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Clinical Studies

Low back pain does not predict unemployment in a U.S. refugee population: A retrospective cohort study

Benjamin D. Holmes^{a,*}, Kaia C. Yngve^a, Susan M. Haskamp^b, Ruta Brazauskas^c^a Mayo Clinic, 200 First Street SW, Rochester, MN 55905, USA^b Intercultural Mutual Assistance Association, 2500 Valleyhigh Drive NW, Rochester, MN 55901, USA^c Medical College of Wisconsin, 8701 W Watertown Plank Road, Milwaukee, WI 53226, USA

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ABSTRACT

Background: Unemployment can limit host-community integration for refugees. Poor health is a leading cause of unemployment among refugees in the U.S. This study assesses whether low back pain (LBP) is predictive of unemployment among a group of refugees in the U.S.

Methods: Electronic medical record data were collected for a total of 3,183 refugee patients. General patient characteristics (sex, age, home country, need for English interpretation, tobacco use, and illicit drug use), employment status, and mental illness and LBP diagnoses were studied. Descriptive and logistic regression analyses were used to explore relationships between LBP and unemployment.

Results: Of the 12 home countries considered, seven were represented by >40 patients: Somalia (n=1696), Sudan/South Sudan (n=460), Bosnia and Herzegovina (n=280), Iraq (n=266), Ethiopia (n=261), Ukraine (n=72), and Syria (n=60). Nearly a quarter of Iraqi patients suffered from LBP as did approximately 15% of Somali, Syrian, Ethiopian, and Sudanese patients. Nearly half of Iraqi patients were unemployed, as were greater than 30% of Somali, Sudanese, Ukrainian, and Ethiopian patients. A statistically significantly higher percentage of unemployed patients suffered from LBP (17.9%) than employed patients (13.6%) (p=0.003). However, on regression analysis, LBP was not predictive of unemployment (OR: 1.12, p=0.336). Instead, predictive variables included: a patient-reported need for an English interpreter (OR: 3.35, p<.001), female sex (OR: 1.49, p<.001), mental illness (OR: 1.82, p<.001), and illicit drug use (OR: 1.92, p=0.032).

Conclusions: Contrary to findings from multiple studies implicating LBP as a leading cause of unemployment in high-income countries, a diagnosis of LBP does not predict unemployment for this group of refugees in the U.S. This finding illuminates a novel dimension of the healthy immigrant effect and indicates a divergent perception of the relationship between LBP and work in the refugee population as compared to non-refugee populations studied in North America and Europe. Further investigation of refugees' perceptions of LBP in relation to work is indicated.

Introduction

Minnesota consistently ranks within the top dozen resettlement sites for refugees among states in the U.S., with 3.23% of the U.S. total from January to December 2019 [1]. Africa and the Middle East make up a high percentage of refugee home regions. From 1979 to 2018 nearly 24,000 refugees from Somalia resettled in Minnesota [2], and over 6,000 resettled from Ethiopia [3]. Thirty-four percent of all Somali refugees to the U.S. in 2019 settled in Minnesota [1]. Southeast Minnesota resettled more Iraqi refugees than any other region in the state from 2007 to 2017,

and fourth most Somali refugees [4,5]. Other common home countries of refugees in Southeast Minnesota include: Sudan, South Sudan, and Syria.

Employment rates of Middle Eastern and African immigrants in the U.S. are significantly lower (37% and 47%, respectively) than rates for Latinx immigrants (75%) [6]. In Minnesota in 2011 only 41% of male Somali immigrants worked, compared to 93% Indian, 89% Mexican, and 78% of Vietnamese males. Low employment rates are concerning because, due to benefits associated with employment in income, health, housing, education [7], and self-efficacy [8,9] for refugees and their

FDA device/drug status: Not applicable.

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Summary sentence: Low back pain is prevalent in this group of refugees in the U.S., but it does not predict unemployment.

* Corresponding author.

E-mail address: holmes.benjamin@mayo.edu (B.D. Holmes).

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children [10], labor market participation is the most crucial indicator for successful immigrant integration [6,11].

Refugee unemployment is multifactorial. However, poor health or handicap was the top reason U.S. refugees aged 16 or older were not seeking work in 2014, according to the Office of Refugee Resettlement's Annual Survey of Refugees [6]. Also, chronic, non-communicable diseases have become more prevalent in U.S. refugee populations than communicable diseases [12], and low back pain (LBP) predominates health problems in certain refugee populations [13]. LBP is a leading cause of work absenteeism in the U.S., with more than 100 million workdays lost per year due to LBP, at a total annual cost estimate of \$119-238 billion [14]. Further complicating this issue, refugees can face greater barriers than non-refugees in accessing health care [15]. This is related to several issues, including: difficulty communicating with providers due to language barriers and limited translation services and health literacy [16,17], residential mobility and social isolation [18], residential segregation [19], and economic hardship [20]. The relationship between LBP and unemployment frames a socioeconomic disparity between LBP sufferers and non-sufferers [21,22] which is likely broadened by refugee status.

Little is known about the role of LBP in unemployment in U.S. refugee populations. To the investigators' knowledge, the relationship between LBP and unemployment among refugees has not been studied. This project aims to clarify this relationship and to inform future efforts to understand and confront the barriers which refugees face to employment and spinal healthcare access.

Materials and methods

This study protocol was developed in partnership with a local refugee mutual assistance association. Data from the electronic medical record system of a multicenter, multispecialty clinic in Southeast Minnesota were collected and deidentified for refugees living in Olmsted County, seen at one of five distinct sites between January 2019 and December 2020. Records were included if a patient's "country of origin" matched a home country listed in U.S. State Department records of refugees relocating to Minnesota between 2010 and 2020 (Appendix 1). "Country of origin" data were absent from several patients' medical records; therefore, records of patients whose reported primary language is spoken in refugee countries listed by the State Department were also included (Appendix 2). Length of time in the U.S. was absent from patient medical records. Patients were then dichotomized into employed and unemployed groups.

Variables which were collected and analyzed include: LBP (by ICD-10 diagnosis code, Appendix 3), sex, age, BMI, ethnic group, race, religion, need for an interpreter, mental illness (by ICD-10 diagnosis code as listed in the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition), use of illicit drugs, and tobacco smoking status. Data describing phenotypes of patients' LBP, such as intensity, duration, impact on activities of daily living (ADLs), and etiology, were not uniformly available in the electronic medical records. Patients were considered unemployed if they had documented disability, were not employed, or were retired. They were considered employed if they worked full time or part time, were self-employed, or were full time or part time students. The analysis of the association between LBP and employment was restricted to patients younger than 66 years of age. Patients with missing employment status were removed from this analysis.

The study variables were summarized using the means and standard deviations for continuous variables and frequencies and percentages for categorical variables. Wilcoxon rank-sum test was used to compare continuous variables while chi-square test was used for categorical variables. Multivariable logistic regression model was used to evaluate the effect of LBP on unemployment after adjusting for other predictors associated with the outcome. In addition to the analysis of the entire cohort, home country-specific subgroup analyses were carried out for the five home countries which were represented by 200 patients or more.

Level of significance of 5% was used throughout. All tests are two-sided. Analyses were conducted using SAS 9.4 (SAS Institute, Cary, NC). All research ethics rules and institutional requirements were followed for this quality assessment and improvement project.

Results

A total of 3,183 refugee patients were included in this study, of whom 1,758 (55%) were female (Table 1). The mean age was 43 years (standard deviation: 16.4). Twelve home countries were represented in the medical records, of which seven were represented by >40 patients: Somalia (n=1,696; 53%), Sudan/South Sudan (n=460; 15%), Bosnia and Herzegovina (n=280; 9%), Iraq (n=266; 8%), Ethiopia (n=261; 8%), Ukraine (n=72; 2%), and Syria (n=60; 2%). Nearly one in every six refugee patients was diagnosed with LBP (n=488). Percentage of patients with LBP varied significantly dependent on their home country (Table 1, $p=0.004$). Nearly a quarter of Iraqi patients suffered from LBP (n=63) as did approximately 15% of Somali (n=269), Syrian (n=9), Ethiopian (n=36), and Sudanese (n=63) patients (Fig. 1).

There was a statistically significant difference (<0.001) in the employment status of patients with LBP versus without LBP, a higher percentage of those with LBP being unemployed (50%) than those without (40%) (Table 1). A higher percentage of LBP sufferers were female (62%) than non-sufferers (54%) ($p=0.002$), were older ($p<0.001$), requested language interpretation ($p<0.001$), had mental illness ($p<0.001$), and did not use illicit drugs ($p=0.003$).

Refugee unemployment analysis was limited to patients younger than 66 years of age (n=2,751). About 35% (n=973) of total patients were unemployed (Table 2). Nearly half of Iraqi patients were unemployed (n=109), as were $\geq 30\%$ of Somali (n=558), Sudanese (n=144), Ukrainian (n=17), and Ethiopian (n=72) patients (Fig. 2). Also, 37% (n=1,019) of the patients reported a need for interpretation into their primary language. Half of the patients from Iraq (n=133) needed English interpretation, as did 48% of Somali (n=818), 40% of Ethiopian (n=105), 33% of both Bosnian (n=93) and Syrian (n=20), 26% of Sudanese (n=121), and 14% of Ukrainian (n=10) patients.

For patients younger than 66 years, a statistically significantly higher percentage of unemployed refugees suffered from LBP (18%) as compared to employed refugees (14%) ($p=0.003$) (Table 2). Other factors significantly associated with unemployment in this refugee patient population included sex (higher proportion of females was observed among unemployed patients vs employed patients, $p<0.001$), patient home country ($p<0.001$), the need for an interpreter (those unemployed were more likely to request an interpreter than employed patients, $p<0.001$), and mental illness (unemployed patients were more likely to have a diagnosis of mental illness than employed patients, $p<0.001$).

Predictors of unemployment in refugee patients younger than 66 years were identified via logistic regression analysis on both aggregate and subgroup levels (Table 3). On the aggregate, unemployment was predicted by a patient's reported need for an interpreter ($p<0.001$), sex ($p<0.001$), mental illness ($p<0.001$), and illicit drug use ($p=0.032$). The odds ratio of unemployment for patients who needed an interpreter, compared to patients who did not, was 3.35 (95% confidence interval, CI, 2.81-4.00), and for females versus males was 1.49 (95% CI, 1.24-1.79). The odds ratio of unemployment for patients with a diagnosis of mental illness, compared to patients without a mental illness diagnosis, was 1.82 (95% CI, 1.46-2.26), and the odds ratio of unemployment for drug users relative to nonusers was 1.92 (95% CI, 1.06-3.50).

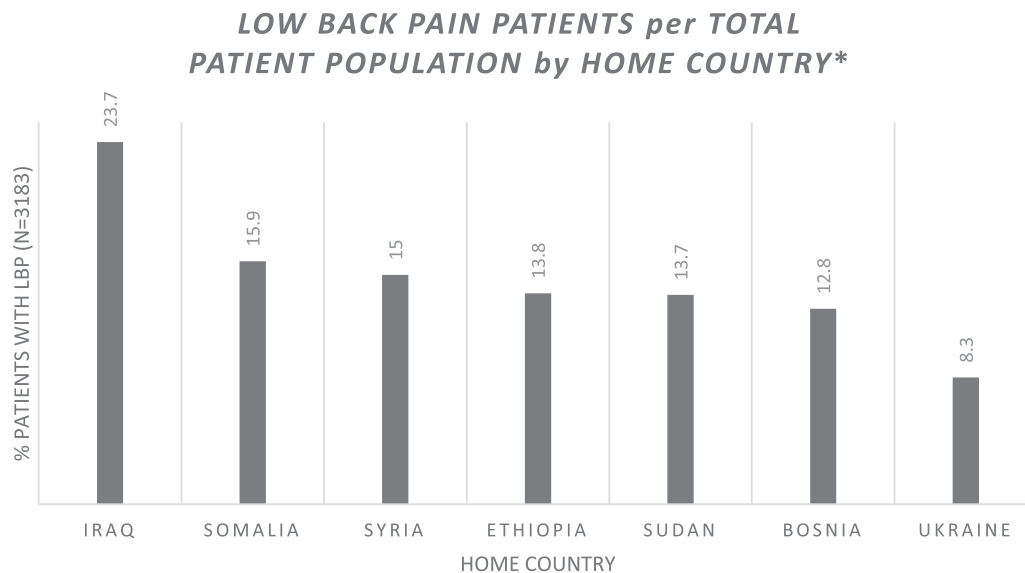
On subgroup analysis, the need for an interpreter predicted unemployment for refugee patients from five home countries: Somalia (OR: 2.98, $p<0.001$), Bosnia and Herzegovina (OR: 15.81, $p<0.001$), Ethiopia (OR: 3.14, $p<0.001$), Iraq (OR: 4.18, $p<0.001$), and Sudan (OR: 3.89, $p<0.001$). Female sex was a statistically significant predictor of unemployment only for Somali patients (OR: 1.43, $p=0.005$). Mental illness significantly predicted unemployment for refugee patients from Somalia (OR: 2.07, $p<0.001$), Bosnia and Herzegovina (OR: 2.58, $p=0.039$),

Table 1
Patient characteristics by low back pain.

		Total patients (column %) N = 3183	Low back pain (LBP) (col %) N = 488	No LBP (col %) N = 2695	p-value		
Sex	Female	1758 (55.2)	301 (61.7)	1457 (54.1)	0.002		
	Male	1425 (44.8)	187 (38.3)	1238 (45.9)			
Age	Mean ± SD	42.9 ± 16.4	47.1 ± 16.1	42.1 ± 16.3	<0.001		
Home country	Belarus	23 (0.7)	1 (0.2)	22 (0.8)	0.004		
	Bhutan	6 (0.2)	0 (0.0)	6 (0.2)			
	Bosnia and Herzegovina	280 (8.8)	36 (7.4)	244 (9.1)			
	Congo	15 (0.5)	0 (0.0)	15 (0.6)			
	Eritrea	19 (0.6)	1 (0.2)	18 (0.7)			
	Ethiopia	261 (8.2)	36 (7.4)	225 (8.3)			
	Iraq	266 (8.4)	63 (12.9)	203 (7.5)			
	Myanmar	25 (0.8)	4 (0.8)	21 (0.8)			
	Somalia	1696 (53.3)	269 (55.1)	1427 (52.9)			
	Sudan*	460 (14.5)	63 (12.9)	397 (14.7)			
	Syria	60 (1.9)	9 (1.8)	51 (1.9)			
	Ukraine	72 (2.3)	6 (1.2)	66 (2.4)			
	Interpreter needed	Yes	1340 (42.1)	245 (50.2)		1095 (40.6)	<0.001
		No	1842 (57.9)	243 (49.8)		1599 (59.4)	
Missing		1	0	1			
Employment status	Unemployed**	1280 (41.5)	241 (49.5)	1039 (40.0)	<0.001		
	Employed	1805 (58.5)	246 (50.5)	1559 (60.0)			
	Missing	98	1	97			
Mental illness	Yes	677 (21.3)	154 (31.6)	523 (19.4)	<0.001		
	No	2506 (78.7)	334 (68.4)	2172 (80.6)			
Illicit drug use	Yes	53 (2.9)	2 (0.5)	51 (3.5)	0.003		
	No	1794 (97.1)	370 (99.5)	1424 (96.5)			
	Missing	1336	116	1220			
Tobacco use	Yes	343 (13.0)	64 (13.3)	279 (13.0)	0.853		
	No	2291 (87.0)	418 (86.7)	1873 (87.0)			
	Missing	549	6	543			

* Includes South Sudan

** Disabled, not employed, retired; ages 18 – 65



*Countries represented by > 40 patients

Fig. 1. Low back pain patients per total patient population by home country*

*Countries represented by > 40 patients.

and Iraq (OR: 2.22, p=0.028). Drug use was not predictive of unemployment on subgroup analysis of any individual home country. LBP was not predictive of unemployment in aggregate (OR: 1.12, p=0.336) or in subgroup analysis for any home country. The only variable which consistently predicted unemployment on both aggregate and subgroup levels for each home country was the need for an interpreter.

Discussion

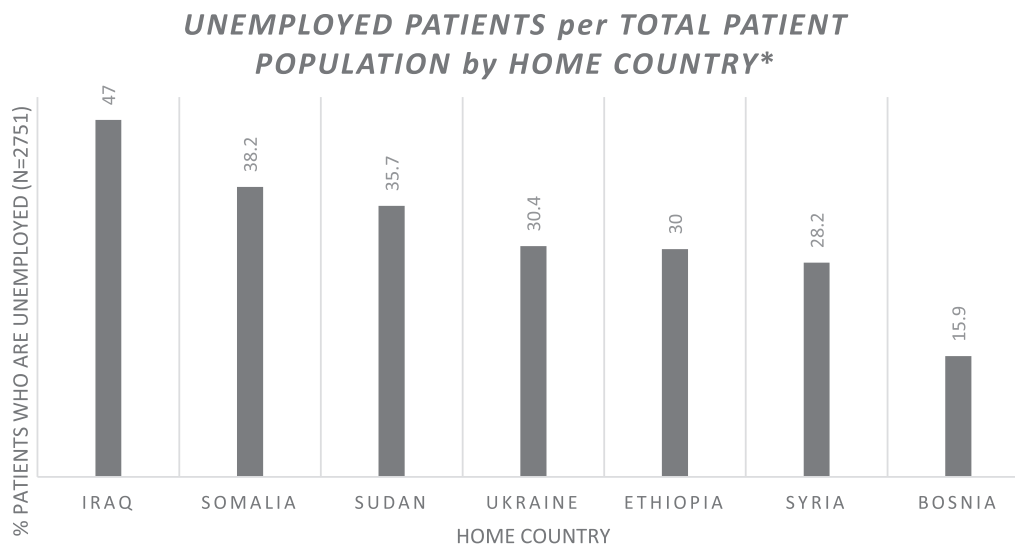
Aside from directly benefitting financial stability, safe housing, education opportunities, and self-efficacy [9], employment also provides social network-related benefits of full host-community integration for refugees and their children. In this project’s study population, un-

Table 2
Patient characteristics by employment.

		Total patients (column %) N = 2751	Unemployed* (col %) N = 973	Employed (col %) N = 1778	P Value		
LBP	Yes	416 (15.1)	174 (17.9)	242 (13.6)	0.003		
	No	2335 (84.9)	799 (82.1)	1536 (86.4)			
Sex	Female	1537 (55.9)	606 (62.3)	931 (52.4)	<.001		
	Male	1214 (44.1)	367 (37.7)	847 (47.6)			
Age	Mean ± SD	39.1 ± 12.6	39.9 ± 14.3	38.7 ± 11.6	0.088		
Home country	Belarus	19 (0.7)	0 (0.0)	19 (1.1)	<.001		
	Bhutan	6 (0.2)	3 (0.3)	3 (0.2)			
	Bosnia and Herzegovina	239 (8.7)	38 (3.9)	201 (11.3)			
	Congo	15 (0.5)	7 (0.7)	8 (0.4)			
	Eritrea	12 (0.4)	5 (0.5)	7 (0.4)			
	Ethiopia	240 (8.7)	72 (7.4)	168 (9.4)			
	Iraq	232 (8.4)	109 (11.2)	123 (6.9)			
	Myanmar	21 (0.8)	7 (0.7)	14 (0.8)			
	Somalia	1462 (53.1)	558 (57.3)	904 (50.8)			
	Sudan**	403 (14.6)	144 (14.8)	259 (14.6)			
	Syria	46 (1.7)	13 (1.3)	33 (1.9)			
	Ukraine	56 (2.0)	17 (1.7)	39 (2.2)			
	Interpreter needed	Yes	1019 (37.0)	543 (55.8)		476 (26.8)	<.001
		No	1732 (63.0)	430 (44.2)		1302 (73.2)	
Mental illness	Yes	568 (20.6)	264 (27.1)	304 (17.1)	<.001		
	No	2183 (79.4)	709 (72.9)	1474 (82.9)			
Illicit drug use	Yes	53 (3.3)	26 (4.4)	27 (2.7)	0.067		
	No	1554 (96.7)	570 (95.6)	984 (97.3)			
Tobacco use	Yes	310 (13.5)	121 (14.4)	189 (13.0)	0.353		
	No	1989 (86.5)	722 (85.6)	1267 (87.0)			
	Missing	452	130	322			

* Disabled, not employed, retired; ages 18 – 65

** Includes South Sudan



*Countries represented by > 40 patients

Fig. 2. Unemployed patients per total patient population by home country*

*Countries represented by > 40 patients.

employment was predicted by four factors: the patient-reported need for an English interpreter (OR: 3.35, p<.001), female sex (OR: 1.40, p<.001), mental illness (OR: 1.82, p<.001), and illicit drug use (OR: 1.92, p=0.032). It was not predicted by a diagnosis of LBP.

Low back pain

At 15.3%, LBP prevalence in this group of refugees was slightly higher than the global point prevalence of LBP, calculated at approx-

imately 12% [32]. The subgroup prevalence among Iraqi refugees was particularly high at 23.7%. Prevalence among Southeast Minnesotan Black refugees who do not report LBP to their primary care provider is unknown but is possibly higher than average as well, as Black residents of Southeast Minnesota show a significantly higher observed to expected ratio (OER) of LBP of 1.53, as compared to Asian, White, and Latinx residents of the region (OERs of 0.80, 1.01, and 1.12, respectively) [33]. Since a higher percentage of this study's unemployed refugees had LBP (17.9%) as compared to employed patients (13.6%), an explanatory

Table 3
Regression analysis of refugee unemployment*

		N	Odds ratio	Lower CI	Upper CI	P value
LBP	No	2316	1.00	.	.	
	Yes	416	1.12	0.89	1.43	0.336
Interpreter needed	No	1713	1.00	.	.	
	Yes	1019	3.35	2.81	4.00	<.001
Sex	Male	1205	1.00	.	.	
	Female	1527	1.49	1.24	1.79	<.001
Mental illness	No	2165	1.00	.	.	
	Yes	567	1.82	1.46	2.26	<.001
Illicit drug use	No	1539	1.00	.	.	
	Yes	53	1.92	1.06	3.50	0.032

* The model was also adjusted for age, BMI, home country, and tobacco use.

factor of this disparity may be found in exploring the informal economy, which entails unregulated or undocumented work activities such as childcare, housework, and services performed for cash. Psychosocial factors related to histories of trauma and forced displacement may also contribute [34], as there was a statistically significant association in this study between LBP and mental illness.

Interestingly, contrary to findings from studies implicating LBP as a leading cause of unemployment in high income countries [35–37], a diagnosis of LBP does not predict unemployment for this group. This finding may illuminate a novel dimension of the healthy immigrant effect, wherein upon arrival in their host country, immigrants are generally healthier than those native to the host country [38]. Specifically, it may indicate a healthier, more guideline-concordant perception of the relationship between LBP and work (current guidelines encourage work participation as a method of managing LBP) [39,40] in the refugee population as compared to non-refugee populations studied in North America and Europe.

Need for interpreter

Refugee unemployment was predicted by a patient's self-reported need for English interpretive services. Limited English proficiency is frequently a barrier for individuals who are trying to obtain and maintain formal employment, especially jobs that are more secure, higher paying, and offer benefits, as these kinds of jobs frequently require fluent English [23]. Further, many jobs require a certain level of education, training, or certification. To compete for these jobs, refugees must both learn English and navigate the host country's education system. With such opportunities being limited to English-speaking refugees, many non-English speakers may opt for "employment" in the informal economy.

Sex

Another predictor of unemployment in this study was female sex. On subgroup analysis by country, female sex was predictive of unemployment in only the Somali population (OR: 1.43, $p=0.005$), with 42% ($n=352$) of Somali women in the study reporting unemployment. Nearly half of Somalia's population lives in a rural setting [24], and most traditionally lead nomadic or semi-pastoral lifestyles [25]. The spectrum of women's work in such settings can be limited to nurturing, including tending to nuclear and extended family and livestock [26]. It has been shown that a home country's sociocultural norms can persist for refugees as they transition to a host country [27]. This phenomenon complicates the relationship seen in this study between female sex and employment, as some female Somali refugees may report unemployment but are actually "employed" in such informal sectors as childcare and housekeeping.

Mental health and drug use

Two other predictors of unemployment were mental illness and illicit drug use. Refugees who migrate, resettle, and adjust to a host country

commonly experience increased challenges to both mental and physical health [28]. Mental illnesses such as depression, post-traumatic stress disorder, and anxiety may present more frequently in refugee populations [29]. Disease prevalence, coupled with daily stressors such as legal uncertainties, social isolation, unstable housing, and fractured family structures may put refugees at increased risk for illicit drug use as a coping strategy [30]. Additionally, mental illness-related stigma, health illiteracy, language barriers, and a dearth of counselors proficient in refugees' languages and cultures [31] may limit access to professional mental healthcare.

Limitations

There are limitations to this study. A patient's refugee status is not recorded in the electronic medical records analyzed for this study. The algorithm used to determine a patient's refugee status, while innovative, could not differentiate between refugees, asylees, and migrants. In addition, the algorithm may inadvertently have included a non-refugee whose primary language matches refugees' primary languages and excluded refugees whose home country is not the reported country of origin (e.g., a patient who reports Kenya as a country of origin but fled Somalia for Kenya as a refugee before emigrating to the U.S.). A patient's length of time in the U.S. was also inaccessible in the dataset, which could influence the healthy immigrant effect.

Additionally, due to the limited diagnostic acuity of source data, this study was unable to account for the effects on unemployment of various phenotypes of LBP, including pain intensity, duration, impact on ADLs, and etiology. While this study's findings regarding the relationship between unemployment and generic LBP in refugees are compelling from a public health perspective, this limitation diminishes their clinical value.

This study's findings have limited generalizability. The multicenter, multispecialty clinic involved in this study provides a significant proportion of medical care to the Southeast Minnesota region, but not all of it. Also, refugees with LBP who do not seek medical care are not included in this study. This may be a sizeable population, given both evidence that refugees' health beliefs may be discordant with the Western biomedical model [2] and the possibility that refugees whose home countries lack specialized spinal care may not be aware of care options in the U.S. Finally, the effects of LBP on refugees who are formally unemployed but informally employed (e.g., stay-at-home moms and cash workers) are not reflected in this study. LBP prevalence in this population may be similarly high, but its predictive role of informal unemployment is unknown.

Next steps

Further investigations should phenotype refugees' LBP in order to clarify the relationships between pain intensity, duration, impact on ADLs, and etiology and unemployment. Furthermore, refugees' own perceptions of LBP, its etiology, and its relationship to work should also

be assessed. Refugees may view nonspecific, self-limiting LBP appropriately as a benign aspect of daily working life and not as a problem necessarily preventing work. Host-community integration carries a risk of adoption of the local prevailing perception of LBP as a medical problem requiring work absence and costly treatment, and it is well known that other measures of immigrant health tend to assimilate to native-born levels over time [38,41].

Qualitative research methods can be employed both to assess the effects on unemployment of LBP phenotypes, and to understand trends in Southeast Minnesotan refugees' beliefs regarding LBP. Results can guide local clinical efforts to provide high-value spine care to refugees who suffer from LBP. Results can also be utilized in research efforts to develop culturally sensitive high-value spine care models for use in lower resource settings globally.

Future community-based studies should also examine the relationships between employment and English proficiency, female sex, mental illness, and drug use in both formal and informal economies. Additionally, non-English-speaking, female, mentally ill, and drug-using refugees in Olmsted County should be engaged to assess interest in formal employment, and community resources should be mobilized accordingly.

Conclusions

These results indicate that some groups of refugees in Southeast Minnesota have a high prevalence of LBP. However, while refugees' English proficiency, sex, mental health status, and drug use predict unemployment, LBP does not, contrary to findings from multiple studies implicating LBP as a cause of unemployment in high-income countries. This latter finding may illuminate a novel dimension of the healthy immigrant effect and indicate a divergent perception of the relationship between LBP and work in the refugee population as compared to non-refugee populations studied in North America and Europe. Further assessment of the phenotypes and perceptions of LBP and their relationship to work for refugees is indicated, as are studies examining the relationships between employment and English proficiency, female sex, mental illness, and drug use in both formal and informal economies.

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Declarations of Competing Interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Supplementary materials

Supplementary material associated with this article can be found, in the online version, at [doi:10.1016/j.xnsj.2022.100181](https://doi.org/10.1016/j.xnsj.2022.100181).

Appendix A

Country of origin	Refugees resettled in Minnesota between 2010 and 2020 [1]
Myanmar	6888
Somalia	6686
Bhutan	1040
Iraq	1011
Ethiopia	996
Dem. Rep. Congo	493
Ukraine	362
Eritrea	240
Belarus	123
Sudan*	109
Bosnia and Herzegovina**	0

* Includes South Sudan

** Inclusion recommended by community partners

Appendix B

Primary language	Home country designation (unless country of origin above)
Amharic	Ethiopia
Anuak	Ethiopia
Arabic	Iraq/ Sudan
Bosnian	Bosnia and Herzegovina
Burmese	Myanmar
Dinka	Sudan*
Eastern Kayah	Myanmar
Karen	Myanmar
Nuer	Sudan
Oromo	Ethiopia
Somali	Somalia
Tigrinya	Eritrea

* Includes South Sudan

Appendix C

ICD-10 codes

M47.	815
	816
	817
	818
M51.	25
	26
	27
	35
	36
	37
	45
	46
	47
	85
	86
	87
	9
M54.	31
	32
	41
	42
	5
	9
S30.	OXXA
	OXXS
	OXXD
S33	
S39.	002A
	002S
	002D
	012A
	012S
	012D

(continued on next page)

	092A
	092S
	092D
	82XA
	82XS
	82XD
	92XA
	92XS
	92XD
M99.	03
	04
	05
	13
	14
	15
	23
	24
	25
	33
	34
	35
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