

ASSOCIATION BETWEEN DISEASE SEVERITY, SOCIOECONOMIC FACTORS, PATIENT-REPORTED OUTCOMES, AND HEALTHCARE RESOURCE USE ACROSS RACIAL/ETHNIC GROUPS IN INFLAMMATORY BOWEL DISEASE: RESULTS FROM THE NATIONAL HEALTH AND WELLNESS SURVEY

S.C. Burbage, PharmD, MPH,¹ K. Krupsky, PhD, MPH,² M.J. Cambron-Mellott, PhD,² N. Way, PhD,² A.A. Patel, PharmD,¹ MBA, J. Liu, MD³

¹Janssen Scientific Affairs, LLC, Horsham, PA; ²Cerner Enviza, Kansas City, MO; ³Morehouse School of Medicine, Atlanta, GA

INTRODUCTION

- Differences in presentation and severity of symptoms have been observed across racial/ethnic groups in patients diagnosed with inflammatory bowel disease (IBD), which consists of Crohn's disease (CD) and ulcerative colitis (UC).^{1,2}
- As chronic and incurable conditions, CD and UC are associated with poor health-related quality of life (HRQoL), high rates of healthcare resource utilization (HCRU), work productivity impairment (WPI), and high direct and indirect costs.³⁻⁸
- Black, Indigenous, and People of Color (BIPOC) individuals with IBD experience greater socioeconomic disadvantages and often present with more advanced disease than White individuals,^{9,10} however, the association between these factors and health outcomes are not well characterized.
- The objective was to determine the relationship of race/ethnicity and IBD severity with socioeconomic factors, HRQoL, HCRU, WPI, and costs among White, Black, and Hispanic participants with self-reported IBD.

METHODS

- This study includes 2018, 2019, and 2020 data from the National Health and Wellness Survey (NHWS), a self-administered, internet-based questionnaire collected from a nationwide sample of adults in the US.¹¹
- Inclusion criteria were as follows: ≥18 years of age and a US resident at the time of study, self-reported Hispanic ethnicity or White or Black race, self-reported previous diagnosis of CD or UC, and a valid Patient Activation Measure (PAM) score.
- Disease severity was self-reported by participants with CD or UC.
- The following PRO measurement tools were used to assess:
 - HRQoL: 5-level EQ-5D (EQ-5D-5L), EQ visual analog scale (EQ VAS), 36-item Short Form Survey version 2 (SF-36v2)¹² Mental Component Summary (MCS) and Physical Component Summary (PCS) scores, and Short Form - 6 Dimension (SF-6D)¹³
 - Depression and anxiety: 9-item Patient Health Questionnaire (PHQ-9) and 7-Item General Anxiety Disorder scale (GAD-7), respectively.
 - Work productivity (among employed respondents): 6-item Work Productivity and Activity Impairment (WPAI) questionnaire
- HCRU included the number of healthcare provider (HCP), gastroenterologist (GE), and emergency room (ER) visits, and hospitalizations over the past six months.
- Direct costs (ie, the costs of an average ER visit, hospitalization, and physician visit) were imputed using age group- and region-specific Medical Expenditure Panel Survey (MEPS) data.¹⁴
- Costs associated with WPI were calculated using estimated wages/salaries for each respondent using data from the Bureau of Labor Statistics.¹⁵
- Bivariate analyses were conducted to compare study variables across racial/ethnic groups.
- Analyses were conducted separately for the self-reported CD and UC cohorts using Chi-square tests, analysis of variance (ANOVA), and independent sample t tests.
- Multiplicity adjustments were conducted using the Bonferroni correction for multiple comparisons.

CONCLUSIONS

- Increased disease severity was associated with worse HRQoL, greater work productivity and activity impairment, and higher HCRU in Black and White participants with self-reported CD and in all racial/ethnic groups with self-reported UC.
- Increased disease severity was also associated with higher direct medical costs in White participants with CD and UC and Black participants with CD; this association was not observed in Hispanic participants.
 - Notably, Hispanic participants with mild CD had numerically higher direct medical costs than White and Black participants with either mild or moderate/severe CD; Hispanic participants with mild UC had numerically higher direct medical costs than White participants with mild or moderate/severe UC and Black participants with mild UC.
 - The lack of significant differences in direct medical costs across disease severity in Hispanic participants may be attributed to a lack of consistency in self-reported disease and/or a greater socioeconomic pressure to continue working despite illness.
- Black participants with moderate/severe CD may have poorer social and financial resources as this group had a significantly higher proportion of participants with a household income <\$25,000 and a numerically higher proportion of participants who were single and uninsured compared with Black participants with mild CD; this was not observed in White or Hispanic participants.
- These findings highlight the need for future studies to better understand associations between race/ethnicity, disease severity, socioeconomic factors, and health outcomes in IBD.

RESULTS

Sociodemographic Characteristics

- A total of 2,577 participants with self-reported disease severity of mild or moderate/severe were included (Table 1).
- Among participants with CD, there was a significant difference in household income between Black participants with moderate/severe and mild disease; no other sociodemographics differed significantly across disease severity groups in White, Black, or Hispanic participants.
- Among participants with UC, there were significant differences in marital status, household income, and health insurance status between White participants with moderate/severe and mild disease; household income was also significantly different between Hispanic participants with moderate/severe and mild disease.
- A numerically higher proportion of Black participants with moderate/severe CD were single, uninsured, and had a low household income, than White participants.

Crohn's Disease	White (N = 514)		Black (N = 304)		Hispanic (N = 67)	
	Mild (N = 214)	Moderate/Severe (N = 300)	Mild (N = 151)	Moderate/Severe (N = 153)	Mild (N = 33)	Moderate/Severe (N = 34)
Marital status, n (%)						
Married/living with a partner	317 (67.7%)	201 (66.7%)	21 (41.2%)	16 (27.6%)	52 (62.7%)	42 (62.7%)
Single, not married/divorced/separated/widowed	196 (38.1%)	103 (33.9%)	31 (37.3%)	25 (37.3%)	31 (37.3%)	25 (37.3%)
Decline to answer	1 (0.2%)	0 (0.0%)	0 (0.0%)	1 (1.7%)	0 (0.0%)	0 (0.0%)
Household income, n (%)						
<\$25,000	63 (12.3%)	39 (12.8%)	8 (15.7%)	24 (41.4%)*	10 (12.0%)	6 (9.0%)
\$25,000 to <\$50,000	107 (20.8%)	56 (18.4%)	10 (19.6%)	10 (17.2%)	11 (16.4%)	11 (16.4%)
\$50,000 to <\$100,000	179 (34.8%)	117 (38.2%)	13 (23.3%)	11 (19.0%)	21 (31.3%)	21 (31.3%)
\$100,000+	152 (29.6%)	94 (30.9%)	15 (29.6%)	12 (20.7%)	29 (34.9%)	28 (41.8%)
Decline to answer	13 (2.5%)	5 (1.6%)	0 (0.0%)	1 (1.7%)	0 (0.0%)	1 (1.5%)
Health insurance, n (%)						
Not insured	31 (6.0%)	27 (8.9%)	6 (11.8%)	10 (17.2%)	12 (14.5%)	9 (13.2%)
Commercially insured	289 (56.2%)	167 (54.9%)	36 (70.6%)	29 (50.0%)	50 (60.2%)	41 (61.2%)
Medicaid	50 (9.7%)	31 (10.2%)	2 (3.9%)	8 (13.8%)	5 (6.0%)	6 (9.0%)
Medicare	133 (25.9%)	70 (23.0%)	10 (19.2%)	4 (6.9%)	4 (4.8%)	4 (6.0%)
Other type of insurance/uninsured	11 (2.1%)	1 (0.3%)	2 (3.9%)	6 (10.2%)	7 (8.4%)	7 (10.2%)
Ulcerative colitis						
Marital status, n (%)						
Married/living with a partner	501 (63.5%)	217 (60.1%)*	19 (31.1%)	10 (26.3%)	63 (47.0%)	62 (63.0%)
Single, not married/divorced/separated/widowed	288 (36.5%)	141 (39.9%)	42 (68.9%)	28 (73.7%)	54 (46.2%)	54 (63.0%)
Decline to answer	0 (0.0%)	3 (0.8%)	0 (0.0%)	1 (0.7%)	1 (0.7%)	1 (0.9%)
Household income, n (%)						
<\$25,000	96 (12.2%)	70 (19.4%)*	11 (18.0%)	11 (28.9%)	17 (12.7%)	22 (18.8%)*
\$25,000 to <\$50,000	161 (20.4%)	74 (20.2%)	13 (21.3%)	13 (33.8%)	18 (15.4%)	18 (15.4%)
\$50,000 to <\$100,000	290 (36.8%)	119 (33.0%)	21 (34.4%)	8 (21.1%)	36 (26.9%)	38 (32.5%)
\$100,000+	209 (26.5%)	90 (24.9%)	19 (31.2%)	19 (49.2%)	38 (32.5%)	38 (32.5%)
Decline to answer	33 (4.2%)	8 (2.2%)	0 (0.0%)	0 (0.0%)	7 (5.2%)	1 (0.9%)
Health insurance, n (%)						
Not insured	44 (5.6%)	44 (12.2%)*	6 (9.8%)	5 (13.2%)	7 (5.1%)	2 (1.7%)
Commercially insured	417 (52.9%)	174 (48.0%)	29 (46.2%)	28 (73.7%)	71 (60.7%)	71 (60.7%)
Medicaid	40 (5.1%)	45 (12.5%)	9 (14.8%)	4 (10.5%)	9 (7.9%)	9 (7.9%)
Medicare	257 (32.8%)	112 (30.9%)	19 (31.2%)	19 (49.2%)	38 (32.5%)	38 (32.5%)
Other type of insurance/uninsured	21 (2.7%)	11 (3.0%)	4 (6.5%)	9 (23.7%)	8 (6.8%)	8 (6.8%)

*P < .05 for distribution of categorical outcomes between mild and moderate/severe disease within the same racial/ethnic group.

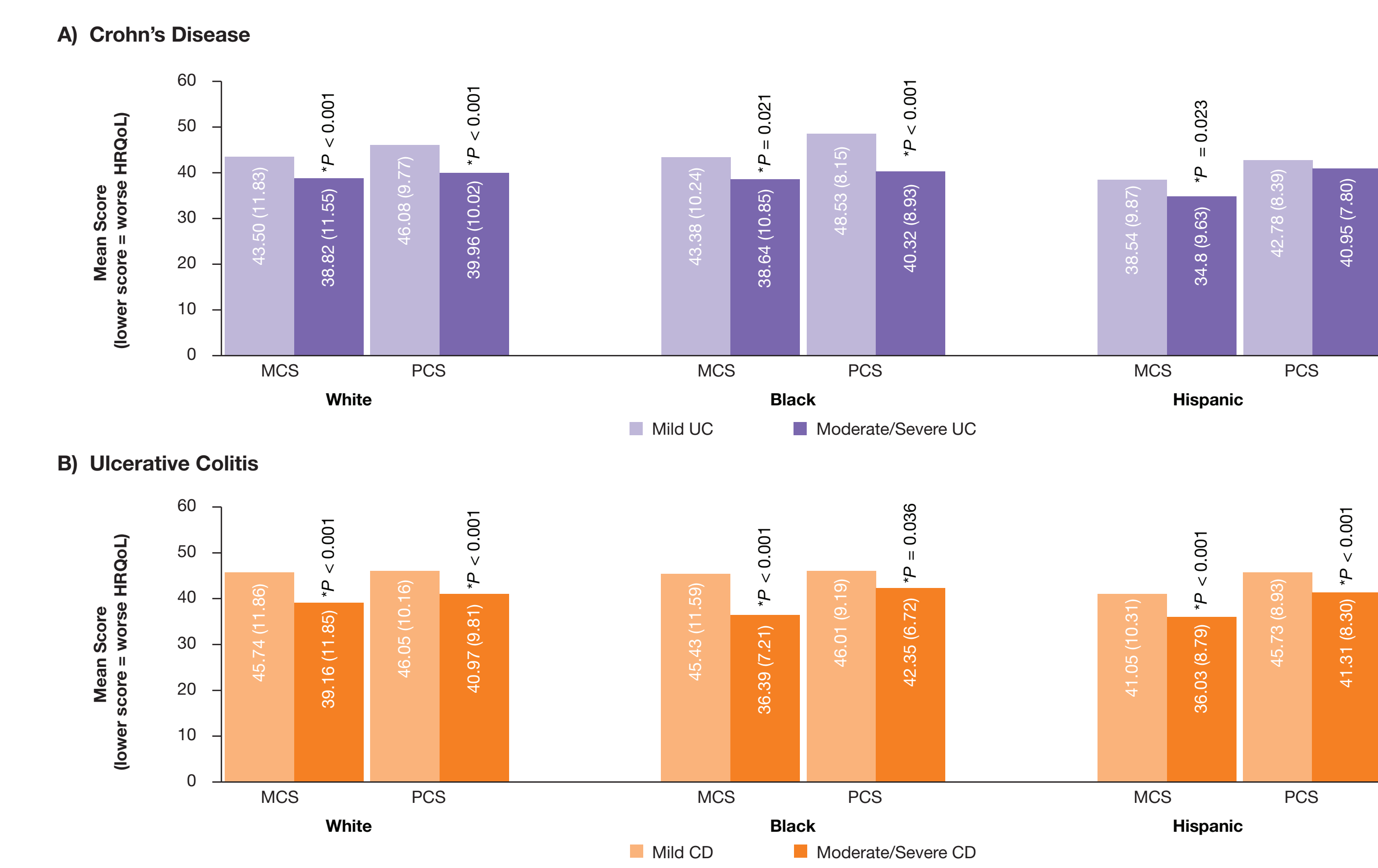
Health-related Quality of Life and Work Productivity and Activity Impairment

- Participants with moderate/severe CD had significantly worse scores than participants with mild CD on PROs (including those for HRQoL and the WPAI) in all racial/ethnic groups, as follows (Table 2, Figure 1A, Figure 2A):
 - White participants – all PROs
 - Black participants – all PROs except for GAD-7 and EQ VAS
 - Hispanic participants – GAD-7, MCS, and activity impairment
- Participants with moderate/severe UC had significantly worse scores than participants with mild UC across all PROs (including those for HRQoL and the WPAI) in all racial/ethnic groups; the only exception was EQ VAS in Black participants (Table 2, Figure 1B, Figure 2B).

Crohn's Disease	White (N = 514)		Black (N = 304)		Hispanic (N = 67)	
	Mild (N = 214)	Moderate/Severe (N = 300)	Mild (N = 151)	Moderate/Severe (N = 153)	Mild (N = 33)	Moderate/Severe (N = 34)
HRQoL, mean (SD)						
PHQ-9 score*	7.36 (6.86)	11.10 (7.70)*	6.71 (5.66)	9.76 (6.40)*	11.59 (7.57)	13.76 (6.64)
GAD-7 score*	5.72 (5.87)	7.94 (6.40)*	5.80 (5.37)	7.45 (6.33)	8.54 (6.98)	10.07 (6.40)*
MCS score	43.50 (11.83)	38.62 (11.55)*	43.38 (10.54)	38.64 (10.95)*	40.95 (9.78)	34.87 (9.63)*
PCS score	46.08 (9.77)	39.95 (10.22)*	48.53 (8.13)	40.32 (9.30)*	42.78 (8.39)	40.95 (9.78)
SF-6D index score	0.660 (0.147)	0.567 (0.124)*	0.664 (0.136)	0.567 (0.111)*	0.535 (0.121)	0.535 (0.121)
EQ-5D index score	0.764 (0.177)	0.657 (0.232)*	0.772 (0.156)	0.651 (0.239)	0.674 (0.166)*	0.600 (0.223)
EQ VAS score	67.60 (23.85)	55.72 (25.33)*	65.84 (24.74)	55.98 (31.24)	65.00 (27.03)	56.93 (29.32)
WPAI, mean % (SD)						
Absenteeism	15.86 (24.80)	24.65 (27.79)*	13.12 (18.81)	40.22 (28.77)*	34.45 (30.81)	26.92 (25.38)
Presenteeism	35.29 (33.25)	51.82 (32.95)*	27.80 (27.25)	54.17 (30.27)*	52.58 (32.08)	56.49 (27.20)
Overall work productivity impairment	38.20 (35.53)	57.65 (35.33)*	34.37 (31.39)	67.96 (32.90)*	62.71 (32.29)	66.49 (27.95)
Activity impairment	36.96 (31.78)	54.47 (28.07)*	32.75 (26.84)	55.34 (26.77)*	52.65 (31.04)	62.54 (27.10)*
Ulcerative colitis						
HRQoL, mean (SD)						
PHQ-9 score*	6.41 (6.62)	9.90 (7.28)*	7.18 (6.58)	10.79 (6.30)*	8.81 (6.96)	12.76 (7.07)*
GAD-7 score*	4.73 (5.26)	7.42 (5.83)*	5.15 (4.83)	8.74 (5.45)	7.10 (5.45)	9.69 (5.18)*
MCS score	45.11 (11.86)	39.16 (11.59)*	45.43 (11.59)	36.39 (12.11)*	46.39 (12.71)*	36.39 (12.71)*
PCS score	46.05 (10.16)	40.97 (9.81)*	40.97 (9.81)	37.05 (9.42)*	45.73 (8.93)	41.31 (8.30)*
SF-6D index score	0.674 (0.139)	0.598 (0.128)*	0.666 (0.154)	0.541 (0.104)*	0.619 (0.131)	0.548 (0.109)*
EQ-5D index score	0.760 (0.174)	0.679 (0.196)*	0.786 (0.140)	0.689 (0.169)*	0.714 (0.185)	0.619 (0.127)*
EQ VAS score	67.37 (25.43)	57.99 (25.81)*	71.56 (24.91)	67.33 (32.96)	59.61 (29.24)*	59.61 (29.24)*
WPAI, mean % (SD)						
Absenteeism	12.93 (24.44)	23.11 (26.85)*	15.86 (27.02)	39.16 (26.03)*	22.05 (26.12)	35.56 (26.02)*
Presenteeism	28.01 (31.42)	50.27 (31.32)*	31.86 (32.68)	60.02 (27.11)*	51.00 (35.24)	60.02 (27.11)*
Overall work productivity impairment	30.88 (33.99)	56.18 (33.83)*	37.91 (37.98)	71.44 (30.64)*	51.00 (35.24)	67.88 (26.06)*
Activity impairment	34.18 (30.79)	53.60 (29.31)*	37.05 (34.80)	68.96 (33.30)*	47.29 (30.11)	67.88 (26.06)*

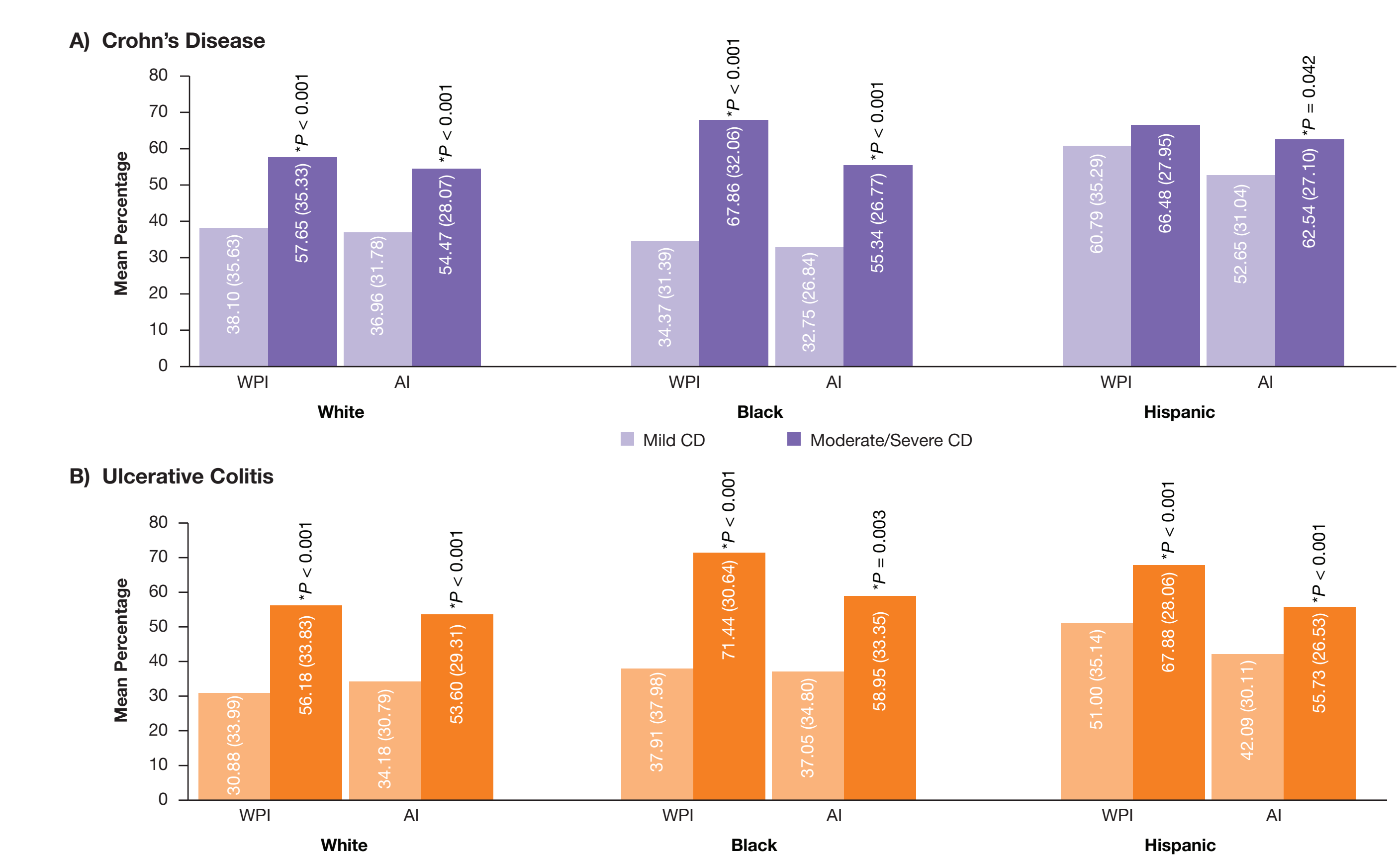
*PHQ-9 includes nine items (range 0 to 27) where higher scores indicate more severe depression.
 *GAD-7 includes seven items (range 0 to 21) and a higher score indicates more severe general anxiety disorder.
 *Absenteeism was not calculated for those who worked zero hours and missed zero hours in the last seven days and presenteeism was only asked among those who worked more than zero hours in the last seven days.
 *P < .05 between mild and moderate/severe disease within the same racial/ethnic group.
 Abbreviations: EQ VAS = EuroQol Visual Analog Scale; GAD-7 = General Anxiety Disorder 7-item; HRQoL = health-related quality of life; IBD = inflammatory bowel disease; MCS = Mental Component Summary; PCS = Physical Component Summary; PHQ-9 = Patient Health Questionnaire - 9 item; SD = standard deviation; SF-6D = Short Form - 6 Dimension; WPAI = Work Productivity and Activity Impairment.

Figure 1. Mental Component Summary and Physical Component Summary scores in participants with self-reported inflammatory bowel disease by race/ethnicity and disease severity



Values are presented as mean (SD) score. *P < .05 between mild and moderate/severe disease within the same racial/ethnic group. Abbreviations: CD = Crohn's Disease; MCS = Mental Component Summary; PCS = Physical Component Summary; SD = standard deviation; UC = ulcerative colitis.

Figure 2. Work Productivity and Activity Impairment outcomes in participants with self-reported inflammatory bowel disease by race/ethnicity and disease severity

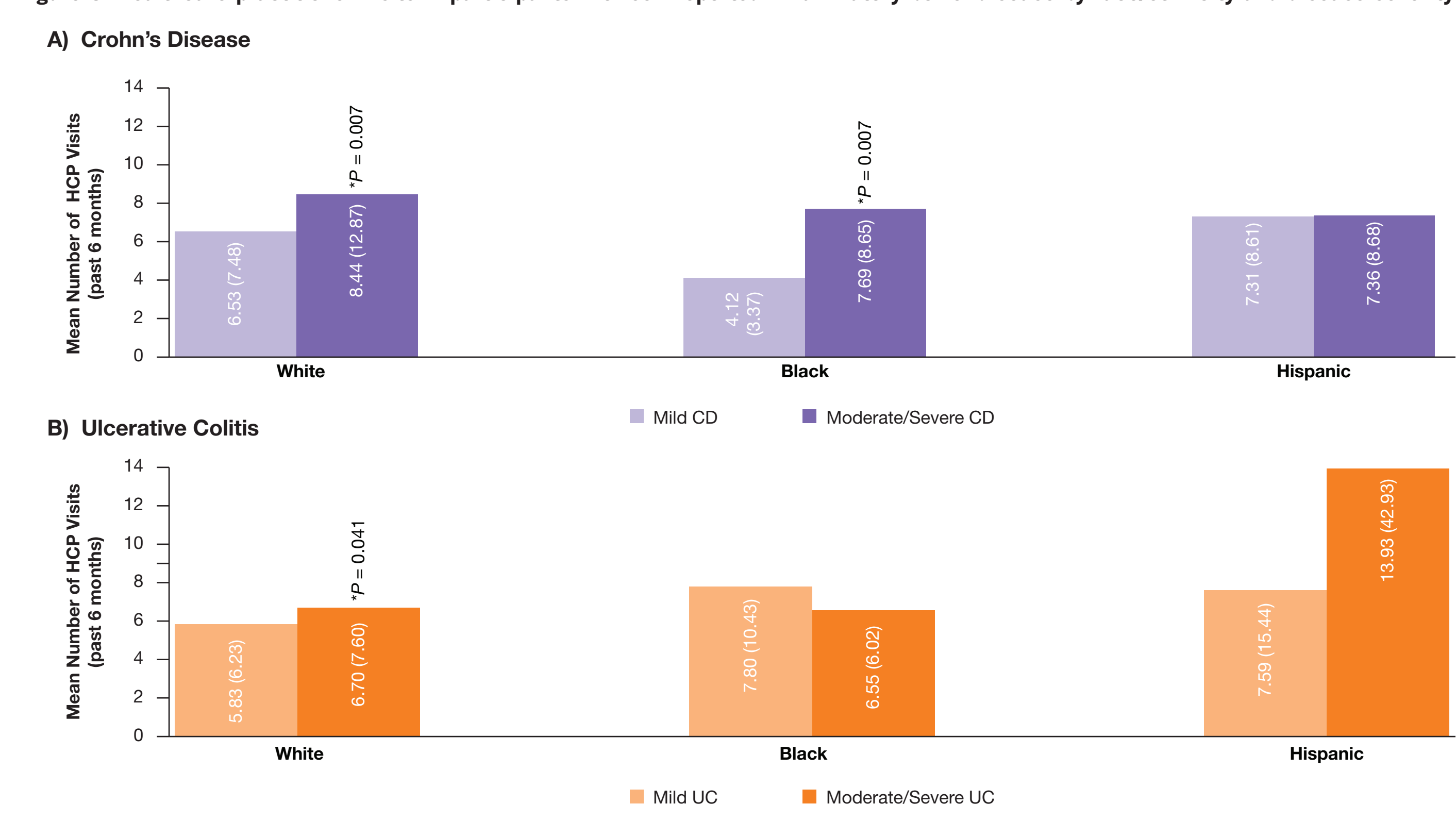


Values are presented as mean (SD) percentage. *P < .05 between mild and moderate/severe disease within the same racial/ethnic group. Abbreviations: AI = activity impairment; CD = Crohn's Disease; SD = standard deviation; UC = ulcerative colitis; WPI = work productivity impairment.

Healthcare Resource Utilization

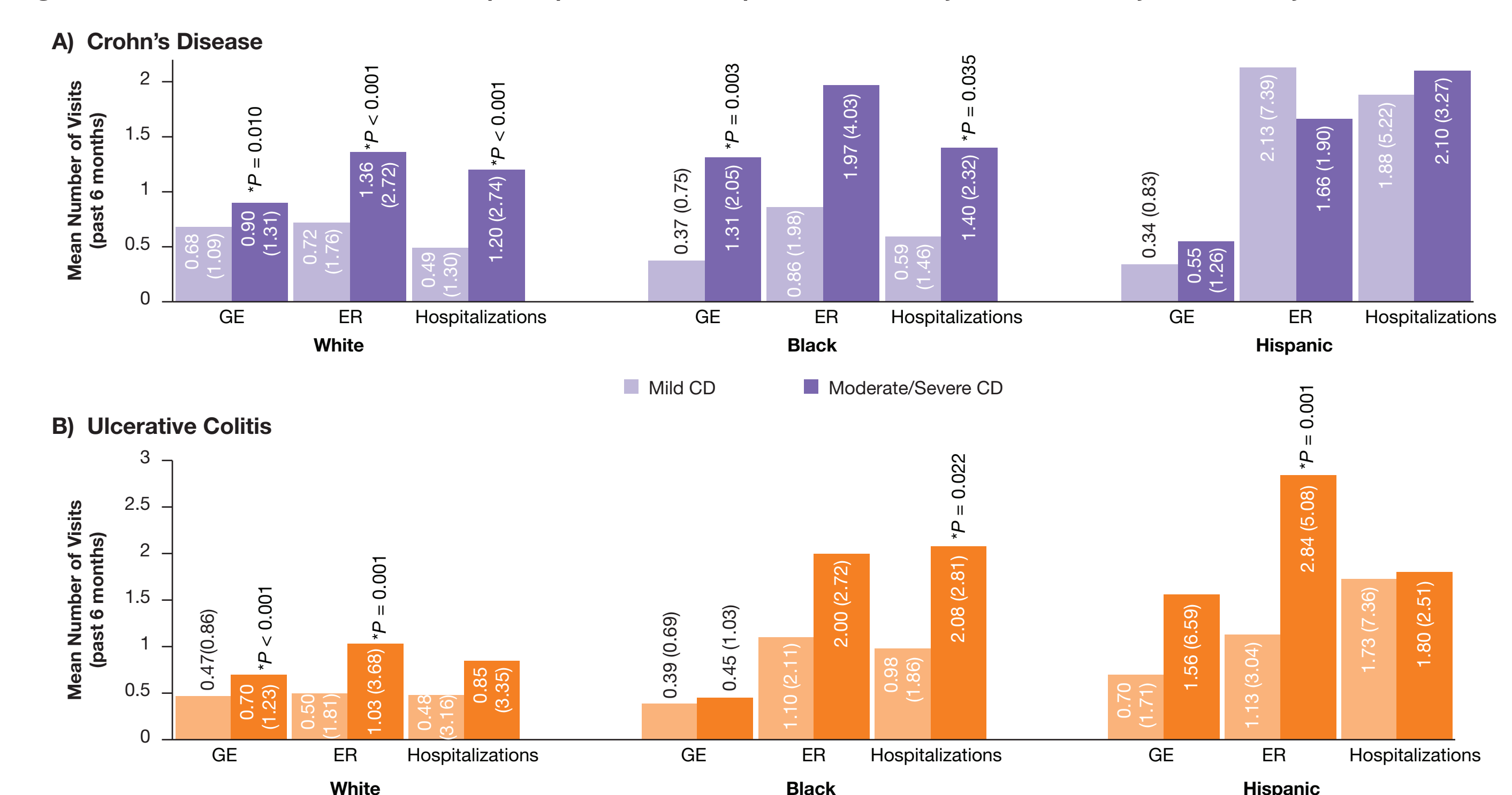
- Participants with moderate/severe IBD had significantly higher HCRU than those with mild IBD in most racial/ethnic groups, as follows (Figure 3):
 - CD (Figure 3A, Figure 4A)
 - White participants – HCP visits, GE visits, ER visits, and hospitalizations
 - Black participants – HCP visits, GE visits, and hospitalizations
 - Hispanic participants – no significant differences
 - UC (Figure 3B, Figure 4B)
 - White participants – HCP visits, GE visits, and ER visits
 - Black participants – hospitalizations
 - Hispanic participants – ER visits

Figure 3. Healthcare practitioner visits in participants with self-reported inflammatory bowel disease by race/ethnicity and disease severity



Values are presented as mean (SD) visits over the past six months. *P < .05 between mild and moderate/severe disease within the same racial/ethnic group. Abbreviations: CD = Crohn's Disease; HCP = healthcare practitioner; UC = ulcerative colitis.

Figure 4. Healthcare resource utilization in participants with self-reported inflammatory bowel disease by race/ethnicity and disease severity

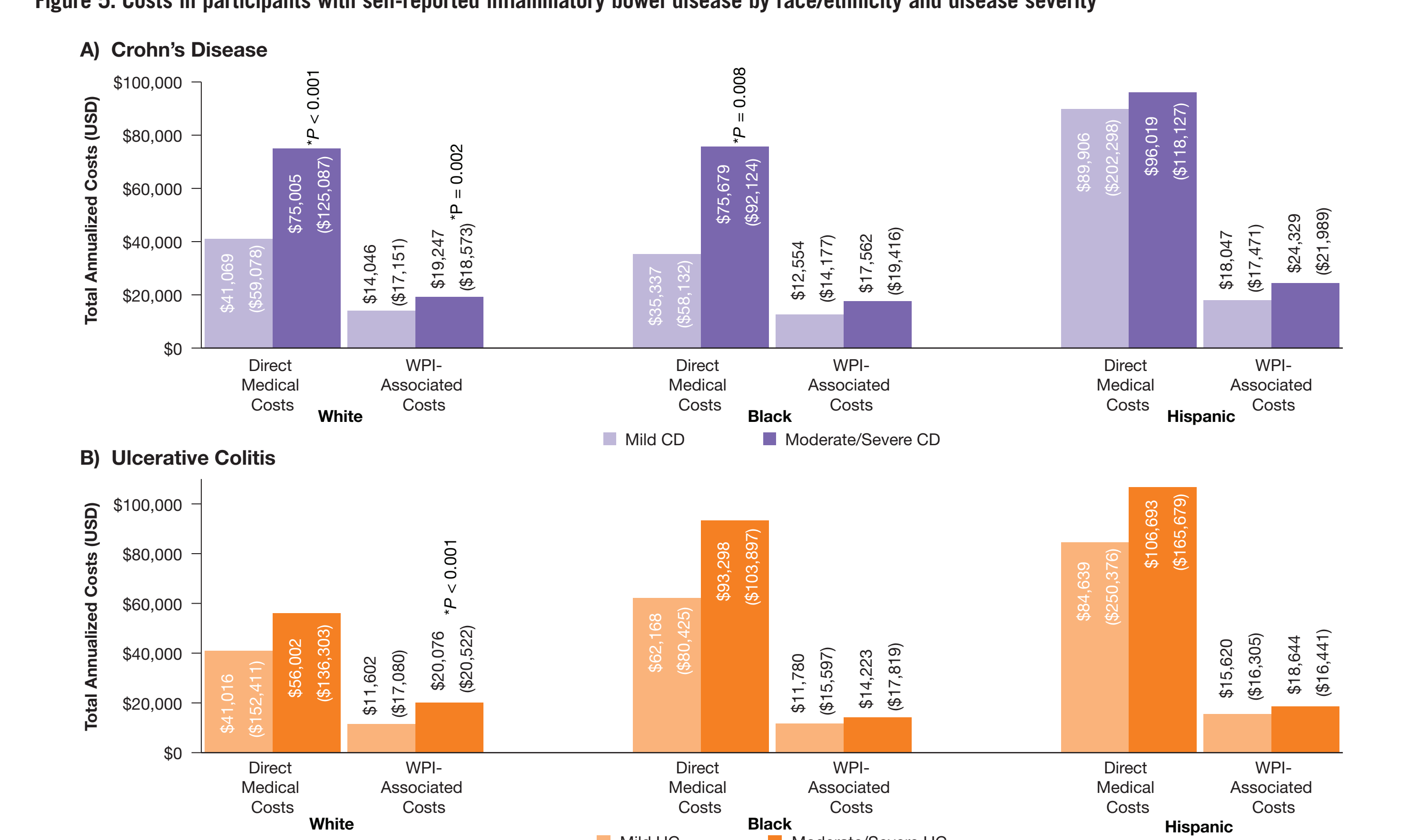


Values are presented as mean (SD) visits over the past six months. *P < .05 between mild and moderate/severe disease within the same racial/ethnic group. Abbreviations: CD = Crohn's Disease; ER = emergency room; GE = gastroenterologist; UC = ulcerative colitis.

Costs

- Participants with moderate/severe IBD had higher direct medical costs and/or costs associated with WPI than mild IBD in some racial/ethnic groups, as follows (Figure 5):
 - CD
 - White participants – direct medical costs and WPI-associated costs
 - Black participants – direct medical costs
 - Hispanic participants – no significant differences
 - UC
 - White participants – WPI-associated costs
 - Black participants – no significant differences
 - Hispanic participants – no significant differences
- White participants with moderate/severe UC had numerically lower mean annualized direct medical costs than Black and Hispanic participants (\$56,002, \$93,298, and \$106,693, respectively) (Figure 5B).

Figure 5. Costs in participants with self-reported inflammatory bowel disease by race/ethnicity and disease severity



Note: WPI-associated costs were only calculated among respondents who were participating in the labor force at the time of the survey and who had a valid response (ie, non-missing) for the number of hours working in the past 7 days and the number of hours missed in the past 7 days.
 Values are presented as mean annualized costs (SD). *P < .05 between mild and moderate/severe disease within the same racial/ethnic group. Abbreviations: CD = Crohn's Disease; WPI = work productivity impairment; UC = ulcerative colitis; USD = United States dollars.

Limitations

- Limitations of this study include relatively small sample sizes for the Black and Hispanic groups (particularly after disease severity stratification), the self-reported nature of the data collected via survey (including disease severity), potential underrepresentation of people without access to online administration, potentially outdated cost analysis (ie, using 2018 costs), sociodemographic data from the study population not reflecting historical national demographic data, and use of only bivariate statistics.

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Disclosures

SCB and AP are employees of Janssen Scientific Affairs (USA), LLC (a Johnson & Johnson company) and hold stock in Johnson & Johnson. KK, JCM, and NW are employees of Cerner Enviza and paid consultants of JSA. JL is an employee of Morehouse School of Medicine and a paid consultant of JSA. This study is funded by Janssen Pharmaceuticals.