' internalizing behaviour—Most of the G2 mothers completed at least one wave of the Couples Study ($N = 130$) and only 16 mothers' data were taken from age 18–21 months or age 3 years of the 3GS assessment (4 mothers lacked data from either source). The internalizing construct was comprised of self-reports on the CES-D (Radloff, 1977) and partner reports on the Young Adult Behaviour Checklist (YABC; Achenbach, 1993). The two indicators were significantly correlated at Pearson's $r = 0.33$ ($p < 0.001$).

G2 mothers' externalizing behaviour—As with the G2 mothers' internalizing behaviour, externalizing behaviour was measured with self-reports on the Elliot Behaviour Checklist and

partner reports on the YABC (Achenbach, 1993). The two indicators were correlated at Pearson's $r = 0.19$ ($p < 0.01$).

G3 internalizing problems—The term “internalizing problems” was used to represent shyness, fear, sadness and associated behavioural tendencies. This construct was based on the parent-reported Toddler Behaviour Assessment Questionnaire (TBAQ; Goldsmith, 1996) administered at the 3GS age-18–21-months’ assessments and the Children’s Behaviour Questionnaire (CBQ; Rothbart, 1989) and Child Behaviour Checklist (CBCL; Achenbach, 1992) administered at the 3GS age three years’ assessment. The fear subscale from the TBAQ; the discomfort, fear, sadness, and shyness subscales from the CBQ; and the anxiety and withdrawn subscale from the CBCL were included. The mother and father reports were significantly correlated, ranging from 0.35 to 0.57 (all $p < 0.001$) and thus averaged to create the G3’s internalizing problems construct, Chronbach’s $\alpha = .69$.

G3 externalizing problems—The term “externalizing problems” was used in the current study to characterize defiance, aggression, and otherwise difficult behaviours. The construct was formed by use of the same instruments used for G3 internalizing problems, and included the activity level and anger subscales from the TBAQ; the activity level, anger, soothability, impulsivity, and inhibitory control subscale from the CBQ; and the aggressive behaviour and destructive behaviour subscale from the CBCL. Again, the mother and father reports on these three indicators were significantly correlated, Pearson’s r from 0.38 to 0.51 (all $p < 0.001$), and averaged to create the externalizing problems construct score, Chronbach’s $\alpha = 0.74$.

Analysis Plan

Because of the limited sample size, G1’s influence on G2 and G2’s influence on G3 were tested in separate models using the structural equation modelling framework. Models were estimated using the full information maximum likelihood estimator in Mplus (Version 5.1, Muthén and Muthén, 1998–2008). As data on G1 were available for the G2 men only (not for their partners), the first transmission model from G1 to G2 included only G2 men. In order to evaluate the hypotheses that G2 parents’ externalizing and internalizing behaviours would be passed down to G3 offspring in gender-specific ways, models were examined separately for G3 boys and girls. All variables (with the exception of the G3 externalizing and internalizing difficulties, which were distributed normally) were transformed to reduce the effects of skewness and outliers. Prior to model entry, all variables were standardized to have a mean of zero and variance of one; thus, the mean and variance of every variable within the model was held equal. For the model involving G2 and G3, the complex sample analysis option in Mplus (Version 5.1) was used to adjust standard errors for the non-independence of cases (i.e., multiple G3 offspring per G2 father).

Results

Associations Among the Study Variables

Correlations among the G1 parents’ and G2 men’s internalizing and externalizing behaviours are presented in Table 1. As expected, G1 mothers’ and fathers’ internalizing and externalizing behaviours, assessed when the G2 men were in late childhood (ages 9–10 and 11–12 years), were significantly and positively associated -- both within individuals, indicating co-occurrence of externalizing and internalizing behaviours, and across parents, indicating assortative partnering. Interestingly, G1 fathers’ internalizing and mothers’ externalizing behaviour were not significantly associated. In general, the patterns of associations between G1 and G2 internalizing and externalizing behaviour were similar for the father-son and the mother-son dyad. Both G1 mothers’ and fathers’ internalizing and externalizing behaviour were positively associated with G2 men’s internalizing and externalizing behaviour during

adolescence (from ages 13–14 to ages 17–18 years) -- except for the association between G1 fathers' internalizing and G2 men's externalizing behaviour, indicating intergenerational associations both within and across behavioural domains.

The associations between G2 parents' behaviours and those of G3 boys and girls were examined separately. Associations varied depending on G3 gender (Table 2). Neither G2 fathers' or mothers' externalizing or internalizing behaviours were significantly related to those of G3 boys except for the association between G2 mothers' internalizing and G3 boys' internalizing behaviour (Pearson's $r = 0.20$, $p < 0.05$). On the other hand, both G2 fathers' and mothers' internalizing behaviours were significantly associated with G3 girls' internalizing behaviours. In addition, G3 girls' externalizing behaviours were associated with G2 fathers' externalizing and G2 mothers' internalizing behaviours. It should be noted that there were no significant differences in the mean levels of externalizing and internalizing difficulties for G3 boys and girls. This implies that, even though the mean levels of difficulties were similar across gender, potential mechanisms of intergenerational transmission of problem behaviours might differ by gender during toddlerhood.

Path Model 1: G1 Parents' Influence on G2 Men

The path model to examine intergenerational transmission from G1 to G2 fitted the data very well, $X^2 = 12.75$ ($df = 10$), $p = 0.24$, $CFI = .98$, $RMSEA = 0.04$. As shown in Figure 1, G1 mothers' internalizing behaviour was significantly related to G2 men's internalizing behaviour during adolescence. G1 mother's externalizing behaviour also was predictive of G2 men's externalizing behaviour. On the other hand, G1 fathers' internalizing behavior was significantly related to G2 men's internalizing behaviour, whereas G1 fathers' externalizing behaviour was not directly related to G2 men's problem behaviour during adolescence. G2 mothers' internalizing behaviour was also predictive of G2 men's externalizing behaviour, albeit its significance was slightly marginal.

Path Model 2: G2 Parents' Influence on G3 Offspring by Gender

Both models for the G3 boys and girls fitted the data very well; Figure 2, males X^2 test = test 3.17 ($df = 10$), $p = 0.98$, $CFI = 1.00$; $RMSEA = 0.00$; female X^2 test = 3.69 ($df = 10$), $p = 0.96$; $CFI = 1.00$; $RMSEA = 0.000$. G2 fathers' internalizing behaviour had a significant association with G3's internalizing behaviours for girls but not for boys. Similarly, G2 fathers' externalizing behaviour was significantly related to G3's externalizing behaviours for girls only. Finally, G2 mothers' internalizing behaviour was significantly related to G3 boys' and girls' internalizing behaviours.

Covariance between G2 fathers' internalizing and externalizing behaviour was 0.54 (8.54) for boys and 0.48 (6.68) for girls, respectively. Covariance between G2 fathers' and mothers' internalizing behaviour was 0.28 (2.86) for boys and 0.22 (3.46) for girls, respectively. Covariance between G2 fathers' externalizing and G2 mothers' internalizing behaviour was 0.34 (3.51) for boys and 0.34 (3.81) for girls, respectively. Covariance between G2 mothers' internalizing and externalizing behaviour was 0.40 (3.31) for boys and 0.52 (7.20) for girls, respectively. Covariance between G2 fathers' and mothers' externalizing behaviour was 0.29 (2.59) for boys and 0.27 (2.52) for girls, respectively.

Discussion

The current study simultaneously examined the transmission of internalizing and externalizing symptoms across three generations, with special attention to gender specific pathways of influence. By including both parental figures' symptoms, the relative importance of each parent's influence on offspring's problem behaviours was tested. As expected, findings

indicated that externalizing and internalizing behaviours co-occurred for individuals within each of the three generations of families (mothers and fathers in both G1 and G2 and boys and girls in G3), as well as at the different developmental periods examined (early childhood, adolescence, and adulthood). Testing of intergenerational pathways from G1 to G2 and from G2 to G3 indicated that both mothers and fathers' symptoms were associated with those of the offspring. Evidence was also found for some gender differences in intergenerational effects.

Men's and women's internalizing and externalizing symptoms were positively associated, both within and between problem domains. These patterns, which were evident for both G1 and G2, are consistent with prior research (e.g., Brennan *et al.*, 2002; Merikangas, 1982) and with the theory of assortative partnering by risk characteristics. As implied in the DDS model, such associations between partners may also indicate mutual influence processes through interactions within couples (Capaldi, Kim and Owen, 2008; Maes *et al.*, 1998). Recent developmental studies have increasingly recognized the importance of assortative partnering and social influence processes between partners in the continuity of problem behaviours in adulthood (e.g., Capaldi, Kim and Owen; Caspi and Herbener, 1990; Moffitt *et al.*, 2001). In addition, offspring of two affected parents tend to be at a greater risk for the development of problems than do offspring with one or no affected parents (Dierker *et al.*, 1999). These findings suggest that the role of one parent's psychopathology in predicting behaviour problems in children cannot be fully understood without taking into account the other parent's influence. The problems of each parent may exacerbate the problems of the other, thereby causing the effects on the child of either parent's psychopathology to be greater than if only one parent were manifesting problems (Brennan *et al.* 2002).

Overall, G1 mothers' and fathers' internalizing and externalizing behaviour were significantly related to both forms of symptoms among G2 men in adolescence in bivariate correlations. Associations between G2 in adulthood and G3 in toddlerhood were more complex, however. G2 fathers' internalizing and externalizing behaviours were significantly associated with the corresponding behaviours in G3 girls, whereas this pattern was not evident with respect to G2 mothers. Specifically, G2 mothers' internalizing symptoms were linked with both internalizing and externalizing for G3 girls, whereas mothers' externalizing symptoms were not significantly related to girls' behaviour. For G3 boys, only mothers' internalizing behaviour was significantly related to their sons' increased internalizing symptoms.

The path models supported these rather complex gender-specific intergenerational associations. The G1 to G2 and G2 to G3 models both indicated that mothers' internalizing behaviours were significantly related to those of their offspring. G1 mothers' internalizing behaviour was significantly and positively related to G2 men's internalizing behaviour, and, similarly, G2 mothers' internalizing behaviour significantly predicted increased levels of internalizing symptoms for G3 boys and girls. In addition, G2 men's externalizing behaviour was predicted by G1 mothers' internalizing behaviour as well as externalizing behaviour, albeit the latter was only marginally significant. On the other hand, fathers' influence on G2 was rather limited. Overall, both parents' internalizing behaviours were predictive of G2 men's internalizing behaviours and this was replicated in the G2 to G3 girls' model.

This finding is consistent with our previous work with the OYS sample, indicating the importance of paternal depressive symptoms in transmission of depression (Kim *et al.*, 2003), so that G1 mothers' depressive symptoms were associated with those of their G2 sons only when G1 fathers' depressive symptoms were at average or high levels. This suggests that when father's symptom levels are low, they may buffer the negative effects of mothers' internalizing behaviour. Thomas *et al.* (1995) reported similar findings: fathers may play a buffering role in families with affected mothers if fathers themselves are not affected. Another interesting finding is that only mothers' internalizing behaviour showed a significant robust

transmission pattern when both parents' internalizing and externalizing behaviour were considered simultaneously. Why this may be the case is not clear. Future research needs to systematically examine specific mechanisms of parents' influence for internalizing behaviour with a focus on potential moderators (e.g., time spent together) and mediators (e.g., family processes).

The G2 to G3 model also indicated that the intergenerational transmission pattern may vary depending on the child's gender. G3 girls' internalizing and externalizing behaviour was predicted by their fathers' corresponding behaviour, but this was not true for G3 boys. In a study of intergenerational transmission of childhood conduct problems, D'Onofrio *et al.* (2007) argued that unmeasured environmental factors resulting from parental conduct disorder significantly mediated transmission for boys, whereas for girls a common genetic liability accounted for such transmission. Thus, mechanisms of intergenerational transmission and the magnitude of influence of paternal problem behaviour may vary depending on the child's gender, particularly at younger ages. This finding indicates the need to investigate further gender-specific mechanisms of intergenerational transmission of internalizing and externalizing behaviour.

Several limitations of the current study should be noted. The current focus was gender-specific pathways in the intergenerational transmission of internalizing and externalizing behaviour. Thus, mediational processes were not considered. Poor parenting skills have been consistently implicated in the continuity of problem behaviour across generations (Capaldi *et al.*, 2003; Conger *et al.*, 2003; Hops *et al.*, 2003). In the next step, we will focus on both parents' parenting behaviours and parent-child relationships in the gender-specific transmission of internalizing and externalizing behaviour. In addition, as noted above, different patterns of association in the G1 to G2 and the G2 to G3 models might also be because of the different developmental periods represented in the models, potentially limiting their comparability. However, intergenerational transmission effects were apparent at both developmental stages over periods ranging from 4 to 10 years. This indicates that cross-generational associations show some robustness to differences in developmental stage.

The findings from the current study contribute to the literature by simultaneously examining internalizing and externalizing behaviours for both mothers and fathers. Although potential mechanisms by which both parental figures influence offspring's development remain to be specified, the current findings illustrate the importance of including both parents in studies of the development of children's problem behaviours. Furthermore, the relatively common practice of combining mother and father scores may obscure the differential contributions of each parent to the pattern of intergenerational transmission. Finally, the additive and interactive effects of each parent's problem behaviours should be more closely examined because one parent may buffer or exacerbate the effects of problem behaviours in the other. Such research efforts may lead to better understanding of the etiology of internalizing and externalizing behaviours and aid in the development of targeted intervention programs.

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Figure 1.

Intergenerational transmission from G1 to G2

Note. Bold faced paths indicate significant paths ($p < .10$). Values in the parentheses indicate t -values. For simplicity, coefficients and t -values for nonsignificant paths are not presented.

Figure 2.

Intergenerational transmission from G2 to G3

Note. Bold faced paths represent significant paths. Values in bold represent estimates for girls. Values in parentheses indicate *t*-values. Covariance between G2 fathers' internalizing and externalizing behaviour was .54 (8.54) for boys and .48 (6.68) for girls. Covariance between G2 fathers' and mothers' internalizing behaviour was .28 (2.86) for boys and .22 (3.46) for girls. Covariance between G2 fathers' externalizing and G2 mothers' internalizing behaviour was .34 (3.51) for boys and .34 (3.81) for girls. Covariance between G2 mothers' internalizing and externalizing behaviour was .40 (3.31) for boys and .52 (7.20) for girls. Covariance between G2 fathers' and mothers' externalizing behaviour was .29 (2.59) for boys and .27 (2.52) for girls.

Table 1

Correlations between G1 and G2

	1	2	3	4	5
1. G1 father's internalizing behaviour					
2. G1 father's externalizing behaviour	0.24 [*]				
3. G1 mother's internalizing behaviour	0.44 ^{***}	0.25 [*]			
4. G1 mother's externalizing behaviour	0.17	0.64 ^{***}	0.29 ^{***}		
5. G2 men's internalizing behaviour	0.37 ^{***}	0.23 [*]	0.38 ^{***}	0.20 ^{**}	
6. G2 men's externalizing behaviour	0.15	0.38 ^{***}	0.27 ^{***}	.045 ^{***}	0.53 ^{***}

^{*} p < 0.05
^{**} p < 0.01
^{***} p < 0.001

G1, Generation 1; G2, Generation 2

Table 2

Correlations between G2 and G3.

	1	2	3	4	5	6
1. G2 father's internalizing behaviour		0.51***	0.25**	0.19*	0.20*	0.11
2. G2 father's externalizing behaviour	0.53***		0.36***	0.29**	0.08	0.27**
3. G2 mother's internalizing behaviour	0.27**	0.33**		0.52***	0.22*	0.19*
4. G2 mother's externalizing behaviour	0.02	0.29**	0.40***		0.04	0.15
5. G3's internalizing behaviour	0.12	0.07	0.20*	-0.07		0.34***
6. G3's externalizing behaviour	0.07	0.12	0.14	-0.01	0.52***	

Note. Values in the upper triangle represent correlations for G3 girls and values in the lower triangle represent correlations for G3 boys

* p < 0.05

** p < 0.01

*** p < 0.001

G2, Generation 2; G3, Generation 3