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Immigrant Status and Work Productivity Loss in Inflammatory Bowel Disease: A Prospective Cohort Study

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Abstract

Background:
Inflammatory bowel disease (IBD) commonly affects individuals during peak working years. Immigrants may face structural and occupational barriers that exacerbate work impairment, but the impact of immigration status on work productivity loss in IBD remains poorly defined.

Methods:
We analyzed prospectively collected data from adult patients with IBD who completed the Work Productivity and Activity Impairment questionnaire. Immigration status was the primary exposure. The primary outcome was composite work productivity loss derived from absenteeism and presenteeism. Group comparisons used chi-square and Mann–Whitney U tests. Multivariable linear regression was used to evaluate the associations between immigration status and productivity loss, adjusting for demographic, clinical, inflammatory, and psychosocial factors. Weekly productivity losses were monetized using contemporary Ontario wage estimates.

Results:
Among 244 patients with IBD, immigrants (n=82) experienced significantly greater composite work productivity loss than non-immigrants (median 36.0% vs. 15.0%, p=0.004). Immigrants reported higher absenteeism and presenteeism despite similar inflammatory markers and psychosocial scores. Immigration status remained independently associated with greater productivity loss after multivariable adjustment (β=0.433 SD, p=0.004). Among employed patients, immigrants lost more weekly work hours (17.9 vs. 8.5 hours/week), translating to an additional $345 in weekly lost productivity (> $17,000 annually).

Conclusions:
Immigrant patients with IBD experience substantially greater work productivity loss independent of disease activity and mental health burden. Immigration status represents a key social determinant of work-related disability in IBD, with significant economic implications.

Summary

Using prospectively collected patient-reported and clinical data, this study demonstrates that immigrant patients with inflammatory bowel disease have significantly greater work productivity impairment than non-immigrants, independent of disease activity and psychosocial factors, with substantial associated economic consequences.

Key Messages

- Inflammatory bowel disease is associated with substantial work productivity loss, driven largely by presenteeism and indirect economic costs.

- Immigrant patients with inflammatory bowel disease experience significantly greater work productivity impairment than non-immigrants, independent of disease activity and psychosocial burden.
- These findings highlight immigration status as an important social determinant of work-related disability in IBD, supporting the need for culturally responsive care, targeted workplace accommodations, and equity-informed clinical management.

Introduction

Inflammatory bowel disease (IBD), including Crohn's disease (CD) and ulcerative colitis (UC), is a chronic immune-mediated condition that commonly develops during prime working years. The global prevalence of IBD continues to rise, with Canada among the countries with the highest reported burden [1]. Symptoms such as abdominal pain, diarrhea, fatigue, and extraintestinal manifestations substantially negatively impact quality of life and occupational functioning [2].

Work productivity loss, encompassing both absenteeism, defined as time missed from paid work due to illness, and presenteeism, referring to reduced productivity while working because of health-related limitations, is now recognized as a major component of the overall burden of IBD [3,4]. These domains capture distinct but complementary aspects of functional impairment, reflecting the extent to which IBD disrupts sustained employment and work performance beyond what is measured by clinical disease activity alone. The Work Productivity and Activity Impairment (WPAI) questionnaire is a validated, patient-reported tool used to standardize measures of absenteeism, presenteeism and work productivity loss in chronic inflammatory conditions, like IBD [3,4].

The burden of work productivity loss in IBD is substantial and clinically meaningful. Studies demonstrate that 40 to 60 percent of employed individuals with IBD report impaired work productivity, primarily driven by presenteeism, which consistently accounts for the majority of total loss versus absenteeism [5, 6]. Patients with active disease experience higher rates of missed workdays; however, even individuals in clinical remission frequently report ongoing symptoms such as fatigue, abdominal pain, and psychological distress that impair on-the-job performance [7]. From an economic perspective, indirect costs related to productivity loss, including absenteeism, presenteeism, and work disability, account for more than half of the total societal cost of IBD, frequently surpassing direct healthcare expenditures [8, 9]. As IBD predominantly affects individuals during their peak working years, work productivity loss represents a critical patient-centered outcome with significant implications for quality of life, economic security, and health system sustainability.

Social determinants of health also strongly influence functioning and health outcomes in chronic disease, including IBD. Immigrants represent a growing demographic in Canada and internationally [10]. Evidence suggests that immigrants may experience structural barriers such as language discordance, limited workplace protections, socioeconomic precarity, and challenges navigating healthcare systems [11,12]. These factors may intersect with chronic illness to exacerbate work-related disability. Although

productivity loss and indirect costs are known to represent a substantial portion of the economic burden of IBD [13], few studies have examined whether these outcomes differ across sociocultural groups. Furthermore, presenteeism which is often the largest contributor to productivity loss remains understudied in vulnerable populations [14].

Understanding how immigration-related factors influence productivity loss is increasingly relevant amid rising inflation, persistent labour market instability, and widening socioeconomic inequalities [15]. As such, we aimed to compare WPAI-derived work productivity outcomes between immigrant and non-immigrant patients with IBD, and to quantify the monetary value of productivity loss using contemporary provincial wage data.

Methods

Study Design and Population

The study cohort included patients with a diagnosis of IBD, recruited from the Gastroenterology (GI) clinics at Toronto General Hospital (TGH) and (TWH) located in Ontario, Canada, who consented to be part of an ongoing prospective GI registry up until October 2025. Patient-reported outcome measures were collected longitudinally as part of routine clinical care within the prospective GI registry. Patients completed WPAI questionnaire and associated psychosocial instruments at the time of enrollment in the registry. For the purposes of this analysis, only data obtained at the index consultation, corresponding to the patient's initial inclusion in the registry, were analyzed. The index visit represents a standardized baseline time point at which demographic, clinical, biochemical, and patient-reported outcomes were simultaneously collected.

Exposures and Outcomes

The primary exposure was immigration status, categorized as a binary variable (immigrant vs non-immigrant) based on self-reported country of birth. Immigration status was treated as a fixed sociodemographic determinant and was used to stratify all outcome analyses.

The primary outcome was work productivity impairment attributable to IBD, assessed using registry-derived measures aligned with the validated Work Productivity and Activity Impairment Questionnaire: Specific Health Problem, Version 2.0, Clinical Practice Version (WPAI:SHP, V2.0, CPV) [3]. Specifically, the registry captured the total number of hours missed from work due to IBD in the preceding seven days and the degree to which IBD affected work productivity, reported by participants on a 0–10 numerical rating scale (0 indicating no impact of bowel symptoms on work and 10 indicating that bowel symptoms completely prevented the participant from working). These measures correspond to the WPAI domains of absenteeism and presenteeism, respectively. Absenteeism was calculated as the proportion of scheduled work hours missed due to IBD over the prior seven days, while presenteeism scores were converted to percentage impairment according to standard WPAI scoring conventions.

Overall work impairment was quantified using the WPAI composite work productivity loss score, which reflects the combined impact of absenteeism and presenteeism. The composite score was derived using the standard WPAI formula: composite work impairment = absenteeism + (1 − absenteeism) × presenteeism [16]. This approach ensures that impairment while working is appropriately weighted by the proportion of time spent at work and avoids overestimation of total productivity loss. Composite scores range from 0%, indicating no work impairment, to 100%, indicating complete work loss due to IBD [3].

Secondary outcomes included activity impairment related to non-work daily activities, as measured by the WPAI instrument, as well as work absence rates stratified by disease severity as characterized by objective laboratory markers and endoscopic findings. Additional secondary outcomes included measures of mental health burden assessed using validated questionnaires for anxiety, depression, and perceived stress, along with immigration-related characteristics such as years since immigration and country of origin.

Model covariates

To adjust for common confounders to work impairment in IBD, we adjusted for several parameters. These included markers of disease activity including the most recent inflammatory biomarkers (C-reactive protein (CRP) or fecal calprotectin (FCP), endoscopic disease activity (using the Simple Endoscopic Score for CD (SES-CD) and/or Mayo endoscopic subscore (MES)). We also captured disease phenotype using the Montreal classification system, including age at diagnosis, disease location, and behavior for patients with CD, and severity and extent for patients with UC Additional sociodemographic and psychosocial variables were also incorporated. Duration of time in Canada since immigration was recorded as a continuous variable to capture potential acculturation effects. Mental health symptoms were assessed using validated questionnaires: the Generalized Anxiety Disorder-7 (GAD-7) scale for anxiety [17], the Patient Health Questionnaire-9 (PHQ-9) for depressive symptoms [18], and the Perceived Stress Scale (PSS) for perceived stress [19]. These instruments were examined both as continuous severity scores and using standard clinical cutoff thresholds. Fatigue severity, frequently implicated in productivity loss among patients with chronic disease, was measured using the Functional Assessment of Chronic Illness Therapy–Fatigue (FACIT-F) scale [20]. All psychosocial variables were incorporated into multivariable analyses to assess whether mental health or fatigue acted as a mediating variable in the relationship between immigration status and work impairment.

Statistical analyses

All statistical analyses, including survival analyses and Kaplan-Meier methods, were conducted using R software (version 4.0.3; R Foundation for Statistical Computing, Vienna, Austria). Continuous variables were expressed as either means with standard deviations or medians with Interquartile (IQRs), and categorical variables as numbers (percentages). Group comparisons used chi-square tests for

categorical variables and Mann–Whitney U tests for non-parametric continuous variables. Within the immigrant patient group, spearman's correlations were also conducted for years since immigration and place of birth (western vs non-western country) prior to immigration to determine relationships with WPAI composite scores. Across immigrant and non-immigrant patient groups, spearman's correlations were also conducted to evaluate the relationship between the scores across various mental health questionnaires to WPAI composite scores. Multivariable linear regression with standardized (z-scored) outcomes examined adjusted associations between immigrant status and composite productivity loss, controlling for age, sex, IBD subtype, and psychosocial indices (PSS, GAD-7, PHQ-9, FACIT-F, TIPS-GI). A logit-transformed sensitivity model evaluated stability of effect estimates. For employed participants, hours lost (absenteeism) were converted into weekly monetary losses using contemporary Ontario wage estimates (CAD $36.50 per hour) for mean comparisons [15]. A two-sided p value of < 0.05 was considered statistically significant.

Ethics Approval

This study was approved by the University Health Network Research Ethics Board. All participants provided informed consent.

Results

Baseline characteristics

We included 244 patients with IBD, 82 immigrants and 162 non-immigrants. Baseline demographic and clinical characteristics were similar between groups (Table I). The mean age did not differ significantly (48.3 ± 17.9 vs 47.7 ± 15.6 years, p = 0.91). Inflammatory markers, including CRP (5.5 ± 9.7 vs 4.8 ± 14.2 mg/L, p = 0.19) and fecal calprotectin (348.4 ± 1002.4 vs 145.8 ± 332.6 µg/g, p = 0.18), were also comparable. Psychosocial measures, including stress (PSS), anxiety (GAD-7), depression (PHQ-9), ARFID score, fatigue (FACIT-F), and GI quality of life (TIPS-GI), did not differ significantly between immigrants and non-immigrants. IBD phenotypes did not differ significantly between immigrants and non-immigrants for CD or UC, except for UC severity (Table I).

Table I. Baseline characteristics of immigrant and non-immigrant patients with IBD.

Age (years, mean ± SD)	**Immigrant persons (n = 82)**	**Non-Immigrant persons (n = 162)**
	48.3 ± 17.9	**47.7 ± 15.6**
Female sex (n, %)	42 (51.2)	114 (58.2)
IBD subtype (n, %)		
Crohn's disease	35 (42.7)	111 (56.6)
Ulcerative colitis	47 (57.3)	85 (43.4)
C-reactive protein (mean ± SD)	5.5 ± 9.7	4.8 ± 14.2
Fecal calprotectin, (µg/g, mean ± SD)	348.4 ± 1002.4	145.8 ± 332.6
Ulcerative colitis phenotype (n, %)		
Proctitis	8 (16.7)	26 (31.3)
Left-sided colitis	15 (31.3)	24 (28.9)
Extensive/pan-colitis	25 (52.1)	33 (39.8)
Ulcerative colitis severity (n, %)		
Mild	27 (56.3)	69 (83.1)
Moderate	14 (29.2)	10 (12.0)
Severe	7 (14.6)	4 (4.8)
Crohn's disease, Montreal Classification (n, %)		
Age		
A1	6 (17.6)	10 (12.4)
A2	19 (55.9)	55 (69.9)
A3	9 (26.5)	14 (17.7)
Location		
L1	16 (47.1)	48 (60.2)
L2	8 (23.5)	16 (20.4)
L3	10 (29.4)	15 (19.5)
Phenotype		
B1	23 (67.6)	53 (67.3)

Age (years, mean ± SD)	**Immigrant persons (n = 82)**	**Non-Immigrant persons (n = 162)**
	48.3 ± 17.9	**47.7 ± 15.6**
B2	5 (14.7)	21 (26.5)
B2B3	1 (2.9)	2 (2.7)
B3	5 (14.7)	3 (3.5)
Stress (PSS, mean ± SD)	19.2 ± 5.6	20.6 ± 4.4
Anxiety (GAD-7, mean ± SD)	5.6 ± 5.4	6.0 ± 5.5
Depression (PHQ-9, mean ± SD)	6.2 ± 6.1	6.0 ± 5.6
ARFID score (mean ± SD)	11.8 ± 9.5	11.1 ± 9.0
Fatigue (FACIT-F, mean ± SD)	69.7 ± 20.8	72.1 ± 14.0
Trust in Physician (TIPS-GI, mean ± SD)	35.6 ± 5.2	36.0 ± 4.4

Work Productivity in immigrants and non-immigrants with IBD

Immigrants demonstrated significantly greater work productivity impairment across all WPAI domains (Table II). Absenteeism was more than threefold higher among immigrants compared with non-immigrants (10.0 (0.0–12.0) vs 0.0 (0.0–0.0), $p < 0.001$). Presenteeism was also significantly worse among immigrants (3.0 (1.0–6.0) vs 1.0 (0.0–3.0), $p = 0.003$). Composite productivity loss was similarly elevated in immigrants vs. non-immigrants with IBD (0.36 (0.08–0.60) vs 0.15 (0.00-0.39), $p = 0.014$). In multivariable linear regression adjusting for age, sex, IBD subtype, and psychosocial covariates (Table III), immigrant status ($\beta = 0.433$, 95% CI 0.137–0.729, $p = 0.004$) and younger age ($\beta = -0.175$, CI − 0.308 to − 0.042, $p = 0.01$) remained independent predictors of greater work impairment in IBD. Finally, on subgroup analysis, years since immigration (Spearman $\rho = -0.11$, $p = 0.46$) and region or origin (Western vs. non-Western (10.1 ± 15.5% vs 14.8 ± 25.2%, $p = 0.91$) did not impact overall work productive loss amongst immigrants.

Table II. Work Productivity and Activity Impairment (WPAI) outcomes in immigrant vs non-immigrant patients with IBD.

Absenteeism (median %, IQR)	Immigrant persons (n = 82)	Non-Immigrant persons (n = 162)	p
	10.0 (0.0–12.0)	**0.0 (0.0–0.0)**	**< 0.001**
Presenteeism (median score, IQR)	3.0 (1.0–6.0)	1.0 (0.0–3.0)	**0.003**
Composite productivity loss (%, IQR)	36.0 (8.0–60.0)	15.0 (0.0–40.0)	**0.014**

Table III. Multivariable linear regression examining predictors of work productivity loss (composite WPAI z-score).

Outcome	Predictor	β (estimate)	95% CI	p	R^2	n
WPAI Composite (%) z-scored	**Immigrant Status**	**0.433**	0.137 to 0.729	**0.004**	0.362	251
	Age (years)	**−0.175**	−0.308 to −0.042	**0.010**		
	Sex (Female vs Male)	0.080	−0.176 to 0.336	0.544		
	IBD Subtype (CD vs. UC)	−0.091	−0.393 to 0.211	0.556		
	PSS (total score)	0.123	−0.030 to 0.277	0.116		
	GAD-7 (total score)	0.052	−0.099 to 0.203	0.503		
	PHQ-9 (total score)	0.045	−0.113 to 0.203	0.573		
	FACIT-F (total score)	−0.087	−0.222 to 0.048	0.204		
	TIPS-GI (total score)	−0.029	−0.173 to 0.115	0.693		

Impact of mental health comorbidities on work impairment in IBD

Greater mental health burden was significantly associated with increased work productivity loss as measured by the WPAI composite score among immigrant and non-immigrant patients with IBD. Specifically, higher anxiety symptoms, assessed by the GAD-7, were strongly correlated with greater composite work impairment (Spearman ρ = 0.44, p = 0.002). Depressive symptoms, measured using the PHQ-9, were also significantly associated with increased productivity loss (ρ = 0.35, p = 0.01). Similarly,

higher perceived stress scores (PSS) demonstrated a positive correlation with WPAI composite scores (ρ = 0.30, p = 0.03). Similarly, among non-immigrant patients, higher anxiety scores (GAD-7; Spearman ρ = 0.27, p = 0.003), depressive symptoms (PHQ-9; ρ = 0.22, p = 0.012), and perceived stress (PSS; ρ = 0.27, p = 0.002) were also associated with increased WPAI composite work productivity loss, though magnitude of correlations were smaller in magnitude in the non-immigrant vs. immigrant groups (Figure I).

Economic impact of work impairment in immigrants and non-immigrants with IBD

Among employed participants, immigrants experienced significantly greater weekly work-hour loss compared with non-immigrants (17.9 ± 17.2 hours vs 8.5 ± 14.8 hours, p ≈ 0.0002). When monetized using contemporary Ontario wage estimates, this translated to mean weekly productivity losses of $654/CAD for immigrants versus $308/CAD for non-immigrants. Therefore, immigrant workers absorbed an additional $345 in productivity losses per week, corresponding to greater than $17,000 in additional annual lost earnings if observed persistently over the course of a year.

Discussion

Immigrant patients with IBD demonstrated significantly greater work impairment than non-immigrants, despite similar levels of inflammatory activity, psychosocial burden, and disease phenotypes. Immigrants reported higher absenteeism, greater presenteeism, and more than double the composite productivity loss. Cumulatively, immigrants with IBD had lost more than twice as many work hours per week as non-immigrants, translating to an additional $345 per week (or >$17,000 annually) in productivity loss. These findings extend previous work showing that IBD substantially affects occupational functioning and highlight a novel disparity driven by social-related factors rather than disease severity alone [21–23].

While mental health burden was significantly associated with work productivity loss in both immigrant and non-immigrant patients, the magnitude of these associations was consistently weaker among non-immigrants. In contrast, immigrant patients demonstrated stronger correlations between anxiety, depression, and perceived stress and WPAI composite work productivity loss, suggesting heightened functional vulnerability to psychosocial distress. Prior studies in IBD populations have similarly shown that psychological comorbidity contributes independently to work impairment but does not fully account for observed disparities in employment outcomes [24–26].

Importantly, in our multivariable linear regression analyses adjusting for mental health burden, inflammatory activity, IBD subtype, and sociodemographic factors, immigration status remained independently associated with greater work productivity loss. This finding indicates that mental health symptoms, although clinically important, explain only part of the excess work impairment observed among immigrants. Immigration status likely reflects a broader set of structural and social determinants, including employment insecurity, limited access to paid sick leave and workplace accommodations,

language barriers, financial strain, and differential access to health and mental health services, that may amplify the functional consequences of IBD [27–30]. Collectively, these findings suggest that mental health is a critical but incomplete explanatory factor and that immigration status itself represents an independent risk factor for work-related disability in IBD, underscoring the need for both clinical and system-level interventions to reduce productivity-related inequities.

The health-economic analysis further emphasizes the practical consequences of these disparities. Indirect costs are known to account for a substantial proportion of the economic burden of IBD, and our findings indicate that immigrants disproportionately absorb this burden [13]. These losses occur despite comparable clinical markers, suggesting that structural and occupational factors, rather than biological disease activity, play a central role. The combination of higher work impairment and mental health burden, and substantial financial losses points to the need for culturally responsive healthcare delivery, improved workplace accommodations, and policy interventions that address the unique vulnerabilities of immigrant workers. Given rising inflation and increasing economic pressures, these disparities may widen without targeted support [15].

While this study included a robust sample of patients and leveraged detailed clinical and psychosocial data, several limitations should be considered. First, the study was conducted within a single academic hospital network, which may limit generalizability to broader or more diverse IBD populations, including those receiving care in community settings or outside major urban centers. However, our site serves as a large catchment area that includes surrounding communities with large immigrant populations strengthening the external validity of our results. Second, participation required completion of multiple questionnaires, raising the possibility of selection bias; individuals experiencing greater disease burden, employment instability, or language barriers may have been less likely to participate, potentially underestimating true disparities. Third, detailed occupational information was not captured. Factors such as job type, physical demands, access to remote work, employment precarity, unionization, benefit structures, and availability of paid sick leave can strongly influence work-related disability yet could not be evaluated in this analysis. These unmeasured workplace-level determinants may partially explain the differential productivity losses observed between immigrant and non-immigrant patients.

Future research should incorporate granular employment data to clarify how occupational characteristics interact with IBD symptoms and immigration-related factors. Studies examining workplace accommodations, employer flexibility, and barriers to sick leave could identify modifiable structural contributors to productivity loss. Additionally, qualitative research may provide insight into lived experiences, including stigma, fear of job loss, and challenges navigating workplace communication, particularly for recent immigrants. Such work would help inform policy and workplace interventions aimed at reducing inequities in employment outcomes among individuals living with IBD.

Overall, immigrant status is a significant social determinant of work-related disability in IBD. Immigrants were more likely to miss work, more likely to experience reduced productivity while working, and more likely to face combined forms of impairment, with a possibly worse mental health burden. These

disparities translate into meaningful financial consequences and warrant urgent targeted clinical and policy reforms.

Declarations

Conflict of interests:

None

Funding Statement:

This study received no external funding.

Author Contribution

D.S. conceived and designed the study, performed analyses, and drafted the manuscript. D.C. data interpretation, and manuscript revision. S.B. contributed to patient recruitment and data collection. J.Y. provided manuscript revision. A.S. and M.C. contributed to data acquisition and manuscript review. P.T. conceived and designed the study; provided senior supervision and critical revision.

Data Availability

Existing data from a gastroenterology registry were analyzed for this study. De-identified data may be made available upon reasonable request, subject to data transfer policies and approval from the local and requesting institutions' research ethics boards.

References

1. Kaplan GG, Windsor JW. The global burden of inflammatory bowel disease: from 2015 to 2025. *Nat Rev Gastroenterol Hepatol.* 2021;18(12):709–720.
2. Büsch K, da Silva SA, Holton M, et al. Impact of inflammatory bowel disease on daily life and work productivity: results from the IBD2020 survey. *Inflamm Bowel Dis.* 2014;20(3):447–455.
3. Reilly MC, Zbrozek AS, Dukes EM. The validity and reproducibility of a work productivity and activity impairment instrument. *Pharmacoeconomics.* 1993;4(5):353–365.
4. Reilly MC, Gerlier L, Brabant Y, Brown M. Validity, reliability, and responsiveness of the Work Productivity and Activity Impairment questionnaire in Crohn's disease. Clin Ther. 2008;30(2):393–404.

5. van der Valk ME, Mangen MJ, Leenders M, et al. Healthcare costs of inflammatory bowel disease have shifted from hospitalisation and surgery towards anti-TNFα therapy: results from the COIN study. Gut. 2014;63(1):72–79.
6. Williet N, Sandborn WJ, Peyrin-Biroulet L. Patient-reported outcomes as primary end points in clinical trials of inflammatory bowel disease. Clin Gastroenterol Hepatol**.** 2014;12(8):1246–1256.
7. Graff LA, Vincent N, Walker JR, et al. A population-based study of fatigue and sleep difficulties in inflammatory bowel disease. Inflamm Bowel Dis. 2011;17(9):1882–1889.
8. Stark RG, Reitmeir P, Leidl R, König HH. Costs of inflammatory bowel disease in Germany. Pharmacoeconomics. 2006;24(8):797–814.
9. van Gennep S, Dijkstra G, van der Valk ME, et al. Work productivity loss is substantial in patients with inflammatory bowel disease. Clin Gastroenterol Hepatol. 2021;19(7):1481–1490.e2.
10. Government of Canada. Immigration, Refugees and Citizenship Canada (IRCC) Annual Report; 2023.
11. Asanin J, Wilson K. "I spent nine years looking for a doctor": exploring access to health care among immigrants in Mississauga, Ontario, Canada. *Soc Sci Med.* 2008;66(6):1271–1283.
12. Derose KP, Escarce JJ, Lurie N. Immigrants and health care: sources of vulnerability. *Annu Rev Public Health.* 2007;28:335–358.
13. Bernstein CN, Longobardi T, Finlayson G, et al. Direct and indirect health care costs of inflammatory bowel disease in Canada. *J Crohns Colitis.* 2020;14(9):1203–1210.
14. van der Valk ME, Mangen MJ, Leenders M, et al. Fatigue, quality of life and work productivity in patients with inflammatory bowel disease. *J Crohns Colitis.* 2016;10(5):554–561.
15. Statistics Canada. Consumer Price Index and labour market indicators, 2024. Ottawa: Statistics Canada; 2024.
16. Zhang W, Bansback N, Boonen A, Young A, Singh A, Anis A. *Validity of the Work Productivity and Activity Impairment (WPAI) questionnaire – general health version in patients with rheumatoid arthritis.* Arthritis Res Ther. 2010;12(1):R10.
17. Spitzer, R.L., et al., *A brief measure for assessing generalized anxiety disorder: the GAD-7.* Arch Intern Med, 2006. 166(10): p. 1092-7.
18. Kroenke, K., R.L. Spitzer, and J.B. Williams, *The PHQ-9: validity of a brief depression severity measure.* J Gen Intern Med, 2001. **16**(9): p. 606-13.
19. Cohen, S., T. Kamarck, and R. Mermelstein, *A global measure of perceived stress.* J Health Soc Behav, 1983. **24**(4): p. 385-96.
20. Butt, Z., et al., *Measurement of fatigue in cancer, stroke, and HIV using the Functional Assessment of Chronic Illness Therapy - Fatigue (FACIT-F) scale.* J Psychosom Res, 2013. **74**(1): p. 64-8.
21. Büsch K, et al. Impact of inflammatory bowel disease on daily life and work productivity. *Inflamm Bowel Dis.* 2014;20(3):447–455.
22. van der Valk ME, et al. Fatigue, quality of life and work productivity in IBD. *J Crohns Colitis.* 2016;10(5):554–561.

23. Reilly MC, et al. Validity and reproducibility of the WPAI instrument. *Pharmacoeconomics.* 1993;4(5):353–365.
24. Bernstein CN, Hitchon CA, Walld R, et al. Increased burden of psychiatric disorders in inflammatory bowel disease. *Inflamm Bowel Dis.* 2019;25(2):360–368.
25. Mikocka-Walus A, Knowles SR, Keefer L, Graff L. Controversies revisited: a systematic review of the comorbidity of depression and anxiety with inflammatory bowel diseases. *Inflamm Bowel Dis.* 2016;22(3):752–762.
26. van der Valk ME, Mangen MJ, Leenders M, et al. Risk factors of work disability in patients with inflammatory bowel disease: a population-based cohort study. *Gut.* 2014;63(3):552–559.
27. Evans-Lacko S, Knapp M. Global patterns of workplace productivity for people with depression: absenteeism and presenteeism costs across eight diverse countries. *Soc Psychiatry Psychiatr Epidemiol.* 2016;51(11):1525–1537.
28. Marmot M, Allen J, Goldblatt P, Boyce T, McNeish D, Grady M. *Fair Society, Healthy Lives (The Marmot Review).* London: University College London; 2010.
29. Hynie M. The social determinants of refugee mental health in the post-migration context: a critical review. *Can J Psychiatry.* 2018;63(5):297–303.
30. Salami B, Meherali S, Salami A. The health of immigrants in Canada: a scoping review. *J Immigr Minor Health.* 2015;17(4):1246–1261.

Figures

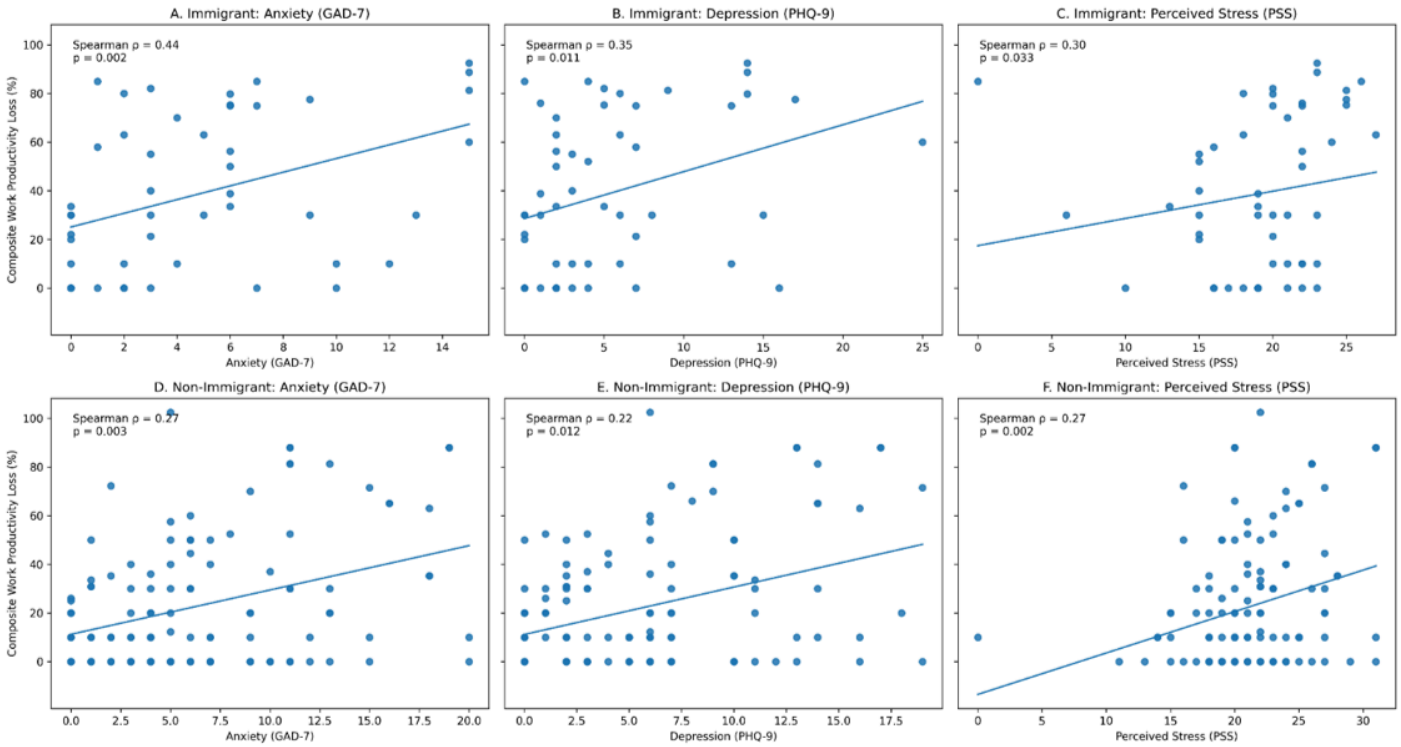


Figure 1

Mental health burden and composite work productivity loss by immigrant status.