Physical and Mental Comorbidity, Disability, and Suicidal Behavior Associated With Posttraumatic Stress Disorder in a Large Community Sample

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Objective: To assess if posttraumatic stress disorder (PTSD), recognized as a common mental disorder in the general population and veteran samples, has a unique impact on comorbidity, disability, and suicidal behavior (after adjusting for other mental disorders, especially depression). **Methods:** Data came from the Canadian Community Health Survey Cycle 1.2 (n = 36,984; age ≥15 years; response rate 77%). All respondents were asked if they had been given a diagnosis of PTSD by a healthcare professional. A select number of mental disorders were assessed by the Composite International Diagnostic Interview. Chronic physical health conditions, measures of quality of life, disability, and suicidal behavior were also assessed. **Results:** The prevalence of PTSD as diagnosed by health professionals was 1.0% (95% CI = 0.90–1.15). After adjusting for sociodemographic factors and other mental disorders, PTSD remained significantly associated with several physical health problems including cardiovascular diseases, respiratory diseases, chronic pain conditions, gastrointestinal illnesses, and cancer. After adjusting for sociodemographic factors, mental disorders, and severity of physical disorders, PTSD was associated with suicide attempts, poor quality of life, and short- and long-term disability. **Conclusions:** PTSD was uniquely associated with several physical disorders, disability, and suicidal behavior. Increased early recognition and treatment of PTSD are warranted. **Key words:** posttraumatic stress disorder, comorbidity, suicidal behavior, physical health problems, epidemiology, quality of life.

PTSD = posttraumatic stress disorder; **CCHS 1.2** = Canadian Community Health Survey cycle 1.2; **CI** = confidence interval; **WBMMS** = Psychological Well-Being Manifestation Scale.

INTRODUCTION

Posttraumatic stress disorder (PTSD) is characterized by a constellation of distressing and/or impairing symptoms that occur after experiencing, witnessing, or being confronted with a traumatic event that includes an actual or perceived threat to the self or others (1). PTSD involves repeated and intrusive memories related to the trauma (thoughts, dreams/nightmares), avoidance of situations that are reminders of the trauma, and hyperarousal (irritability, reduced concentration, exaggerated startle response) (2,3). Estimates from the general population samples across the world indicate that PTSD is a common mental disorder with a lifetime prevalence between 7% to 12% (4–7). Studies in at-risk populations—combat veterans (8,9), peacekeepers (10,11), terrorist attack survivors (12), and Aboriginal populations (13)—have demonstrated higher rates of PTSD than the general population samples (14). The majority of people with a diagnosis of PTSD have a comorbid diagnosis with another lifetime Axis I mental disorder (5).

Emerging evidence shows that PTSD is associated with high rates of medical service utilization (15,16), and is often comorbid with several physical health conditions (17–22). Previous reports suggest a positive association between PTSD and chronic pain (23,24), cancer (25–29), cardiovascular disease (30), and diabetes (31). Additionally, PTSD has been found to be associated with reduced quality of life, increased rates of distress, and suicidal behavior (32–36).

Although there is mounting evidence that PTSD is a common and disabling condition, there has been significant controversy as to whether PTSD has unique effects on disability and quality of life after adjusting for other common mental disorders (especially depression). Although PTSD is commonly comorbid with major depression (5), and a number of the symptoms that comprise the diagnosis of PTSD are also found in depression (37), some authors have argued that PTSD does not have a unique effect on disability after adjusting for the effects of depression. A small study of 70 veterans in the United Kingdom did not find a unique impact of PTSD on disability after adjusting for the effects of depression and substance use (38). However, the study was underpowered to test the stated hypothesis. Frayne et al. (39), in a large US veteran sample (>30,000 women), found lower quality of life among those with PTSD and depression, compared with depression alone. However, Frayne's study did not adjust for the effects of two important confounding factors: other common mental disorders (e.g., anxiety disorders), which are often associated with PTSD and functional impairment, and the severity of physical illness, because PTSD is commonly comorbid with several physical health problems and this comorbidity may affect functioning. To the best of our knowledge, only one study in a civilian sample has examined this issue. Marshall et al. (40) utilized the National Screening Day for Anxiety Disorders sample—individuals who presented for screening during a publicized anxiety awareness campaign—and found that PTSD was independently associated with disability even after adjusting for depression. However, the Screening Day sample may be affected by selection bias.

Across veteran and general population samples, it remains unknown whether PTSD has a unique impact on disability and poor quality of life after adjusting for the effects of other

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This study was supported by New Emerging Team Grant PTS-63186 from the Canadian Institutes of Health Research (CIHR) Institute of Neurosciences, Mental Health and Addiction; grant from the Health Sciences Centre Foundation; Establishment Grant from Manitoba Research Council (J.S.); Career Development (K24) Award (MH64122) from the National Institutes of Health (M.B.S.); CIHR Investigator Award (Dr. Asmundson); and Canada Research Chair (B.J.C.).

Received for publication April 7, 2006; revision received October 31, 2006.
DOI: 10.1097/PSY.0b013e31803146d8

0033-3174/07/6903-0242

common mental disorders and severity of physical illness. This is an important question to address for three reasons. First, from a public health perspective, this information will delineate the impact of PTSD on the community and inform policymakers as to whether it is important to recognize and treat PTSD. Second, for clinicians, the current study will address the unique associations between PTSD and several physical health problems and may highlight the importance of screening for PTSD among patients with particular physical problems. Third, the findings of the current study may provide information regarding possible biobehavioral mechanisms linking PTSD with other physical health problems.

In the current study, we examined the impact of PTSD on comorbidity, disability, and suicidality in a large general population sample of 36,984 individuals—the Canadian Community Health Survey cycle 1.2 (CCHS 1.2) (41). Similar to the study on combat veterans by Frayne et al. (39), the current study asked all respondents if they had been diagnosed with PTSD by a health professional. The CCHS 1.2 included assessment of a selected number of mental disorders, several physical problems, and measures of functioning (well-being, disability, and distress). The current study extends the literature on the impact of PTSD on functioning in specific ways. First, the current analysis uses data from a large general population mental health survey. This large sample size allows use of stringent analytic methods to examine the unique impact of PTSD on functioning. Second, the current survey includes a comprehensive assessment of short- and long-term measures of distress, well-being, disability, and suicidality. This study allows for the most detailed examination of the impact of PTSD on functioning in any sample to date. Third, the current study is the first to examine the unique impact of PTSD on functioning after adjusting for other common mental disorders as well as morbidity due to physical health problems.

METHODS

Data came from the public use files of the CCHS 1.2 (n = 36,984, age ≥15 years, response rate 77%) (41). The CCHS 1.2 was designed by Statistics Canada under the provisions set out in the federal Statistics Act. The method of selection for household interviews is detailed elsewhere (42). Our target population included persons living in private dwellings in the 10 Canadian provinces with the exclusion of those living in the three territories and First Nations communities and comprised the clientele of institutions. Using a multistage stratified cluster design ensured that the sample would be representative of the Canadian general population. Statistics Canada relied on professional interviewers who received additional training to increase sensitivity to mental health issues. All participants in the survey were informed about the nature of the questions before they were asked if they wished to consent to participate.

Measures

PTSD

PTSD was assessed in the chronic conditions section of the survey where all respondents were asked if they were currently suffering from a condition that had lasted at least 6 months and had been diagnosed by a healthcare professional. Chronic was defined as lasting for at least 6 months. In this section, the following question specifically assessed PTSD: "Do you suffer from posttraumatic stress disorder?" This methodology is consistent with previous work by Frayne et al. (39).

Chronic Physical Conditions

Several common chronic physical health conditions were assessed in the CCHS 1.2 by asking respondents if a health professional had given them a diagnosis for any of the specified physical conditions. To adjust for the effects of medical morbidity, we used the empirically validated and commonly used Charlson Comorbidity Index (43,44,45), which was developed empirically to index medical conditions that singly, or in combination, increase the short-term risk of mortality (46,47). All the chronic conditions assessed in the survey were given a Charlson Comorbidity Index score (range 1–6). A total score was computed by adding together all assigned scores for each chronic condition.

Non-PTSD Mental Disorders

A select number of mental disorders—major depression, mania, panic attacks, social phobia, agoraphobia, alcohol dependence, and drug dependence—were assessed using the World Health Organization Composite International Diagnostic Interview (48,49).

Past-Month Well-Being Measure

Psychological well-being was assessed in the CCHS 1.2 using the Psychological Well-Being Manifestation Scale (WBMMS) (50). The WBMMS produces an overall psychological well-being score based on questions assessing self-confidence, ambition, happiness, emotional balance, feeling healthy, and so forth. A dichotomous psychological well-being variable was created to indicate high versus low psychological well-being based on the median score for the WBMMS (51).

Past-Month Distress

The K10 Distress Scale (52,53) was used in the CCHS 1.2 to measure the participants' responses to 10 items that asked about nervousness, hopelessness, and so forth. A dichotomous distress variable was created to indicate high versus low distress based on the median score for the K10 Distress Scale.

Past Two-Week Disability

Two variables were used to assess past 2-week disability: one measured disability due to physical health problems and the other measured disability due to mental health problems. Each current disability variable was calculated by totaling the number of days in the past 2 weeks that the respondent was in bed for all or most of the day (due to physical or mental health problems). Because both disability variables had a skewed distribution with most respondents reporting zero days of disability, the variables were dichotomized into zero versus ≥1 days of disability.

Long-Term Disability

Respondents were asked if a long-term physical health condition, mental health condition, or health problem had reduced the amount or kind of activity a) "at home," b) "at school," c) "at work," or d) "in other activities, for example transportation or leisure." For each of the areas of reduced functioning, the respondent had the choices of a) sometimes, b) often, or c) never. Respondents endorsing "never" for all areas of functioning were categorized as "not restricted," whereas the remaining respondents were categorized as "restricted." This methodology has been used in previous work with CCHS datasets (51,54,55).

Past-Year Suicidal Behavior

Past-year suicidal ideation and suicide attempts were measured by two separate questions asking the respondents if they had a) seriously thought about committing suicide or taking their own life, and if they had b) attempted or tried to take their own life.

Sociodemographic Variables

Gender, age, marital status, education, and household income were included in the analysis. Age was categorized into 15 to 24 years, 25 to 44 years, 45 to 64 years, and ≥65 years. Marital status was trichotomized into a)

TABLE 1. Logistic Regression Analysis Determining the Relationship Between Posttraumatic Stress Disorder (PTSD) and Sociodemographic Factors

Sociodemographic Variable	No PTSD (n = 36,476) n (%)	PTSD (n = 478) n (%)	Odds Ratio (95% Confidence Interval)
Gender			
Female	19,893 (50.8)	301 (58.1)	1.00
Male	16,583 (49.2)	177 (41.9)	0.74 (0.58–0.96)*
Age			
15–24 years	5,628 (16.6)	45 (9.5)	1.00
25–44 years	12,606 (38.0)	199 (41.9)	1.93 (1.25–2.99)**
45–64 years	10,566 (30.4)	185 (39.8)	2.29 (1.47–3.57)***
≥65 years	7,676 (15.0)	49 (8.7)	1.02 (0.59–1.78)
Marital status			
Married/common law	18,982 (61.9)	187 (50.0)	1.00
Separated/widowed/divorced	7,785 (12.7)	165 (26.1)	2.54 (1.90–3.40)***
Never married	9,666 (25.5)	126 (23.9)	1.16 (0.86–1.57)
Education			
High school or more	25,799 (74.5)	347 (73.1)	1.00
Less than high school	10,447 (25.5)	131 (26.9)	1.08 (0.82–1.42)
Income			
Lower quartile	4,830 (10.1)	131 (21.8)	1.00
Lower to middle quartile	7,958 (20.9)	116 (25.0)	0.55 (0.39–0.80)**
Upper middle quartile	11,654 (35.8)	126 (35.3)	0.46 (0.33–0.64)***
High quartile	8,647 (33.2)	65 (17.9)	0.25 (0.17–0.37)***

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

married or common law, b) never married, and c) divorced, separated, or widowed. Household income was divided into lower quartile, lower middle quartile, upper middle quartile, and high quartile.

Analyses

Two estimation procedures were followed for all data analyses using this dataset. First, we employed the appropriate statistical weights provided by Statistics Canada (42) to ensure the representativeness of the data to the general population. Second, Taylor Series Linearization (42,56) was used to perform the necessary estimation of design-based standard errors required for data with a complex sampling design. This analysis was conducted using the statistical weight and stratification information within the CCHS 1.2 public use dataset and survey data analysis (SUDAAN) software (42,56).

First, the prevalence of sociodemographic variables, psychiatric disorders, chronic conditions, and disability variables were estimated among individuals with and without PTSD. Second, we used logistic regression analysis to examine the association between PTSD and sociodemographic variables (unadjusted models), psychiatric disorders (adjusted for gender, age, marital status, education, and income using Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition), chronic physical conditions (adjusted for gender, age, marital status, education, income, depression, mania, panic attacks, agoraphobia, social phobia, alcohol dependence, and drug dependence), and disability variables (adjusting for gender, age, marital status, education, income, depression, mania, panic attacks, agoraphobia, social phobia, alcohol dependence, drug dependence, and Charlson Comorbidity Index scores). We used a stringent analytic strategy where we entered each mental disorder as a separate variable.

RESULTS

The prevalence of PTSD as diagnosed by health professionals was 1.0% (95% CI = 0.90–1.15). Table 1 illustrates that several sociodemographic factors—gender, age, income level, and marital status—were associated with PTSD. Table 2 demonstrates that, after adjusting for sociodemographic factors, all mental disorders assessed in the survey were significantly associated with PTSD. The largest effects were found for major depression, social phobia, and drug dependence.

Table 3 shows the relationship between chronic physical conditions and PTSD. All physical health problems were more prevalent among respondents with PTSD compared with those without PTSD. In adjusted models controlling for the effects of sociodemographic factors and mental disorders, several

TABLE 2. Multiple Logistic Regression Analyses Determining the Relationship Between PTSD and Other Mental Disorders

Disorders (12 months)	No PTSD (n = 36,476) n (%)	PTSD (n = 478) n (%)	Adjusted Odds Ratio (95% CI)
Major depression	1763 (4.5)	174 (37.2)	10.45 (7.76–14.06)***
Mania	354 (0.9)	39 (7.2)	6.38 (3.89–10.45)***
Panic attacks	2906 (7.7)	169 (33.5)	5.40 (4.09–7.14)***
Agoraphobia	249 (0.7)	23 (4.0)	3.66 (1.68–7.98)**
Social phobia	1091 (2.8)	96 (19.9)	7.06 (4.96–10.03)***
Alcohol dependence	1023 (2.5)	25 (5.8)	2.59 (1.40–4.82)**
Drug dependence	271 (0.7)	17 (4.4)	6.37 (3.07–13.23)***

PTSD = posttraumatic stress disorder; adjusted odds ratio (95% CI) = odds ratio and 95% confidence interval (CI) adjusted for gender, age, marital status, education, and income.
* $p < .05$.
** $p < .01$.
*** $p < .001$.

TABLE 3. Multiple Logistic Regression Analyses Determining the Association Between PTSD and Chronic Physical Health Conditions

Chronic Condition	No PTSD (n = 36,476) n (%)	PTSD (n = 478) n (%)	AOR (95% CI)
Respiratory conditions			
Asthma	3258 (8.4)	94 (19.8)	1.99 (1.38–2.88)***
Chronic bronchitis, emphysema or chronic obstructive pulmonary disease	1705 (3.8)	75 (17.3)	3.08 (2.01–4.72)***
Chronic pain conditions			
Fibromyalgia	556 (1.4)	38 (7.7)	2.59 (1.50–4.47)**
Arthritis (excluding fibromyalgia)	8040 (17.3)	193 (42.6)	3.46 (2.49–4.81)***
Back problems (excluding fibromyalgia and arthritis)	8161 (20.6)	224 (46.0)	2.04 (1.51–2.74)***
Migraine headaches	3823 (10.5)	154 (33.8)	2.77 (1.99–3.85)***
Cardiovascular diseases			
Hypertension	6520 (14.7)	115 (22.8)	1.55 (1.09–2.20)*
Heart disease	2661 (5.4)	52 (9.0)	1.69 (1.08–2.65)*
Neurologic diseases			
Stroke	499 (1.0)	21 (3.3)	2.31 (0.99–5.36)
Epilepsy	244 (0.6)	9 (2.1)	1.69 (0.58–4.94)
Metabolic conditions			
Diabetes	2086 (4.8)	43 (8.1)	1.58 (0.92–2.73)
Thyroid condition	2366 (5.6)	45 (7.4)	1.06 (0.68–1.64)
Gastrointestinal diseases			
Bowel disorder (Crohn's disease or colitis)	1198 (2.7)	37 (7.2)	1.85 (1.07–3.21)*
Stomach or intestinal ulcers	1618 (4.0)	83 (15.4)	1.93 (1.22–3.07)**
Other conditions			
Chronic fatigue syndrome	392 (1.0)	72 (15.0)	5.78 (3.47–9.65)***
Cancer	836 (1.9)	25 (5.5)	2.69 (1.36–5.32)**
Multiple chemical sensitivities	884 (2.3)	49 (10.9)	3.95 (2.46–6.35)***

PTSD = posttraumatic stress disorder; chronic condition = a condition expected to last or already lasted ≥6 months, diagnosed by a health professional; AOR (95% CI) = adjusted odds ratio and 95% confidence interval-adjusted for gender, age, marital status, education, income, depression, mania, panic attacks, agoraphobia, social phobia, alcohol dependence, and drug dependence.
* $p < .05$.
** $p < .01$.
*** $p < .001$.

TABLE 4. Multiple Logistic Regression Analyses Determining the Association Between PTSD and Quality of Life, Disability, Distress, and Suicidal Behavior

Outcome Variable	No PTSD (n = 36,476) n (%)	PTSD (n = 478) n (%)	AOR (95% CI)
Current low scores on psychological well-being (RG—high scores)	17,369 (49.3)	374 (80.1)	2.11 (1.45–3.05)***
Current high scores on the K10 distress index (RG—low scores)	15,670 (43.5)	403 (83.2)	2.66 (1.78–3.95)***
One or more days of disability due to mental health problems (RG—zero days)	410 (0.9)	68 (12.8)	2.72 (1.61–4.62)***
One or more days of disability due to physical health problems (RG—zero days)	4,841 (12.3)	124 (27.8)	1.37 (0.97–1.93)
Past year suicidal ideation (RG—no suicidal ideation)	1,348 (3.5)	104 (20.1)	1.22 (0.73–2.05)
Past year suicide attempt (RG—no suicide attempt)	195 (0.5)	34 (6.5)	2.35 (1.29–4.29)**
Long term reduction of activities (RG—no reduction)	9,075 (21.5)	299 (62.7)	2.89 (2.04–4.09)***

PTSD = posttraumatic stress disorder; AOR (95% CI) = adjusted odds ratio and 95% confidence interval-adjusted for gender, age, marital status, education, income, depression, mania, panic attacks, agoraphobia, social phobia, alcohol dependence, drug dependence, and medical morbidity (Charlson Comorbidity Index); RG = reference group.
* $p < .05$.
** $p < .01$.
*** $p < .001$.

physical health problems remained associated with PTSD. These included respiratory diseases (asthma, chronic bronchitis), cardiovascular diseases (heart disease, hypertension), chronic pain conditions (arthritis, back problems, fibromyalgia, and migraine headaches), gastrointestinal illnesses (ulcers, Crohn's disease, or ulcerative colitis), cancer, chronic fatigue syndrome, and multiple chemical sensitivities.

Table 4 demonstrates that respondents with PTSD had a significantly increased likelihood of reporting short- and long-term disability, poor well-being, high distress, and suicide attempts. All of the associations, except for past-year suicidal ideation and past 2-week disability due to physical problems, remained significant in stringent regression models that included sociodemographic factors, mental disorders, and the Charlson Comorbidity Index (reflecting overall chronic physical illness burden). For the well-being and distress measures, we conducted a supplementary analysis to ensure that the dichotomization of the continuous measures did not affect the pattern of results. In multiple linear regression models with the same covariates as in the logistic regression analysis, PTSD was associated with a decrease in psychological well-being of −5.34 points (standard error (SE) = 1.17; $p < .001$). For distress, PTSD was associated with an increase in distress scores of 2.97 (SE = 0.43; $p < .001$).

CONCLUSIONS

The current study adds to a growing body of literature confirming that PTSD is an important public health problem in the general population. The most important contribution of the current study is that PTSD was found to have a unique impact on several measures of short- and long-term disability, overall well-being, and suicide attempts. To the best of our knowledge, previous studies in veteran and general population samples have not conducted such stringent analyses by adjusting for the effect of common mental disorders and medical morbidity. These findings underscore the importance of careful screening for PTSD symptoms among patients presenting with other mental disorders and physical disorders. On the other hand, individuals presenting with PTSD symptoms should also be carefully screened for comorbid disorders and suicidal behavior.

The current findings need to be considered in the context of epidemiologic studies that have repeatedly demonstrated that the majority of individuals suffering with PTSD do not seek any mental health treatment (57,58). In the subsample of individuals suffering with PTSD who seek treatment, there are long delays from the onset of PTSD symptoms to the initiation of treatment (59). Recent data from a longitudinal epidemiologic study demonstrated that approximately 50% of individuals with PTSD will develop chronic PTSD (60). Thus, early intervention strategies that target individuals either at risk for developing PTSD or early in the course of illness before the development of chronicity are required.

We also demonstrated that PTSD is commonly comorbid with several physical health problems, even after adjusting for sociodemographic factors and other common mental disorders. The current findings are consistent with previous data supporting the hypothesis that PTSD is associated with several physical health problems (20,39). Inconsistent with a recent study that found a relationship between PTSD and self-reported diagnosis of diabetes (61), we did not find an association between PTSD and diabetes. Future replication of the current findings is required.

Overall, our findings underscore the importance of screening for PTSD in general medical settings. To date, evidence from primary care samples suggests that patients suffering with anxiety disorders are often provided with inadequate treatment (62). Future research is required to determine optimal methods of providing mental health treatment for people suffering with comorbidity of mental and physical health problems.

Several mechanisms to explain the co-occurrence of PTSD with physical illness have been posited in the literature. First, direct trauma-related injury may lead to both PTSD and physical conditions (23). The association between PTSD and chronic pain has been hypothesized to be related to mutual maintenance. This model suggests that pain serves as a reminder of the trauma and that arousal, triggered by the reminder, promotes avoidance of pain-related situations (24). Second, a life-threatening illness, such as myocardial infarction or developing cancer, may precipitate PTSD symptoms related to the illness. Third, hypothalamic pituitary axis abnormalities associated with PTSD may lead to an increased vulnerability to physical conditions (3,63). Fourth, there may be an indirect relationship between PTSD and physical conditions through other Axis I mental disorders, such as major depression and substance use disorders, that are also associated with physical health problems.

Limitations of the current study need to be considered. First, the assessment of PTSD was based on self-report by asking if a healthcare professional had given the individual a diagnosis of PTSD. This methodology has been used previously (39) and has been validated. However, this methodology is likely to underestimate the prevalence of PTSD because most people in the community do not seek treatment for PTSD. The 1.0% prevalence rate is much lower than the 7% to 12% rate found in general population studies (5,64) in which PTSD was diagnosed by a structured interview. Although severity and comorbidity are positively associated with treatment seeking behavior (64), it is likely that those individuals diagnosed with PTSD are among the most severe. Thus, the associations observed here might be stronger than would be seen in an unselected PTSD sample. Future studies should use a standardized assessment of PTSD. Second, chronic physical health conditions were also assessed by self-report rather than by physician assessment. Studies comparing self-reported physical disorders with medical records have demonstrated acceptable levels of concordance between self-reported endorsement and medically recorded physical conditions for asthma, ischemic heart disease, hypertension, and diabetes (κ values between 0.55 for asthma and 0.82 for diabetes) (65,66). This method is commonly used in epidemiologic samples and has good concordance

for certain conditions and lower levels of concordance for other conditions. However, some conditions, such as tinnitus, migraine headaches, and arthritis, are more likely to be self-reported than recorded in medical records. It is unclear if this is due to underestimation of medical records or over-reporting by respondents (65,66).

In conclusion, the current study examined the prevalence and correlates of PTSD in a large population-based sample. We found that PTSD was associated with significant comorbidity with mental and physical health conditions, and had independent effects on morbidity. The current study adds to the growing body of literature suggesting that PTSD is an important public health problem. Screening and treatment programs, especially in general medical settings, should be considered.

We thank Ms. Shay-Lee Belik for her statistical and manuscript preparation work on this project. The opinions expressed in this paper do not represent the opinions of statistics Canada.

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