

Paternal Work Stress and the Mental Health of Fathers and Children: A Role for Urban and Rural Migration Patterns

Stefania Maggi
Carleton University

Aleck Ostry
University of Victoria

William Roberts
Thompson Rivers University

Amedeo D'Angiulli
Carleton University

Clyde Hertzman
The University of British Columbia

ABSTRACT

How paternal influences interact with community factors to determine adolescent mental health is currently not well understood. In the current study we present a unique analysis of how paternal work stress, mental health, ethnicity, work history, and migration patterns between rural and urban communities (or vice versa) are associated with mental health outcomes among 2,342 adolescents. Path analyses revealed that fathers' relocation was associated with less paternal work stress, and fewer mental health problems both in adolescents and their fathers. These findings contribute to our understanding of how family-level variables interplay with community characteristics to promote or hinder mental health among youth.

Keywords: adolescent, father, urban, rural, community

Stefania Maggi, Institute of Interdisciplinary Studies and Department of Psychology, Carleton University, Ottawa, Ontario; Aleck Ostry, Department of Geography, University of Victoria, Victoria, British Columbia; William Roberts, Department of Psychology, Thompson Rivers University, Kamloops, British Columbia; Amedeo D'Angiulli, Institute of Interdisciplinary Studies and Department of Neuroscience, Carleton University, Ottawa, Ontario; Clyde Hertzman, Human Early Learning Partnership, The University of British Columbia, Vancouver, British Columbia.

This research was supported in part by Michael Smith Foundation for Health Research, the Canadian Institutes for Health Research, and the Canada Research Chair program.

Correspondence concerning this article should be addressed to Stefania Maggi, Institute of Interdisciplinary Studies and Department of Psychology, 1125 Colonel By Drive, Carleton University, Ottawa, ON K1S 5B6. Email: stefania_maggi@carleton.ca

RÉSUMÉ

Nous ne comprenons pas encore très bien comment la santé mentale des adolescents et adolescentes est influencée par certains facteurs—liés à la vie de leur père et à la communauté dans laquelle ils vivent—et par les interactions entre ces facteurs. Dans cet article, nous présentons le compte rendu d'une étude que nous avons réalisée grâce à un échantillon de 2 342 adolescents et adolescentes. Nous avons analysé les façons dont les facteurs liés au père (le stress dû au travail, l'état de santé mentale, l'origine ethnique et l'expérience de travail) et le fait de déménager d'une communauté rurale à une communauté urbaine (ou l'inverse) ont une influence sur la santé mentale de ces jeunes. Nos analyses causales montrent que, quand un père fait ce genre de déménagement, il vit un degré moindre de stress dû au travail et souffre alors moins de problèmes de santé mentale, tout comme son ou ses enfants adolescents. Ces résultats nous aident à mieux comprendre comment des facteurs liés à la famille et à la communauté interagissent et influencent la santé mentale des jeunes.

Mots clés : adolescents et adolescentes, pères, milieu urbain, milieu rural, communauté

Research shows that youth and young adults often struggle with mental health problems such as depression, anxiety, and stress-related conditions. A World Health Report estimated that 10%–20% of youth worldwide experience one or more mental health disorders (World Health Organization, 2001). Several studies have also reported that youth who experience mental health disorders are at greater risk of being diagnosed with a psychiatric condition in adulthood (Campbell, 1995; Xue, Leventhal, Brooks, & Earls, 2005).

Theoretical models of human development have long acknowledged the importance of social environments in healthy child and adolescent development (Bronfenbrenner, 1992). Mental health problems in adolescents, however, have traditionally been studied in the context of individual or family-level influences (Rao & Chen, 2009). Despite recent research having demonstrated that community-level influences play important roles in contributing to or protecting against problems in adolescent mental health (Kim, 2008; Mair, Diez Roux, & Galea, 2008), studies exploring health differences in urban and rural pediatric populations are relatively scarce and often inconclusive (Lavik, 1977; Connell, Irvine, & Rodney, 1982; Blazer et al., 1985; Boyle et al., 1987; Offord et al., 1987; Ruiz, Stevens, McKnight, Godley, & Shane, 2005; Gau, Chong, Chen, & Cheng, 2005; Atav & Spencer, 2002; Jacob, Bourke, & Luloff, 1997; Webb, 1984; Mullick & Goodman, 2005).

In a recent study, Smith, Humphreys, and Wilson (2008) found that rural/urban differences disappeared once socioeconomic disadvantage, ethnicity, and lack of access to services were accounted for, suggesting that “urbanity” and “rurality” may have only an indirect impact on health. Similarly, in a study on the effect of migration patterns on child and adolescent mental health, Maggi et al. (2010) found that after controlling for paternal sociodemographic characteristics, differences between urban and rural youth were observed for some mental health conditions (e.g., acute reaction to stress, depression) but not others (e.g., non-dependent drug abuse), indicating that there may be different mechanisms that lead to specific mental health problems.

Conceivably, the urban and rural environments have enough dissimilar characteristics (e.g., social composition, local economy and resources, opportunities for job mobility, access to health and educational services) to create markedly distinct social environments for youth. Much discussion has taken place in

developmental psychopathology about the ways in which environmental stressors may be implicated in the etiology of different mental health outcomes (Cicchetti & Toth, 1991, 1997; Haggerty, Sherrod, Garmezy, & Rutter, 1994; Rutter, 1989). Furthering the study of how features of the urban and rural communities may contribute to such mechanisms will enrich our understanding of the roles played by different social environments. For example, Haggerty et al. (1994) have argued that important stressors with a potential impact on the mental health of children and youth include exposure to acute traumatic events (e.g., the death of a parent), chronic strain and adversity (e.g., living in poverty), and the accumulation of stressful life events and daily challenges (e.g., living with a parent with a mental health condition).

Other important stressors may include neighbourhood violence (Attar, Guerra, & Tolan, 1994), parental chronic illness (Kliewer, 1997; Worsham, Compas, & Ey, 1997), and poverty and economic hardship (McLoyd & Wilson, 1991). Temporary or prolonged parental unemployment may have an indirect impact on the mental health of children with an increase of parental alcohol intake, home violence, and child abuse (Garmezy, 1983). Researchers have argued that unemployment can have a detrimental effect on children when the stress associated with it affects parenting and marital relationships (e.g., Conger et al., 1992; Elder, Nguyen, & Caspi, 1985; Lempers, Clark-Lempers, & Simons, 1989). Similarly, unfavourable working conditions and work stress of both mothers and fathers have been found to have a detrimental effect on children (Han, 2008; Ostry et al., 2006a; Maggi et al., 2008; Strazdins, Shipley, Clements, O'Brien, & Broom, 2010). Given the profound effect on workers' mental health (Commission on the Social Determinants of Health, 2008), the potential impact of parental work stress on young children and adolescents can be considerable (Chalk & Phillips, 1996; Campbell, 1995; Offord et al., 1987). Also important is the broader social context in which families live that may buffer or exacerbate the negative effect of parental stress on children. This is a largely unexplored research area and one that we hope to contribute to with the present study.

Taking advantage of an existing database consisting of male workers from a specific sector (the sawmill industry) and their children, we are able to isolate the effects of family factors (e.g., paternal work stress, paternal mental health, marital status) and broader community factors (rurality/urbanity) from the confounding effects of the socioeconomic status of the participants. Because the sawmill industry conventionally employs almost exclusively males, we can only study the effects of paternal influences.

Below we present a unique analysis of how paternal psychological (work stress, mental health), employment (length of un/employment, job mobility), and demographic characteristics (ethnicity, marital status) intersect with community characteristics (e.g., rurality/urbanity) to contribute to mental health outcomes among adolescent offspring.

We focus on adolescent mental health problems because epidemiological trends indicate that the onset of many mental health disorders occurs during this time (Gau et al., 2005; Atav & Spencer, 2002; Gordon & Caltabiano, 1996; Webb, 1984; Galliher, Rostosky, & Hughes, 2004; Mullick & Goodman, 2005).

Furthermore, this study is concerned with the identification of mechanisms that are potentially responsible for the development of mental health problems in this population of young individuals. Grant et al. (2003) argue that to gather a deeper understanding of the etiological processes involved in the determination of mental health conditions, moderating and mediating processes and their impact on exposure to stressful experiences need to be explored. Therefore the models we set out to test were developed in light of the following five propositions:

(a) Stressors contribute to psychopathology; (b) moderators influence the relation between stressors and psychopathology; (c) mediators explain the relation between stressors and psychopathology; (d) there is specificity in the relations among stressors, moderators, mediators, and psychopathology; and (e) relations among stressors, moderators, and psychopathology are reciprocal and dynamic. (Grant et al., 2003, p. 452)

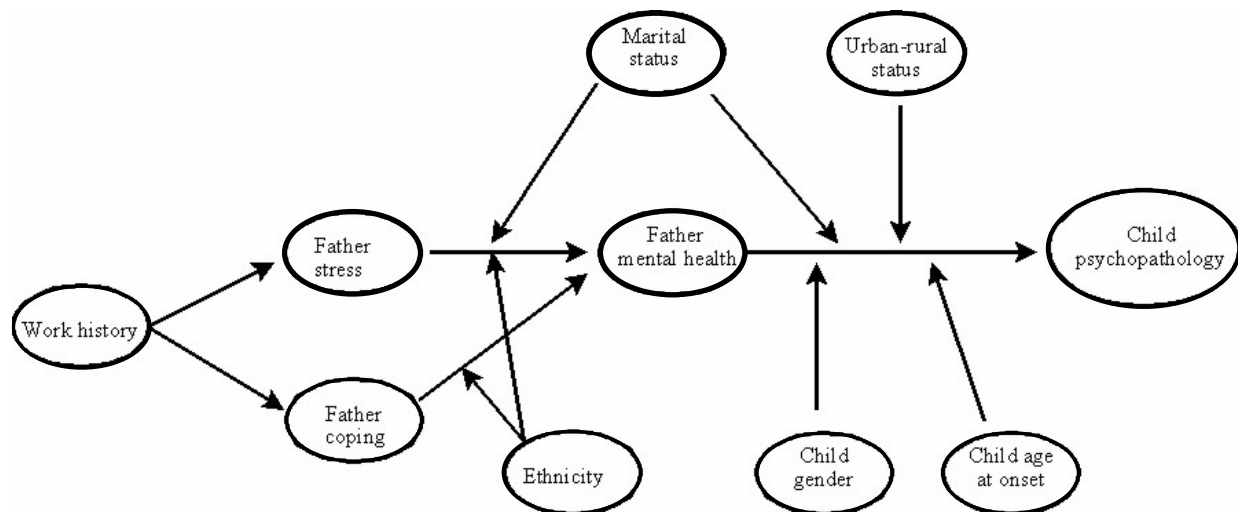
The “specificity” proposition was partially addressed in Maggi et al. (2008, 2010) in which it was found that specific aspects of paternal work stress and migration from/to rural and urban places were associated with some mental health conditions but not others. More specifically, both paternal work stress (Maggi et al., 2008) and migration patterns (Maggi et al., 2010) were more often associated with adolescent anxiety and depressive disorders (i.e., acute reaction to stress, adjustment reactions, and depression). Other adolescent mental health problems (i.e., neurotic disorders, personality disorders, alcohol dependence, and nondependent drug abuse) were unrelated to either paternal work stress (Maggi et al., 2008) or migration patterns (Maggi et al., 2010).

These findings are in contrast with a review of specificity studies (McMahon, Grant, Compas, Thurm, & Ey, 2003) that found limited evidence in support of the hypothesis that specific childhood stressors are associated with specific mental health outcomes. Rather, the review indicates that there is greater support for the hypothesis that a variety of childhood stressful experiences may lead to specific mental health outcomes (equifinality); and that specific childhood stressors may lead to a number of different health outcomes (multifinality). Here we test the hypothesis of multifinality using a stressor-outcome specific model (Garber & Hollon, 1991) while accounting for important moderating and mediating mechanisms.

Guided by the relevant literature, which also includes previous research by this team of researchers (Ostry et al., 2006a, 2006b; Maggi et al., 2008, 2010), we have identified a theoretical model that attempts to explain the relationships between stressors (i.e., paternal work stress), moderators (i.e., urban/rural environments), mediators (i.e., paternal mental health), and mental health outcomes. Furthermore, given the consistent findings in previous research indicating that ethnicity also plays an important role in the mental health outcomes of both fathers and their children (Ostry et al., 2006a, 2006b; Maggi et al., 2008, 2010; Tiwari & Wang, 2006), we explore the role of ethnicity as a moderating factor of paternal work stress (a recent review indicated that while ethnicity plays an important role in the determination of adolescent mental health, it is still unclear how it may be related to other family and community factors; Anderson & Mayes, 2010).

As indicated in Figure 1, we expect that employment history (lay-offs, job changes) will be associated with higher levels of job-related stress and lower levels of coping (job-related control and social support); that stress and coping will in turn have an impact on fathers’ mental health; and that fathers’ mental health, in turn, will influence adolescent mental health outcomes. We expect that these direct pathways will be moderated by ethnicity (with an increased risk for Caucasian children compared to Chinese and Sikh (Ostry et al., 2006a, 2006b; Maggi et al., 2008, 2010); by marital status (with the impact of stress on fathers, and of fathers’ mental illness on children, enhanced in single-parent families); and finally, by migration between urban and rural communities (and vice versa). Consistent with our previous research (Maggi et al., 2010) we also expect that the effect of paternal mental health on the children will be less for individuals migrating from urban to rural communities.

Figure 1
Proposed Theoretical Model Linking Paternal Work Stress, Paternal Mental Health,
Migration Patterns and Mental Health Outcomes among Youth



METHOD

This study reports secondary analyses conducted on data gathered from a cohort of male sawmill workers from British Columbia, Canada. Details on methods for data collection are presented in Hertzman et al. (1997), Ostry, Marion, Demers, et al. (2001), Ostry, Marion, Green, et al. (2001), and Maggi et al. (2008, 2010). A summary of the procedure for data collection is presented here as it relates to the current study.

Urbanity/Rurality

In Canada, the leading statistical agency (Statistics Canada) offers different definitions of rurality—based on population size, density, or proximity to urban centres—and recommends that researchers select the definition that best suits the specific context and purposes of their study (Du Plessis, Beshiri, & Bollman, 2001). In British Columbia, where the cohort of fathers and children was generated, there are two large metropolitan centres (Vancouver and Victoria) located in the southern part of the province, and a collection of medium to small towns with low-density population distributed across the interior, the northern part of the province, and Vancouver Island. Given this geographic reality, we opted for a definition of rurality based on population size. We classified as rural communities with fewer than 100,000 people, and as urban communities with 100,000 people or more. Because in previous research we found that whether participants had moved between rural and urban places was a predictor of certain mental health conditions, in this study we further examine the role of migration patterns rather than place of residence at time of diagnosis. Therefore, health

information records were inspected for the periods between birth and time of diagnosis to identify migration patterns among the study participants. Definitions of migration patterns were based on changes to the participants' postal codes that were associated with records of health services utilization and provided by the local health authorities. Individuals could have been born in and stayed in rural or urban communities within the province of British Columbia, or moved from rural to urban communities within British Columbia, or vice versa. The following three migration patterns have therefore been identified to describe within province migration: urban to rural (0 = no and 1 = yes); rural to rural (0 = no and 1 = yes); and rural to urban (0 = no and 1 = yes). Participants who moved away from the Province of British Columbia and for whom we did not have information about the place of destination ($n = 109$) were dropped from the analyses.

It is worth noting that the "urban to urban" migration pattern could not be included in the present study. The original cohort (i.e., the fathers) was identified among workers of sawmills located in British Columbia in the early 1980s. Urban communities in British Columbia, that is, those with a population of over 100,000 dwellings, are the cities of Vancouver, Victoria, and Kelowna. Of these, only Vancouver still has a sawmill (Kelowna's sawmill closed in the late 1980s, and Victoria never had one); therefore, the likelihood of migration for work from an urban sawmill community to another urban sawmill community was largely non-existent among our study cohort.

The Fathers' Cohort

A cohort of 28,794 sawmill workers was gathered in the mid 1990s to study the effect of chlorophenol anti-sapstain exposure. Data on paternal employment history (number of episodes of unemployment), job mobility (upward, downward, or stable), occupation (manager, tradesman, skilled worker, and unskilled worker), ethnicity, and marital status were obtained from personnel records.

Paternal Work Stress

Information on paternal work stress was obtained using survey methods investigating specific components of the demand/control model of job strain. The demand/control model postulates that job strain occurs when workers are overloaded psychologically and at the same time they have no control over their work environment. This combination of high psychological demand and low control is hypothesized to increase the risk of stress-related illnesses (Karasek & Theorell, 1990).

Exposure to job strain (i.e., work stress) can be measured in different ways. Typically, work stress is assessed from self-reports via a questionnaire, inferred from occupational titles, or externally assessed by expert job evaluators who evaluate the degree to which certain jobs are stressful on the basis of the job characteristics (Belkic, Landsbergis, Schnall, & Baker, 2004). This study used both occupational titles and job evaluators to assess work stress. Specifically, we obtained historical estimates of job control, psychological demand, physical demand, social support, and noise among the sawmill workers (i.e., the fathers) in the following ways: (a) four experienced job evaluators (two union and two management) in the British Columbia sawmill industry filled out the demand/control questionnaire to obtain a retrospective estimation for all basic job titles prior to 1975; (b) a panel of senior workers was selected in each participating mill and completed the demand/control questionnaire for basic job titles in their mill for two time periods (1975

to 1985 and 1986 to 1998). Estimates were provided for each sub-dimension of the demand/control model (i.e., control, psychological demand, physical demand, social support, and noise). Greater control and higher levels of social support can also be considered as resources for coping with stress.

Paternal Mental Health

Information on paternal mental health was obtained from the British Columbia Linked Health Database (BCLHDB), a provincial health administrative database. To be included in the BCLHDB, mental health diagnoses had to be made by a health professional (e.g., psychiatrist, clinical psychologist) in the context of public health care services (e.g., health clinic, hospital). For the purposes of this study, we considered *any* mental health diagnosis, which might have included depression, anxiety, drug and/or alcohol dependence, suicidal behaviours, psychotic disorders, and personality disorders. The BCLHDB consists of person-specific, longitudinal records on all residents of British Columbia and contains files with data on deaths, hospital discharges, and all physician encounters for the years 1985 through to 2001. Ethical approval was obtained from the University of British Columbia (UBC) and the British Columbia Ministry of Health to conduct this study. The sawmill workers' cohort was linked to the BCLHDB in order to obtain mental health diagnoses. In this study, we only considered mental health diagnoses that had been assigned to the fathers *before* the time of diagnosis of the child.

The Children's Cohort

The cohort of adult sawmill workers (i.e., fathers) was linked to the British Columbia birth file in order to identify all of the children of these workers born in British Columbia between 1952 and 2000 ($N = 37,827$ children in the cohort). Ages of the children in the cohort ranged from less than 1 year old to 49 years old in 2000. A total of 19,833 children of sawmill workers satisfied the eligibility criterion for inclusion (i.e., father had to have worked for at least a year at a study sawmill while their children were between 0 and 16 years of age). Of these, we identified 2,342 adolescents, a third of which (cases) had been assigned a mental health diagnosis between the age of 14 and 18.

Children's Outcomes

In British Columbia complete hospital discharge and physician visit records are available through the BCLHDB. These include the International Classification of Diseases, 9th Revision (ICD9) codes for each diagnosis. Permission was obtained to access the BCLHDB to identify all cases with a diagnosis related to drug or alcohol use occurring between January 1, 1991 (the first year that ICD diagnoses were obtained on physician billing records in British Columbia), and March 31, 2001.

A case was defined as an individual who had been assigned a diagnosis *after* the start of the father's employment at one of the study sawmills. Each participant was assigned a code of 1 (i.e., had been diagnosed) or 0 (i.e., had not been diagnosed) for each diagnosis. For children with more than one mental illness ($n = 141$), age at first diagnosis was used in the analyses. The following mental health diagnoses are explored in the study: ICD9 codes 308 (acute reaction to stress), 309 (adjustment reaction), and 311 (depressive disorder). We focus on these three diagnoses given our earlier findings (Maggi et al., 2010) of a link with rurality/

urbanity. Interestingly, these three diagnoses share similar symptomatology, characterized by depressive and anxious moods. Acute reaction to stress is diagnosed when anxiety, irritability, mood swings, poor concentration, and sadness are experienced in response to a traumatic event. Events such as the death of a family member, accidents, loss of a job, or family problems can cause an acute reaction to stress. The term *acute* refers to the fact that the symptoms usually appear right after exposure to the stressful event but do not last very long. Adjustment reaction, on the other hand, occurs when these symptoms persist for longer periods of time, but no more than 6 months, at which point they become part of a chronic condition. Depression is characterized by similar symptoms to those present in acute reaction to stress and adjustment reaction, but what differentiates depression from the other two conditions is that its symptoms appear in the absence of the traumatic event. Therefore, if these conditions were put on a gradient for severity, acute reaction to stress would be at the lower end of the spectrum, adjustment reaction in the middle, and depression at the upper end of the spectrum.

Each case was originally assigned three controls, matched for age and gender. After combining data sets for individual diagnoses, we discarded some control cases in order to ensure that each was used only once, and that all controls had no diagnosed mental illness of any sort. For the final sample, 1,722 cases qualified as controls, 132 children were diagnosed with acute reaction to stress, 155 were diagnosed with adjustment reaction, and 488 were diagnosed with depression. Of the 620 children with a diagnosed mental illness, over 20% ($n = 127$) had two diagnosed illnesses, and over 2% ($n = 14$) had three.

RESULTS

Descriptive Characteristics

As shown in Table 1, fathers in this male, Caucasian sample were typically married and experienced moderate levels of stress, social support, and control in the workplace. Over a fifth of the fathers had a diagnosed mental illness themselves, although alcohol abuse was relatively infrequent and suicidal behaviour was rare.

Fathers' ethnicity and urban/rural status differed across children's diagnostic groups, as shown in Table 2. Caucasian children were more likely to be found in each diagnostic group than in the comparison group, a pattern reversed for Sikh children, multivariate $F(8, 4672) = 7.19, p < .001$; for both univariate F s, $p < .001$. This consistent main effect for ethnicity will be seen in the path analyses described below. Urban/rural status also differed significantly across diagnostic groups, multivariate $F(20, 7739) = 3.18, p < .001$; for all five univariate F s, $p < .05$ or better. Comparisons with the control group suggested that there were often, but not always, benefits to rural as opposed to urban settings. Children who stayed in a rural setting were less likely than control children to be diagnosed with either acute reaction to stress or adjustment reaction, and the group that moved from an urban to a rural setting had a lower rate of depression than the control group. Consistent with this pattern, children who stayed within an urban setting were *more* likely than control children to be diagnosed with depression, and children who moved to an urban from a rural setting had a higher rate of adjustment reaction. In contrast, the group that moved within rural settings experienced a higher rate of depression than did controls, and the group that moved from an urban to a rural setting had a higher rate of acute reaction to stress than did the control group.

Table 1
Sample Characteristics

	Mean	SD	Minimum	Maximum
Child variables				
Child gender	68.4% male			
Child age at first diagnosis	16.5 years	1.2	14	18
Father's demographic				
Marital status	90.2% married			
Ethnic status				
Caucasian	78.0%			
Sikh	20.0%			
Chinese	2.0%			
Father's stress				
Psychological demands	11.5	2.1	5.5	15.3
Physical demands	3.0	0.5	1.4	4.0
Noise	3.0	0.3	1.3	4.0
Father's coping resources				
Control	21.0	2.7	14.8	28.3
Social support	5.5	0.6	3.4	8.0
Father's work history				
Years experience	10.4	5.6	1.0	17
Job mobility	0.3	0.5	0	1.0
Interruptions	1.7	1.4	0	4.0
Father's mental disorders				
Mental illness	21.2%			
Alcohol abuse	4.5%			
Suicidal behaviour	1.5%			
Father's urban–rural status				
Urban stay	18.1%			
Urban migrant	12.5%			
Rural stay	26.8%			
Rural–urban	14.6%			
Rural–rural	23.4%			

Table 2
Fathers' Ethnic and Urban/Rural Status, by Children's Diagnostic Category

Variables	Control (%)	Acute Reaction (%)	Groups		Multiple Diagnoses (%)	η^2
			Adjustment Reaction (%)	Depression (%)		
Caucasian	74.3	88.7**	91.5**	86.0***	92.2***	.021
Sikh	23.3	8.1**	6.8**	12.8***	7.8***	.023
Urban stay	17.7	17.7	15.3	23.2*	12.1	.004
Urban-rural	13.0	22.6*	16.9	7.3**	13.5	.007
Rural stay	28.0	9.7**	13.6**	25.7	27.0	.007
Rural-urban	14.8	16.1	27.1*	11.5	14.9	.004
Rural-rural	21.3	29.0	27.1	29.1**	30.5*	.007
<i>n</i>	1722	62	59	358	141	

Note. Within each variable (Caucasian, etc.), all comparisons are with the control group.

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

Testing the Model: Multiple Regression and Path Analyses Predicting Mental Illness

Data aggregation. In order to simplify model testing, variables assessing work history, work-related stress, and work-related social support and control were aggregated using factor scores from separate principal-component analyses. (A preliminary-factor analysis confirmed the empirical distinctness of the stress and social support variables. Two factors, negatively correlated, emerged, accounting for 63% of the variance in the original five measures.) Details are presented in Table 3.

Model-testing proceeded in two stages. First, the many moderating effects in Figure 1 were tested in a series of multiple regression analyses predicting fathers' and children's mental illnesses. In all cases, the expected interactions failed to reach statistical significance. However, rural/urban variables were frequently present as both direct and indirect predictors, and these were assessed in a second round of analyses, in which LVPLS path models (Lohmöller, 1984) were constructed to assess the direct and mediated relations presented in Figure 1.

While Lohmöller's approach does not generate standard errors for path coefficients (and hence tests of significance) on the grounds that this entails assumptions about the multivariate distributions that are difficult to test and unlikely to be true (Falk & Miller, 1992; Wold, 1980), we used critical values for r (alpha = .05, two-tailed) as a rough guide when considering paths to prune from our models. We now consider in turn each of these models, one for each child outcome.

Table 3
Latent Variables for Work Conditions, Work Stress, and Social Support

Latent variable	Manifest variable with factor loading
Work history (60% of original variance)	.88 years experience .79 interruptions .65 job mobility
Stress (54% of original variance)	.79 psychological demands .77 noise .64 physical demands
Social support (65% of original variance)	.81 control .81 social support

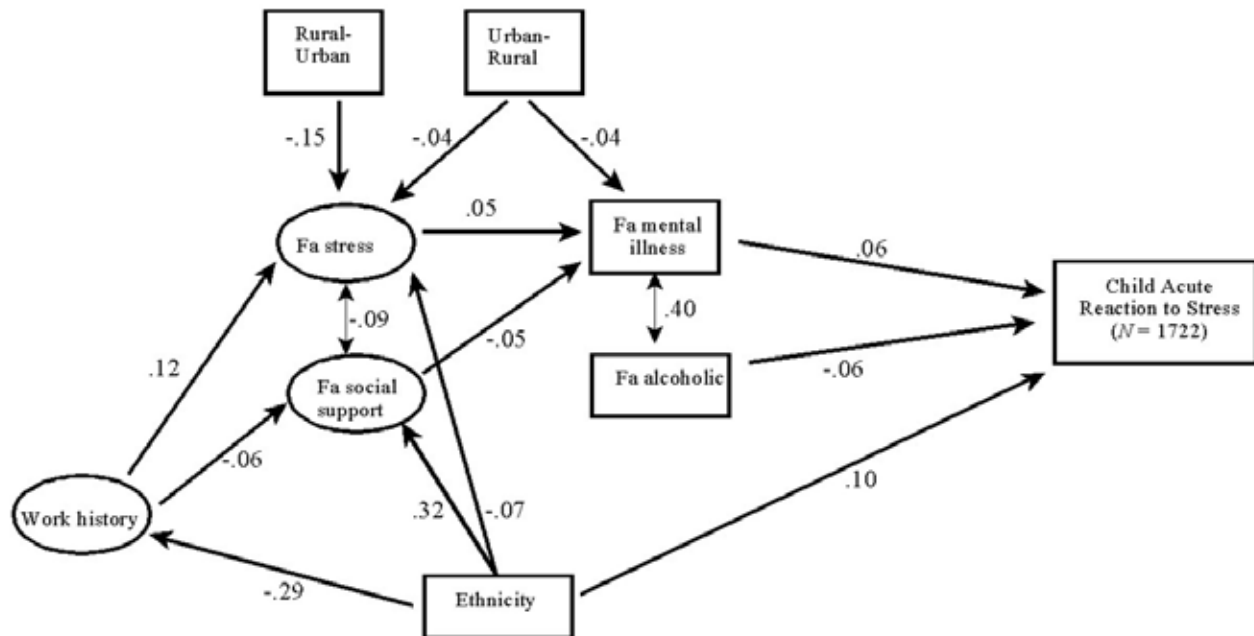
Acute reaction to stress. As shown in Figure 2 ($n = 1722$; cases = 126; Multiple $R = .11$, $p < .001$), alcohol abuse was a suppressor variable in this sample: it positively correlated with fathers' mental illness (double-headed arrows in the diagram indicate a correlation, not a path coefficient) and negatively correlated with children's disorders. It was therefore included in the present model in order to partial these effects. By making the diagnostic and comparison groups more equivalent, partialling more clearly reveals the relation between fathers' mental illness and children's acute reaction to stress. However, given its function as a statistical control and its anomalous positive relation with child disorder, predictors of alcohol abuse were not considered.

As expected, children who were diagnosed with acute reaction to stress were more likely to have fathers diagnosed with a mental illness. Fathers' mental illness, in turn, was predicted by greater job-related stress and less job-related social support and control; and these factors, in turn, were associated with a work history of interruptions and job changes.

Consistent with the group differences described earlier, path coefficients indicated ethnic differences, which were sometimes fairly substantial. Compared to Sikh and Chinese fathers, Caucasian fathers enjoyed a more favourable work history (that is, fewer job interruptions and changes) and higher levels of social support and control. They also experienced somewhat less job-related stress. In spite of these advantages, however, children of Caucasian fathers were more likely to be diagnosed with a mental disorder, perhaps for social or cultural reasons.

Independently of work history and ethnic status, geographic mobility was associated with benefits for fathers (and indirectly for their children). Specifically, stress was lower for fathers who moved from a rural to an urban community, and, to a lesser extent, for those who moved from an urban to a rural community. The latter group also experienced a lower level of mental illness.

Figure 2
Results of the Path Analysis Pertaining to Diagnosis of Acute Reaction to Stress

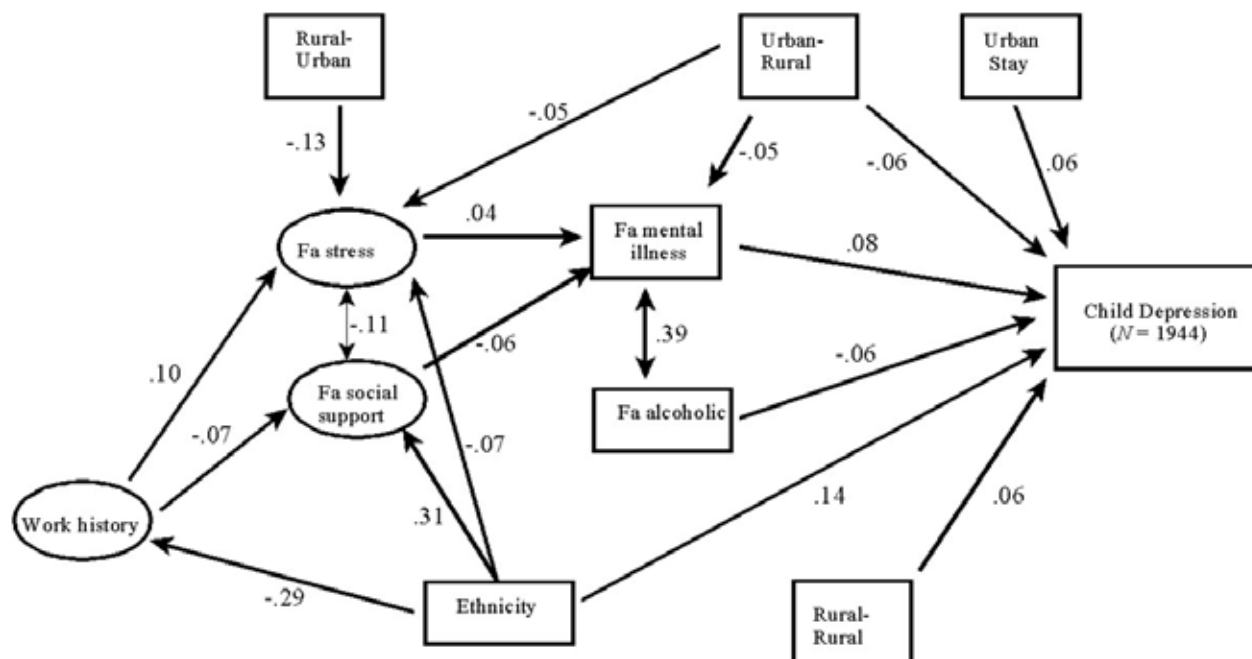


Depression. As shown in Figure 3 ($n = 1944$; cases = 433; Multiple $R = .19$, $p < .001$), many of the relations just described for acute reaction to stress were also found for children's depression. As discussed above, fathers' alcohol abuse was included in the path model as a statistical control, but was not otherwise assessed; and the same network of relations just described for fathers' mental illness also emerged in this somewhat larger group as well.

As with acute reaction to stress, children's depression was associated with fathers' lack of geographic mobility. As shown in Figure 3, fathers who were geographically stable, whether in urban or rural settings, had children who were more frequently diagnosed with depression. Similarly, fathers who moved from urban to rural communities had children who were less frequently diagnosed with depression. These effects, while significant, were not strong.

Adjustment reaction. As shown in Figure 4, a rather distinct model emerged for children's adjustment reaction ($n = 1745$; cases = 149; Multiple $R = .15$, $p < .001$). In contrast to acute reaction to stress and depression, adjustment reaction was associated with fathers' suicidal behaviour, but not with their mental illness or alcohol abuse; and fathers' social support at work showed a direct relation with child mental illness rather than the indirect relations seen in Figures 2 and 3.

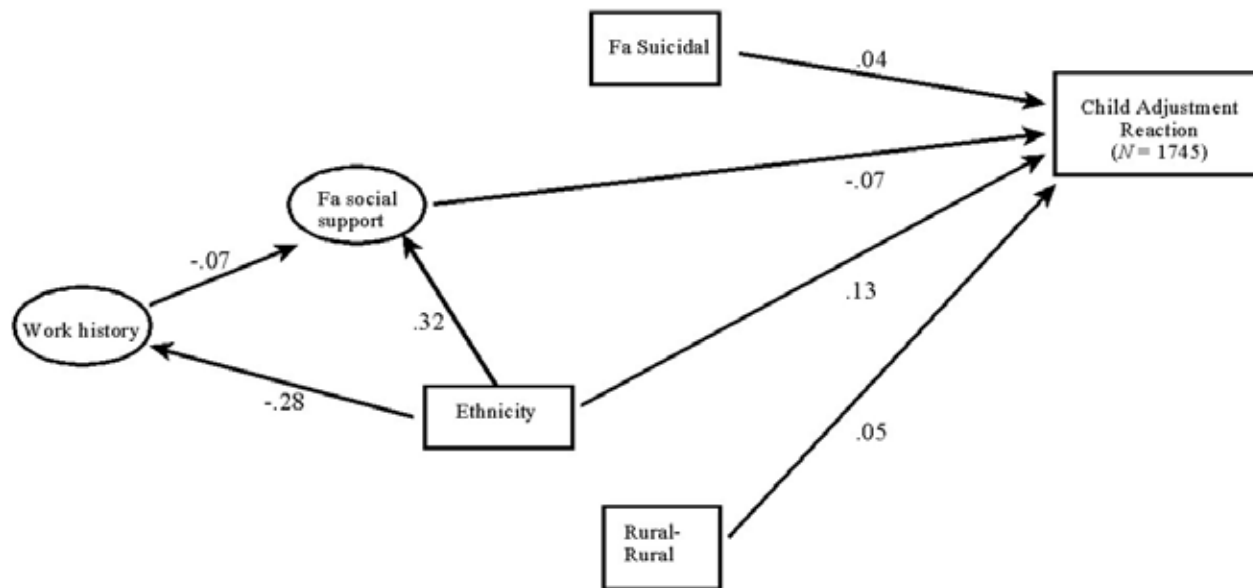
Figure 3
Results of the Path Analysis Pertaining to Diagnosis of Depression



In contrast to these differences, the model for adjustment reaction showed some similarities with the other models. As with depression and acute reaction to stress, Caucasian fathers were more likely to have a child diagnosed with adjustment reaction despite their more favourable work histories and levels of social support. Finally, migration from rural to rural was positively related to children's adjustment reaction, suggesting that to be beneficial mobility must cross urban/rural contexts.

We considered the possibility that the similarities in the first two path models might be due to children with multiple disorders who were included in both analyses; however, there were only 59 children who were diagnosed with both depression and acute reaction to stress. In contrast, the distinct model for adjustment reaction emerged despite the fact that 85 children were diagnosed with both depression and adjustment reaction, and a further 25 were diagnosed with both acute reaction to stress and adjustment reaction. Thus it seems plausible to attribute the similarities and differences in the path models to characteristics of the disorders, rather than to shared characteristics in those children who participated across analyses.

Figure 4
Results of the Path Analysis Pertaining to Diagnosis of Adjustment Reaction



DISCUSSION

The purpose of this study was to evaluate how paternal psychological (work stress, mental health) and sociodemographic characteristics (ethnicity, work history) intersect with community characteristics (rurality/urbanity) in their contribution to mental health outcomes among youth, using multifinality and specificity theories (Grant et al., 2003). We found that there is a set of core predictors accounting for the diagnoses in the three mental health conditions of interest, suggesting support for the multifinality theory. However, we also observed unique associations between some of our predictors and each of the three outcomes of interest. Therefore, we believe that the complexity of our results is better accounted for by a combination of the multifinality and the specificity frameworks, which did not appear to be mutually exclusive in our findings. Accordingly, we propose a framework of *multifinality-core with variable specificity* to guide interpretation of our results. A multifinality-core with variable specificity framework implies that while there may be some core factors that appear to increase the risk for a number of different psychopathologies with similar symptomatology (multifinality-core), there are other factors that are uniquely associated with a specific diagnosis (variable specificity), and that it is the combination of these two conditions that determines an individual's risk to develop any given mental health condition. In what follows, we discuss our findings within the multifinality-core with variable specificity framework.

Multifinality-Core

A core set of predictors was found to be associated with all three outcomes. That is, acute reaction to stress, adjustment reaction, and depression were less common among children whose fathers had a more favourable work history (e.g., longer employment, fewer layoffs), which tended to be associated with greater control and social support in the workplace and with Caucasian origin. Despite the fact that Caucasian fathers were less likely to have unfavourable work histories and experience stress in the work place, children of minority fathers were less likely to be diagnosed with either acute reaction to stress, adjustment reaction, or depression.

This core set of findings suggests that fathers' working conditions and struggles to maintain their jobs play a significant role in the development of mental health problems in their adolescent children. Of particular interest here is the role of ethnicity: In the case of the fathers, being of Caucasian origin functioned as a protective factor for unfavourable work histories and lack of control and social support in the workplace; in the case of the children, however, being of Caucasian origin functioned as a risk factor for developing mental health outcomes. These findings may be telling contrasting stories of two generations. It is possible that fathers from a visible minority group face particular challenges in a workplace where Caucasian males are the predominant group. These challenges may include discrimination and segregation, which can lead to lack of control and less perceived social support, which could in turn lead to mental health problems among the fathers, as we will discuss in the next section. On the other hand, belonging to a minority group appears to benefit the children who, given the same conditions, are less likely to develop mental health problems than their Caucasian counterparts. This finding, although not directly related, is not unlike those documented in the immigration literature in which second generation adolescents have been found to do better than non-immigrant adolescents in educational and academic achievement (Kučera, 2008). It can be argued that the close family ties typical of immigrant families provide youth with the necessary social support and emotional resources to cope more effectively with day-to-day challenges. While we cannot determine whether the ethnic minority fathers in our sample are in fact first-generation immigrants, it is not unreasonable to hypothesize a mechanism that implicates cultural differences as a protective factor for mental health among youth. Another plausible, yet contrasting, interpretation might be that fathers from ethnic minorities are less likely than Caucasian fathers to seek mental health services for their children because they may regard mental health problems to be stigmatizing.

Variable Specificity

Migration patterns were not found to be part of the core set of predictors, suggesting that their role is better described within the specificity framework. In fact, in addition to the core predictors discussed above, we found that there were important similarities between acute reaction to stress and depression (but not shared with adjustment reaction) and that there were unique patterns of prediction for each of the three mental health conditions.

For example, we found that in the case of acute reaction to stress and depression, paternal work stress was mediated by paternal mental health; however, social support was directly (but inversely) associated with adjustment reaction. This finding highlights a mechanism by which children's risk for being diagnosed

with acute reaction to stress and depression is increased when they have fathers who develop mental health problems associated with work related factors (i.e., work stress and unfavourable work history). Of interest to this study is the role that the migration patterns from rural to urban communities (or vice versa) play in this network of mediated mechanisms. The strongest effect of migration patterns that we observed was on work stress: Moving away from a rural community to join an urban community was associated with lower paternal work stress, as shown in the models for acute reaction to stress and depression. It can be speculated that this benefit may be due to the greater access to organized social networks and services that can provide support to workers in need. Smaller, yet significant, effects were observed in relation to other migration patterns, which were found to have a direct effect on the mental health of the children. More specifically, children who moved from one rural community to another rural community were more likely to be diagnosed with depression and adjustment reaction; and children who stayed in an urban centre were also more likely to be diagnosed with depression. In contrast, movement from urban to rural communities or vice-versa was associated with lower levels of depression and adjustment reaction, either directly (as in the case of depression and urban–rural moves) or indirectly, via reduced levels of paternal stress and mental illness. A possible interpretation of the latter results may be that no change or moving to a similar setting may protract youth's exposure to stressful events or stimuli associated with fathers' work conditions, which may act as specific conditions for eroding resilience and developing psychopathological responses. This might be particularly evident in this group of individuals because the fathers all work in the same industry, which has been facing significant challenges over the past few decades. Sawmills in British Columbia have downsized considerably and at times closed altogether. It is plausible to assume that when a worker is able to transfer to another sawmill that offers a markedly different environment (e.g., going from a smaller rural sawmill to a larger urban sawmill or vice versa), his working conditions improve and so does his family's well-being. On the other hand, if the worker has no prospect of change and feels trapped in a stressful profession, the consequences of his working conditions are greater than those of a move to a different community.

Another finding worthy of note because of its uniqueness is that fathers' suicide was directly related to an increased likelihood of adjustment reaction diagnosis only. This finding provides a particularly clear example of the action of specificity, since it is not possible to argue that there is a relationship between number and severity of predictors and the severity of the diagnosis. We argued earlier that depression is the most serious of the three disorders considered in this paper because it is of longer duration than adjustment reaction and acute reaction to stress, which arise in response to negative life experiences. However, paternal suicidal behaviours, arguably more traumatic and serious than mental illness in general, were not associated with depression. For this reason, it is not plausible to conceptualize the observed pathways in terms of increasingly complex multifinality.

In conclusion, with this study we have indicated: (a) that the multifinality and specificity theories are not exclusive but can coexist; (b) that youth mental health outcomes can be predicted by both family- and community-level factors; and (c) that the role of rurality and urbanity is specific to the mental health condition and has both a direct and mediated effect through paternal working conditions.

This study highlights two critical but often understudied aspects of adolescent mental health: the role of the well-being of the father and the context in which that role plays out. In particular, our findings suggest that stereotypes concerning urban and rural communities—traffic-congested metropolis versus the rural

peaceful cottage country—are too simplistic. Stability in location, regardless of location, was associated with higher levels of psychiatric disorders in children, whereas fathers' ability or opportunity to relocate, whether from urban to rural communities or vice versa, was associated with lower levels of work-related stress, lower levels of fathers' mental illness, and lower levels of children's psychopathology. Understanding the family and social processes associated with these factors has the potential to inform us further about the nature of psychopathological disorders.

Limitations and Future Research

The present study has some limitations that are worthwhile mentioning. First, we only looked at migration at two points in time, which was determined by looking at place of birth and place of residence at time of diagnosis. It is possible that multiple moves could significantly impact on the well-being of the children. Future research may explore this further. In addition, knowing the reasons for moving and directly assessing perceived work stress from the workers before and after the moves would help test our hypothesis that (in this homogeneous group of workers) mobility (as opposed to stability) is a positive change that benefits family life and adolescent well-being.

Second, this study only takes into account the role of paternal characteristics and work stress. Understanding the role of mothers in the ecology of the family and their working conditions would be of great theoretical and applied interest.

Finally, in this study we only looked at mental health diagnoses assigned to children by health professionals. Future research may want to broaden the scope of this research to include diagnoses or test results obtained within the educational setting. These often identify behavioural and emotional problems in adolescents who may never get to be assessed by a psychiatrist or mental health professional.

REFERENCES

- Anderson E.R., & Mayes L.C. (2010). Race/ethnicity and internalizing disorders in youth: A review. *Clinical Psychology Review*, 30, 338-348.
- Atav, S., & Spencer, G.A. (2002). Health risk behaviors among adolescents attending rural, suburban and urban schools: A comparative study. *Family & Community Health*, 25, 53-64.
- Attar, B., Guerra, N., & Tolan, P. (1994). Neighborhood disadvantage, stressful life events, and adjustment in urban elementary-school children. *Journal of Clinical Child Psychology*, 23, 391-400.
- Belkic, K.L., Landsbergis, P.A., Schnall, P.L., & Baker, D. (2004). Is job strain a major source of cardiovascular disease risk? *Scandinavian Journal of Work Environment and Health*, 30(2), 85-128.
- Blazer, D., George, L.K., Landerman, R., Pennybacker, M., Melville, M.L., Woodbury, M., ... Locke, B. (1985). Psychiatric disorders: A rural-urban comparison. *Archive of General Psychiatry*, 42, 651-656.
- Boyle, M.H., Offord, D.R., Hofmann, H.G., Catlin, G.P., Byles, J.A., Cadman, D.T., ... Szatmari, P. (1987). Ontario child health study I: Methodology. *Archive of General Psychiatry*, 44, 826-831.
- Bronfenbrenner, U. (1992). Ecological systems theory. In R. Vasta (Ed.), *Six theories of child development: Revised formulations and current issues* (pp. 187-249). London, England: Jessica Kingsley.
- Campbell, S.B. (1995). Behavior problems in preschool children: A review of recent research. *Journal of Child Psychology and Psychiatry*, 36, 113-149.
- Chalk, R., & Phillips, D.A. (Eds.). (1996). *Youth development and neighborhood influences: Challenges and opportunities*. Washington, DC: National Academy Press.

- Cicchetti, D., & Toth, S.L. (1991). A developmental perspective on internalizing and externalizing disorders. In D. Cicchetti & S.L. Toth (Eds.), *Internalizing and externalizing expression of dysfunction* (pp. 1-19). New York, NY: Erlbaum.
- Cicchetti, D., & Toth, S.L. (Eds.). (1997). *Developmental perspectives on trauma: Theory, research and intervention*. Rochester, NY: Rochester University Press.
- Commission on the Social Determinants of Health. (2008). *Closing the gap in a generation: Health equity through action on the social determinants of health*. Geneva, Switzerland: World Health Organization.
- Conger, R.D., Conger, K., Elder, G., Lorenz, F., Simons, R., & Whitbeck, L. (1992). A family process model of economic hardship and adjustment of early adolescent boys. *Child Development*, 63, 526-541.
- Connell, H.M., Irvine, L., & Rodney, J. (1982). The prevalence of psychiatric disorder in rural school children. *Australian and New Zealand Journal of Psychiatry*, 16, 43-46.
- Du Plessis, V., Beshiri, R., & Bollman, R.D. (2001). Definitions of rural. *Rural and Small Town Canada Analysis Bulletin*, 3(3). Retrieved from <http://www.statcan.gc.ca/pub/21-006-x/21-006-x2001003-eng.pdf>
- Elder, G., Nguyen, T., & Caspi, A. (1985). Linking family hardship to children's lives. *Child Development*, 56, 361-375.
- Falk, R., & Miller, N. (1992). *A primer for soft modelling*. Akron, OH: University of Akron Press.
- Galliher, R.V., Rostosky, S.S., & Hughes, H.K. (2004). School belonging, self-esteem, and depressive symptoms in adolescents: An examination of sex, sexual attraction status, and urbanicity. *Journal of Youth and Adolescence*, 33, 235-245.
- Garber, J., & Hollon, S. (1991). What can specificity designs say about causality in psychopathology research? *Psychological Bulletin*, 110, 129-136.
- Garmezy, N. (1983). Stressors of childhood. In N. Garmezy & M. Rutter (Eds.), *Stress, Coping, & Development in Children* (pp. 43-84). New York, NY: McGraw-Hill.
- Gau, S., Chong, M.Y., Chen, T.H., & Cheng, A.T.A. (2005). A 3-year panel study of mental disorders among adolescents in Taiwan. *American Journal of Psychiatry*, 162, 1344-1350.
- Gordon, W.R., & Caltabiano, M.L. (1996). Urban-rural differences in adolescent self-esteem, leisure boredom, and sensation-seeking as predictors of leisure-time usage and satisfaction. *Adolescence*, 31, 883-901.
- Grant, K.E., Compas, B.E., Stuhlmacher, A.L., Thurm, S.D., McMahon, S.D., & Halpert, J.A. (2003). Stressors and child and adolescent psychopathology: Moving from markers to mechanisms of risk. *Psychological Bulletin*, 129, 447-466.
- Haggerty, R.J., Sherrod, L.R., Garmezy, N., & Rutter, M. (Eds.). (1994). *Stress, risk, and resilience in children and adolescents: Processes, mechanisms, and interventions*. New York, NY: Cambridge University Press.
- Han, W. (2008). Shift work and child behavioral outcomes. *Work Employment and Society*, 22(1), 67-87.
- Hertzman, C., Teschke, K., Ostry, A., Hershler, R., Dimich-Ward, H., & Kelly, S. (1997). Mortality and cancer incidence among sawmill workers exposed to chlorophenolate wood preservatives. *American Journal of Public Health*, 87(1), 71-79.
- Jacob, S., Bourke, L., & Luloff, A.E. (1997). Rural community stress, distress, and well-being in Pennsylvania. *Journal of Rural Studies*, 13, 275-288.
- Karasek, R., & Theorell, T. (1990). *Healthy work: Stress, productivity, and the reconstruction of working life*. New York, NY: Basic Books.
- Kim, D. (2008). Blues from the neighborhood? Neighborhood characteristics and depression. *Epidemiologic Reviews*, 30, 101-117.
- Kliwer, W. (1997). Children's coping with chronic illness. In S. Wolchik & I.N. Sandler (Eds.), *Handbook of children's coping: Linking theory and intervention* (pp. 275-300). New York, NY: Plenum Press.
- Kučera, M. (2008). *The educational attainment of second generation immigrants in Canada: Analysis based on the General Social Survey*. (Cat. No.: 978-1-100-10553-6). Gatineau, QC: Human Resources and Social Development Canada.
- Lavik, N. (1977). Urban-rural differences in rates of disorder. In P.J. Graham (Ed.), *Epidemiological approaches in child psychiatry* (pp. 223-251). London, England: Academic Press.
- Lempers, J., Clark-Lempers, D., & Simons, R. (1989). Economic hardship, parenting, and distress in adolescence. *Child Development*, 60(1), 25-39.

- Lohmöller, J.-B. (1984). *LVPLS 1.6 program manual: Latent variables path analysis with partial least-squares estimation*. Berlin, Germany: Zentralarchiv.
- Maggi, S., Ostry, A., Callaghan, K., Hershler, R., Chen, L., D'Angiulli, A., & Hertzman, C. (2010, May 13). Rural–urban migration patterns and mental health diagnoses of adolescents and young adults in British Columbia, Canada: A case-control study. *Child and Adolescent Psychiatry and Mental Health*, 4(13). doi: 10.1186/1753-2004-4-13
- Maggi, S., Ostry, A., Tansey, J., Dunn, J., Hershler, R., Chen, L., & Hertzman, C. (2008). The role of paternal psychosocial work condition on mental health of their children: A case-control study. *BMC Public Health*, 8, 104.
- Mair, C., Diez Roux, A.V., & Galea, S. (2008). Are neighborhood characteristics associated with depressive symptoms? A review of the evidence. *Journal of Epidemiology and Community Health*, 62, 940-946.
- McLoyd, V.C., & Wilson, L. (1991). The strain of living poor: Parenting, social support, and child mental health. In A.C. Huston (Ed.), *Children in poverty: Child development and public policy* (pp. 105-135). New York, NY: Cambridge University Press.
- McMahon, S.D., Grant, K.E., Compas, B.E., Thurm, A.E., & Ey, S. (2003). Stress and psychopathology in children and adolescents: Is there evidence of specificity? *Journal of Child Psychology and Psychiatry*, 44(1), 107-133.
- Mullick, M.S.I., & Goodman, R. (2005). The prevalence of psychiatric disorders among 5–10 year olds in rural, urban and slum areas in Bangladesh: An exploratory study. *Social Psychiatry & Psychiatric Epidemiology*, 40, 663-671.
- Offord, D.R., Boyle, M.H., Szatmari, P., Rae-Grant, N. I., Links, P.S., Cadman, D.T., ... Woodward, C.A. (1987). Ontario child health study II: Six-month prevalence of disorder and rates of service utilization. *Archives of General Psychiatry*, 44, 832-836.
- Ostry, A., Maggi, S., Tansey, J., Dunn, J., Hershler, R., Chen, L., ... Hertzman, C. (2006a). The impact of fathers' physical and psychosocial work experience on attempted and completed suicide among their children. *BMC Public Health*, 6, 77.
- Ostry, A., Maggi, S., Tansey, J., Dunn, J., Hershler, R., Chen, L., & Hertzman, C. (2006b). The impact of psychosocial and physical work experience on mental health: A nested case control study. *Canadian Journal of Community Mental Health*, 25(2), 59-70.
- Ostry, A., Marion, S.A., Demers, P.A., Hershler, R., Kelly, S., Teschke, K. (2001). Measuring psychosocial job strain with the job content questionnaire using experienced job evaluators. *American Journal of Industrial Medicine*, 39, 397-401.
- Ostry, A., Marion, S.A., Green, L., Demers, P.A., Hershler, R., & Kelly, S. (2001). Comparison of expert-rater methods for assessing psychosocial job strain. *Scandinavian Journal of Work Environment and Health*, 27, 1-6.
- Rao, U., & Chen, L. (2009). Characteristics, correlates and outcomes of childhood and adolescent depressive disorders. *Dialogues in Clinical Neuroscience*, 11, 45-62.
- Ruiz, B.S., Stevens, S.J., McKnight, K., Godley, S.H., & Shane, P. (2005). Treatment issues and outcomes for juvenile-justice-involved youth from rural and non-rural areas. *Prison Journal*, 85, 97-121.
- Rutter, M. (1989). Pathways from childhood to adult life. *Journal of Child Psychology and Psychiatry*, 30, 23-51.
- Smith, K.B., Humphreys, J.S., & Wilson, M.G.A. (2008). Addressing the health disadvantage of rural populations: How does epidemiological evidence inform rural health policies and research? *Australian Journal of Rural Health*, 16, 56-66.
- Strazdins, L., Shipley, M., Clements, M., O'Brien, L.V., & Broom, D.H. (2010). Job quality and inequality: Parents' jobs and children's emotional and behavioral difficulties. *Social Science and Medicine*, 70, 2052-2060.
- Tiwari, S.K., & Wang, J. (2006). The epidemiology of mental and substance-use related disorders among White, Chinese, and other Asian populations in Canada. *Canadian Journal of Psychiatry*, 51(14), 904-912.
- Webb, S.D. (1984). Rural–urban differences in mental health. In H. Freeman (Ed.), *Mental Health and the Environment* (pp. 226-249). London, England: Churchill Livingstone.
- Wold, H. (1980). Model construction and evaluation when theoretical knowledge is scarce: Theory and application of partial least squares. In J. Kmenta & J. Ramsey (Eds.), *Evaluation of Econometric Models* (pp. 47-74). New York, NY: Academic Press.
- World Health Organization. (2001). *The world health report 2001: Mental health: New understanding, new hope*. Geneva, Switzerland: Author.

- Worsham, N., Compas, B., & Ey, S. (1997). Children's coping with parental illness. In S. Wolchik & I.N. Sandler (Eds.), *Handbook of children's coping: Linking theory and intervention*. (pp. 195-213). New York, NY: Plenum Press.
- Xue, Y., Leventhal, T., Brooks, G.J., & Earls, F.J. (2005). Neighborhood residence and mental health problems of 5 to 11 year olds. *Archive of General Psychiatry*, 62, 554-563.