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### Association of outdoor activity restriction and income loss with patient-reported outcomes of psoriasis during the COVID-19 pandemic: A web-based survey



To the Editor: Under the circumstances of the COVID-19 epidemic, patients with psoriasis or other chronic diseases have been confronted with limited accessibility to health care and medicine. Some underwent income loss or unemployment, which placed them at additional risks of adverse health

outcomes.<sup>1</sup> The impacts of COVID-19 varied across subgroups of people, and we used outdoor activity restriction and loss of income as the proxy measures of the impacts. We investigated the associations of these impacts with the patient-reported outcomes of psoriasis through a web-based survey in China between February 25, 2020, and March 6, 2020.

Outdoor activity restriction was categorized as unaffected, restricted, and quarantined. Loss of income was categorized as complete loss, reduced, and unaffected. The primary outcome was the exacerbation of disease, determined by the Global Rating of Change. Secondary outcomes included perceived stress (visual analog scale),<sup>2</sup> symptoms of anxiety (2-item Generalized Anxiety Disorder) and depression (2-item Patient Health Questionnaire), adherence to treatment, and health care use. Covariates included sex, age, educational level, annual income, marital status, type of psoriasis, course of disease, body surface area of lesions, and comorbidities. Details of the measures are provided in the supplemental materials (available via Mendeley at <http://doi.org/10.17632/gtmhpx4g2f.1>). The data were analyzed with R, version 3.5.2 (R Core Team, Vienna, Austria). Multivariable logistic regression was used to estimate the associations with adjustments. The effect size is presented as adjusted odds ratio (aOR) and 95% confidence interval (CI). *P* values of less than .05 were considered statistically significant.

A total of 926 valid questionnaires was collected. One reported confirmed infection with COVID-19. The mean age of the patients was  $33.1 \pm 12.2$  years, and 36.9% were female. The characteristics of

**Table I.** Associations of outdoor activity restriction with patient-reported outcomes of psoriasis

Patient-reported outcomes	Unaffected (n = 512)		Restricted (n = 291)				Quarantined at home or in hospital (n = 123)			
	n (%)	OR	n (%)	OR (95% CI)	aOR (95%CI)*	<i>P</i>	n (%)	OR (95% CI)	aOR (95%CI)*	<i>P</i>
Deteriorated psoriasis	194 (37.9)	1	139 (47.8)	1.50 (1.12-2.01)	1.39 (1.03-1.88)	.034	72 (58.5)	2.31 (1.55-3.46)	2.08 (1.38- 3.15)	.001
Perceived stress (VAS, $\geq 7$ )	76 (14.8)	1	64 (22.0)	1.62 (1.12-2.34)	1.48 (1.01-2.18)	.044	30 (24.4)	1.85 (1.15-2.99)	1.51 (0.92-2.71)	.107
Anxiety (GAD-2, $\geq 3$ )	321 (62.7)	1	199 (68.4)	1.29 (0.95-1.75)	1.16 (0.85-1.60)	.346	94 (76.4)	1.93 (1.23-3.04)	1.66 (1.04-2.64)	.033
Depression (PHQ-2, $\geq 3$ )	327 (63.9)	1	209 (71.8)	1.44 (1.06-1.97)	1.23 (0.89-1.71)	.219	95 (77.2)	1.92 (1.21-3.04)	1.60 (1.00-2.59)	.053
Nonadherence to treatment	344 (67.2)	1	204 (70.1)	1.15 (0.84-1.56)	1.04 (0.76-1.45)	.793	86 (69.9)	1.14 (0.74-1.74)	1.06 (0.68-1.65)	.804
No health care use	339 (66.2)	1	198 (68.0)	1.09 (0.80-1.48)	1.09 (0.80-1.50)	.580	68 (55.3)	0.63 (0.42-0.94)	0.66 (0.44-1.00)	.049

aOR, Adjusted odds ratio; CI, confidence interval; GAD-2, 2-item Generalized Anxiety Disorder; OR, unadjusted odds ratio; PHQ-2, 2-item Patient Health Questionnaire; VAS, visual analog scale.

\*Adjusted for age, educational level, annual income, marital status, history of hypertension, type of psoriasis, and income loss.

**Table II.** Associations of income loss with patient-reported outcomes of psoriasis

Patient-reported outcomes	Unaffected (n = 263)		Reduced (n = 265)				Complete loss (n = 398)			
	n (%)	OR	n (%)	OR (95% CI)	aOR (95% CI)*	P	n (%)	OR (95% CI)	aOR (95% CI)*	P
Deteriorated psoriasis	89 (33.8)	1	100 (37.7)	1.19 (0.83-1.69)	1.12 (0.77-1.62)	.561	216 (54.3)	2.32 (1.68-3.20)	2.15 (1.46-3.15)	<.001
Perceived stress (VAS, ≥7)	26 (9.9)	1	39 (14.7)	1.57 (0.93-2.67)	1.57 (0.91-2.71)	.103	105 (26.4)	3.27 (2.06-5.19)	3.26 (1.91-5.57)	<.001
Anxiety (GAD-2, ≥3)	146 (55.5)	1	174 (65.7)	1.53 (1.08-2.18)	1.39 (0.96-2.00)	.080	294 (73.9)	2.27 (1.63-3.15)	1.73 (1.17-2.56)	.006
Depression (PHQ-2, ≥3)	146 (55.5)	1	177 (66.8)	1.61 (1.13-2.29)	1.48 (1.02-2.15)	.038	308 (77.4)	2.74 (1.96-3.85)	2.37 (1.58-3.57)	<.001
Nonadherence to treatment	156 (59.3)	1	173 (65.3)	1.29 (0.91-1.84)	1.22 (0.84-1.76)	.292	305 (76.6)	2.25 (1.60-3.16)	2.18 (1.45-3.26)	<.001
No health care use	181 (68.8)	1	179 (67.5)	0.94 (0.65-1.36)	0.92 (0.62-1.35)	.656	245 (65.3)	0.73 (0.52-1.01)	0.78 (0.52-1.16)	.216

aOR, Adjusted odds ratio; CI, confidence interval; GAD-2, 2-item Generalized Anxiety Disorder; OR, unadjusted odds ratio; PHQ-2, 2-item Patient Health Questionnaire; VAS, visual analog scale.

\*Adjusted for age, educational level, annual income, marital status, history of hypertension, type of psoriasis, and outdoor activity restriction.

participants are shown in the supplemental materials. A total of 405 (43.7%) reported moderate to much exacerbation of psoriasis. After adjustments, outdoor activity restriction was positively associated with the exacerbation of psoriasis, stress, and symptoms of anxiety and depression in a dose-response manner but was not associated with nonadherence (Table I). Similarly, income loss was associated with the exacerbation of psoriasis, stress, and symptoms of anxiety and depression (Table II). Differently, income loss was significantly associated with nonadherence to treatment but was not associated with health care utilization. To further determine the independent factors, stepwise regression was conducted, and we found that nonadherence to treatment (aOR, 3.69; 95% CI, 2.67-5.18), stress (aOR, 1.17; 95% CI, 1.11-1.23), quarantine (aOR, 2.05; 95% CI, 1.33-3.18), and income loss (aOR, 1.51; 95% CI, 1.06-2.15) were independently associated with the exacerbation of psoriasis.

Loss of income and work-related benefits experienced by the unemployed consequently lead to impaired health outcomes<sup>3</sup> through mechanisms involving unhealthy coping behaviors and increased psychological distress.<sup>4</sup> This hypothesis is supported by our finding that nonadherence behavior (68.5%) and perceived stress were independently associated with both income loss and exacerbation of psoriasis. Isolation and temporarily closed outpatient services further limited patients' abilities to access to health care, especially for those who were not familiar with or able to access tele dermatology, resulting in discontinued treatment and deteriorated condition.<sup>5</sup> In conclusion,

telemedicine and a supply of medications in addition to mental health intervention are needed for patients with psoriasis to improve their health outcomes.

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### The importance of fit testing in decontamination of N95 respirators: A cautionary note



*To the Editor:* The severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) COVID-19 pandemic resulted in a critical shortage of personal protective equipment (PPE), particularly N95 filtering facepiece respirators (FFRs). Decontamination methods and reuse of FFRs, including ultraviolet germicidal irradiation (UVGI), hydrogen peroxide vaporization, microwave-generated steaming, and dry heating, have been rushed into implementation. However, if the treatment affects filtration or fit, decontamination

is achieved but loss of integrity could be catastrophic to the wearer.

Our recent *JAAD* publication discusses research with a repurposed dermatology phototherapy desktop device to administer UVGI for N95 decontamination.<sup>1</sup> This letter highlights critical differences in fit testing performance collected for different respirator models treated with UVGI administered with this repurposed unit. The effects on respirators of using the suggested UVGI dose of 1 to 2 J/cm<sup>2</sup> were variable.<sup>2</sup>

The respirator fit testing was conducted by the Henry Ford Health System Department of Infection Prevention and Control according to the saccharin solution aerosol protocol laid out by the United States Occupational Safety and Health Administration (OSHA).<sup>3</sup> Irradiation of respirators with UVGI was conducted by the Henry Ford Health System Department of Dermatology Photomedicine Unit. A new, unused respirator served as the test respirator, and irradiation was performed after establishing that an unused respirator passed a baseline fit test. The outside-facing and wearer-facing surfaces of the respirators were irradiated by the Daavlin Desktop UVC Germicidal Lamp (Daavlin, Bryan, OH) with a dose of 1.5 J/cm<sup>2</sup> to each side. If the respirator passed this test, it was considered to have successfully completed 1 cycle. This process was then repeated to establish the number of irradiation cycles that the respirator would pass the fit test. Testing was ceased if a respirator did not pass the fit test. The results are reported in [Table I](#).

The UVGI treatment may degrade polymers in the respirators themselves and impact the elasticity of the bands.<sup>4</sup> The myriad respirators available in this crisis react differently to a given UVGI dose and survive different numbers of decontamination cycles. This may hold true for other respirator treatment methods as well.

Our data strongly indicate that to protect the safety of the N95 respirator user, fit testing after decontamination must be done each time a new model is introduced to a health care system. This has significant safety implications, because varied decontamination methods are being used by different institutions.<sup>5</sup> In addition, N95 respirators should be physically examined before and after decontamination cycles to check for signs of degradation that may have occurred while removing and handling.

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