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Erin M. Hill

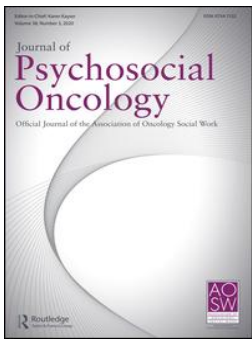
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Experiences of women with ovarian cancer during the COVID-19 pandemic: Examining intolerance of uncertainty and fear of COVID-19 in relation to psychological distress

Erin M. Hill, PhD, Andriana Frost, MS, and Jamie D. Martin, BA

Department of Psychology, West Chester University, West Chester, Pennsylvania, USA

ABSTRACT

Purpose: Our research aimed to examine the role of intolerance of uncertainty (IU) in psychological distress (PD) among women with ovarian cancer. Fear of COVID-19 (FCOV) was examined as a mediator, and participant health status and the reopening status of their geographic region were examined as moderators.

Design: A cross-sectional quantitative design was employed.

Participants: Participants ($n = 100$) were recruited through various online sources and completed the study via Qualtrics.

Methods: Moderated mediation models and post-hoc linear regression analyses were used to determine the role of predictor variables in PD.

Results: No significant moderators or mediators were found. Despite a strong correlation between FCOV and IU, both variables explained unique variance in the anxiety and stress models, while FCOV was not significant in the depressive symptoms model.

Implications for Providers: Both IU and FCOV should be considered in helping women with ovarian cancer manage their PD during the COVID-19 pandemic.

KEYWORDS

Fear of COVID-19; intolerance of uncertainty; ovarian cancer; perceived health status; psychological distress; reopening status

Introduction

Ovarian cancer is associated with significant mental and physical health challenges.¹⁻³ Due to the vague presentation of symptoms and lack of population-wide screening, women with ovarian cancer are often not diagnosed until their cancer has progressed to an advanced stage.⁴ Correspondingly, the symptom burden, and the extensive and invasive treatments can have a significant impact on physical functioning and quality of life.^{2,5} On top of an already difficult illness, the COVID-19 pandemic presents additional challenges for this population; for example, individuals with cancer experience elevated anxiety about their risk of contracting

COVID-19,⁶ and significant strain in terms of managing treatment decisions in relation to the pandemic status in their community.⁷ Given the lengthy and arduous disease and treatment trajectories that women with ovarian cancer endure, coupled with the additional stressors brought on by the COVID-19 pandemic, it is critical to understand factors associated with mental health and well-being in this population.

There have been various psychological factors linked to mental health among women with ovarian cancer, such as social support⁸ and coping strategies.⁹ One noteworthy characteristic linked to psychological distress (encompassing symptoms of depression, anxiety, stress¹⁰) is intolerance of uncertainty (IU)—defined as the extent to which an individual experiences difficulty in the face of uncertain circumstances.¹¹ In addition to being a correlate of psychological distress, trait IU is also considered a vulnerability factor for a range of mental health disorders¹² and has been linked to fear of COVID-19 as well as health anxiety in the context of the COVID-19 pandemic.^{13,14} Among women with ovarian cancer, IU has been linked to depressive symptoms, anxiety, and loneliness.⁸ Given that the COVID-19 pandemic is marked by many uncertainties (e.g., uncertainty about contracting the virus, the impact to healthcare), it is likely that women with ovarian cancer with elevated levels of IU are also likely to experience psychological distress during this challenging time.

In addition to IU, it is important to examine how women with ovarian cancer perceive the viral threat of COVID-19. In helping to understand the extent to which individuals in the general population fear COVID-19, Ahorsu et al.¹⁵ developed the fear of COVID-19 (FCOV) scale—and found that the construct was positively correlated with depressive symptoms, anxiety, perceived infectability of the virus, and germ aversion. Subsequent research has reported similar findings; FCOV has been linked to depressive symptoms and anxiety in other research,^{16,17} as well as decreased physical and environmental quality of life.¹⁸ Furthermore, research supports the notion that a greater FCOV is associated with more public health-compliant behaviors such as social distancing and regular hand washing.¹⁸

The relationship between IU and psychological distress along with the potential mediating role of FCOV has been examined in the general population.¹³ Using a sample of Turkish individuals, Satici et al.¹³ found that rumination and FCOV were serial mediators of the relationship between IU and mental well-being. Similar research has examined IU and future anxiety as mediators of the relationship between FCOV and well-being outcomes.^{16,19} Overall, the research suggests that uncertainty is particularly salient during this pandemic—and may be associated with increased fear, psychological distress, and health anxiety.²⁰ Therefore, it is likely that for women with ovarian cancer, having elevated levels of IU could fuel FCOV, which, in turn, could contribute to or exacerbate psychological distress.

When examining the relationship between IU and FCOV in the oncology population, it is critical to take into account the health status of the individual with cancer. There is evidence to suggest that patients are having their treatments delayed or modified due to the pandemic.^{7,21,22} Further, in a study conducted among women with ovarian cancer, Frey et al.⁷ found that most participants were experiencing significant cancer worry, which, in turn, was associated with being younger and having experienced a delay in oncology care. Additionally, presuming an immunocompromised state was associated with higher levels of worry, anxiety, and depression. Given the challenges associated with cancer—which have been compounded by the pandemic, it is possible that the relationship between IU and FCOV could be exacerbated among individuals still undergoing treatment (not in remission) and/or among those in an immunocompromised state (related to previous or current treatment).

In addition to health status, it is important to consider the severity of the pandemic in each participant's geographic region in terms of understanding the IU-FCOV relationship. Specifically, viral spread in relation to the COVID-19 pandemic has been variable across geographic regions, both within the United States and globally. Therefore, in the present study, to help capture the severity of the pandemic, we measured the reopening status of each participant's geographic region (specifically, the degree of lockdown being enforced). Research suggests that lockdown measures, which may be necessary for helping to control the viral spread, have been associated with loneliness, psychological distress, and poorer life satisfaction.²³ Therefore, it is possible that when viral spread is high (and strict lockdown measures are in place), the relationship between IU and FCOV could be stronger compared to circumstances where the viral spread is lower (and lockdown measures are less strict).

The present study

The aim of the present study was to examine the relationship between IU (predictor variable) and psychological distress (outcome variable) among women with ovarian cancer during the COVID-19 pandemic. FCOV was examined as a mediator in the model; that is, we proposed that high levels of IU would be associated with greater fears of COVID-19, consistent with previous research on IU and FCOV,¹³ which, in turn, would be predictive of elevated levels of psychological distress. We also examined health status and reopening status of each participant's geographic region as moderating variables in the relationship between IU and FCOV in the model. Specifically, we proposed that for those with poorer health status (not in remission or being immunocompromised), the association between IU and FCOV would be stronger compared to those who do not perceive their health as at risk. Finally, we wanted to take into

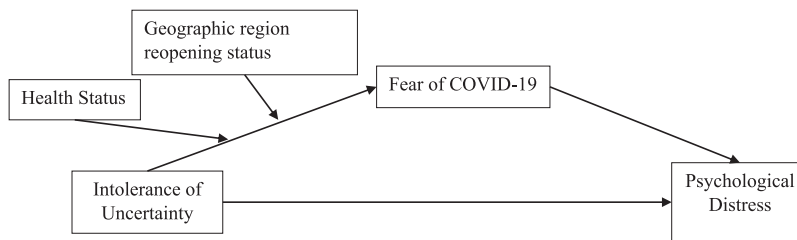


Figure 1. Examining the indirect effect of intolerance of uncertainty on psychological distress through fear of COVID-19: Testing health status and geographic reopening status as potential moderators.

account the pandemic reopening status of each participant's geographic location—anticipating that the relationship between IU and FCOV would be stronger for individuals in geographic locations marked by a less controlled pandemic state (and thus, stricter lockdown conditions). The overall model tested in the present study is presented in [Figure 1](#).

Method

Participants and procedures

Participants ($n = 100$) were recruited through a variety of mechanisms: email lists from our previously conducted studies, posts on social media (e.g., Facebook, Twitter), and through various cancer-related organizations (convenience sampling was employed). Inclusion criteria were the following: aged 18 years or older and having received a diagnosis of ovarian cancer. No exclusion criteria were applied. We did not set geographic limitations in our recruitment (i.e., participants were recruited both within and outside of the United States). In participating in the study, participants completed the consent form, questions, and questionnaires via Qualtrics. At the end of the study, participants had the opportunity to enter into a draw for a \$50 Amazon gift card. Data collection took place between July and October 2020. During this time, COVID-19 cases continued to rise globally. Within the United States, between July 1, 2020 and October 31, 2020, cases per day went from 35,575 to 89,048, with cumulative deaths rising from 126,573 to 227,178 during the time period.²⁴ The study protocol was approved by the authors' institutional review board.

Measures

Intolerance of uncertainty

The 12-item Intolerance of Uncertainty Scale²⁵ was used in the present study. Participants responded to each item on a 5-point Likert scale ranging from 1 “not at all characteristic of me” to 5 “entirely characteristic of

me.” Summing the items computes an overall IU score. In the present study, the total scale had satisfactory internal consistency ($\alpha = .89$).

Fear of COVID-19

The 7-item Fear of COVID-19 Scale (FCS¹⁵) was used in the present study. For each item of the scale, participants responded on a 5-point Likert scale ranging from 1 “strongly disagree” to 5 “strongly agree.” A total score is computed by summing the items. In the present study, the FCS had satisfactory internal consistency ($\alpha = .85$).

Psychological distress

The 21-item Depression Anxiety Stress Scales (DASS-21) were used to measure psychological distress.¹⁰ Each construct is assessed with 7 items, with each item rated on a 4-point Likert scale ranging from 0 “did not apply to me at all” to 3 “applied to me very much, or most of the time.” For each scale, items are summed and then multiplied by two to obtain a score that is comparable to the 42-item DASS.¹⁰ In the present study, the three scales had adequate internal consistency (anxiety symptoms; $\alpha = .73$; depressive symptoms: $\alpha = .92$; stress: $\alpha = .87$).

Demographic and medical information

Participants were asked to provide information about their age, country of residence, province/state, ethnicity, education level, marital status, employment status, and family income. They were also asked whether their employment status and income were impacted by the COVID-19 pandemic. In terms of medical information, participants were asked about their date of diagnosis, stage at diagnosis, current and previous treatments, current medical status (including whether they were in remission), to what extent they feel they are immunocompromised (4-point scale: strongly disagree to strongly agree), their attribution about why they are immunocompromised, recurrence information, and other medical issues.

COVID-19 and other pandemic-related information

Participants were asked whether they have had COVID-19 (yes/no) and whether the diagnosis was confirmed through testing (yes/no). They were also asked to rate extent to which they agreed with the following statements: “Compared to the general population, I am at an elevated risk for contracting COVID-19” and “If I were to contract COVID-19, compared to the general population, the course of the illness would likely be more severe.” Participants responded to each on a 4-point scale ranging from strongly disagree (1) to strongly agree (4). Participants were asked to

indicate why they believed they were at an elevated risk for contracting COVID-19; they were provided with a list of options (listed in Table 1) and they were able to indicate other reasons (open-ended). Participants were also provided with a list of preventive health practices to avoid contracting COVID-19 (e.g., social distancing, wearing a face mask out in public) and participants were to select all that applied (listed in Table 1).

In order to capture the severity of the pandemic in each participant's geographic region, we provided participants with the reopening categories used in the research team's state, Pennsylvania (red: stay-at-home order in place, life sustaining businesses only, large gatherings prohibited; yellow: stay-at-home order lifted, in-person retail allowable (curbside/delivered preferable), large gatherings of more than 25 prohibited; green: social gatherings of more than 250 prohibited, restaurants and bars can open at 50% occupancy²⁶) We then asked participants, "Using the above criteria, what best describes the pandemic phase in your geographic location?" with red, yellow, and green as response options. Participants could also elaborate on their response in an open-ended textbox directly following the question.

Statistical approach

In examining the data, it became apparent that one individual in the study had experienced COVID-19. Due to the focus of the study on IU and fears of COVID-19, which might be mitigated as a result of experiencing the illness, the individual was removed from the dataset and analyses were conducted among the 99 participants who had not been diagnosed with COVID-19. Regression assumptions were also examined; although outliers were identified for the psychological distress variables, Cook's distance indicated no influential cases in the regressions. Therefore, all cases ($n = 99$) were used to preserve power. Our initial target sample size was at least 100; according to Cohen²⁷ with a sample size of at least 91, we would have enough power (.8) to detect a medium effect with regressions containing five predictor variables.

A series of moderated mediated regressions were conducted using PROCESS in SPSS²⁸ to examine whether there would be an indirect effect of IU on psychological distress via FCOV, and the extent to which the relationship between IU and FCOV would be moderated by the individual's health status (remission status, perceived immunocompromised state) and geographic reopening status (red and yellow were combined vs. green). As will be discussed in the results section, none of the moderating or mediating effects were present when applying Models 7 and 9 of PROCESS. Therefore, post-hoc linear regressions were conducted to examine the role of all predictors (IU, FCOV, immunocompromised status, remission, reopening status) in psychological distress (depressive symptoms, anxiety, stress).

Table 1. Participant COVID-19-related experiences (n = 100).

Variable	Category	n	%
Perceived risk for contracting COVID-19	Strongly disagree	10	10.1
	Disagree	18	18.2
	Agree	47	47.5
	Strongly agree	24	24.2
	Age	38	38.4
Reasons for believing they are at risk*	Health status	50	50.5
	Personal living circumstances (e.g., living with frontline worker)	10	10.1
	Current work circumstances (e.g., working as a frontline worker)	10	10.1
	There is an outbreak of COVID-19 in my community	20	20.2
	The functioning of my immune system	40	40.4
	My experience with cancer	54	54.5
	Medical conditions other than cancer	16	16.2
	Strongly disagree	5	5.1
	Disagree	20	20.2
	Agree	56	56.6
Perceived severity of COVID-19 if contracted	Strongly agree	18	18.2
	Engaging in social distancing (i.e., staying 6 feet or more from other people)	96	97.0
	Washing hands often	97	98.0
	Frequent cleaning and disinfecting your home/work environment	78	78.8
	Avoiding large social gatherings	87	87.9
	Minimizing attending large social gatherings	62	62.6
	Wearing a face mask out in public	96	97.0
	Red	9	9.1
	Yellow	49	48.5
	Green	42	42.4
Preventive health practices to avoid contracting COVID-19*	Strongly agree	18	18.2
	Engaging in social distancing (i.e., staying 6 feet or more from other people)	96	97.0
	Washing hands often	97	98.0
	Frequent cleaning and disinfecting your home/work environment	78	78.8
	Avoiding large social gatherings	87	87.9
	Minimizing attending large social gatherings	62	62.6
	Wearing a face mask out in public	96	97.0
	Red	9	9.1
	Yellow	49	48.5
	Green	42	42.4
Pandemic-related reopening status in geographic region	Red	9	9.1
	Yellow	49	48.5
	Green	42	42.4

*Participants were able to select multiple responses. Note. Perceived risk for contracting COVID-19 – Participants were asked “How much do you agree with the following statement: Compared to the general population, I am at risk for contracting COVID-19.” Perceived severity of COVID-19 if contracted – Participants were asked “How much do you agree with the following statement? If I were to contract COVID-19, compared to the general population, the course of the illness would likely be more severe.”.

Results

Descriptives and bivariate correlations

Demographic and medical information for the sample are presented in Table 2. Participants in the present study ranged in age from 22 to 77 ($M = 55.03$, $SD = 12.01$), and had been diagnosed between 1 month and 421 months prior to participating ($M = 67.74$, $SD = 62.61$). Most women in the study identified as Caucasian ($n = 90$), were from the United States ($n = 83$), had completed college ($n = 71$) and were married ($n = 57$). In terms of health status, most participants had been diagnosed at an advanced stage (i.e., III or IV; $n = 61$). While some women were in active treatment related to presence of disease ($n = 25$), the majority ($n = 69$) reported being in remission. Participants' responses to the COVID-19-related questions are presented in Table 1. Descriptive statistics and bivariate correlations for the psychosocial variables are presented in Table 3.

Moderated mediation and post-hoc linear regression analyses

Results from the moderated mediation regression analyses are presented in Table 4. Notably, health status (perceived immunocompromised state, remission status) and reopening status did not moderate the association between IU and FCOV in the models. Accordingly, post-hoc linear regression models were conducted to instead examine the role of the predictor variables (IU, FCOV, perceived immunocompromised state, remission status, reopening status) in psychological distress. Depressive symptoms, anxiety, and stress were each examined as outcome variables in three separate regression analyses.

Standardized regression coefficients for each of the models are presented in Table 5. The depressive symptoms model was significant ($F(5, 93) = 6.88$, $p < .001$, $Adj. R^2 = .231$), with IU ($\beta = .37$, $p = .001$) and reopening status ($\beta = -.26$, $p = .006$) as the only significant predictors. Higher levels of IU were associated with depressive symptoms, and a more locked-down status of the geographic area (red or yellow status) was associated with increased depressive symptoms. The anxiety model was also significant ($F(5, 93) = 12.70$, $p < .001$, $Adj. R^2 = .374$), with FCOV emerging as the strongest predictor ($\beta = .34$, $p = .001$), followed by IU ($\beta = .30$, $p = .002$), and then reopening status ($\beta = -.17$, $p = .041$). IU and FCOV were positively predictive of anxiety symptoms, and a more locked-down status of the geographic area (red or yellow status) was associated with increased anxiety symptoms. Finally, the stress model was also significant ($F(5, 93) = 14.00$, $p < .001$, $Adj. R^2 = .399$), with IU emerging as the strongest predictor ($\beta = .37$, $p < .001$), followed by FCOV ($\beta = .34$, $p = .001$).

Table 2. Participant sociodemographic and medical information.

Demographics		Medical Information	
Variable	Category	n	%
Ethnicity	Caucasian	90	90.9
	Hispanic/Latino American	2	2.0
	African American	1	1.0
	Asian	1	1.0
	Other	4	4.0
Country of origin	Missing	1	1.0
	USA	83	83.8
	UK	3	3.0
	Canada	11	11.1
	Kenya	1	1.0
Education (completed)	Philippines	1	1.0
	Postgraduate degree	34	34.3
	College graduate	37	37.4
	Trade school/some college	18	18.2
	High school graduate	10	10.1
Family income	\$20,000 or less	7	7.1
	\$20,001-\$30,000	2	2.0
	\$30,001-\$50,000	23	23.2
	\$50,001-\$70,000	17	17.2
	\$70,001-\$100,000	25	25.3
Marital status	\$100,001 or more	22	22.2
	Missing	3	3.0
	Married	57	57.6
	Living with a partner	5	5.1
	Divorced/separated	18	18.2
	Widowed	5	5.1
	Single	14	14.1
	Variable	n	%
	Current medical status	25	25.3
	Disease state at diagnosis	26	26.3
Current active treatments*	Stage I	10	10.1
	Stage II	51	51.5
	Stage III	10	10.1
	Stage IV	2	2.0
	Missing	4	4.0
	Surgery	23	23.2
	Chemotherapy	0	0
	Radiotherapy	5	5.1
	Hormonal therapy	12	12.1
	Other	28	28.3
Cancer recurrence (for participants who reported experiencing recurrence after a period of remission; n = 44)	1 time	10	10.1
	2 times	2	2.0
	3 times	4	4.0
	4 times	4	4.0
Agreement with the statement: "I am immunocompromised."	Strongly disagree	17	17.2
	Disagree	17	17.2
	Agree	47	47.5
	Strongly agree	18	18.2

*Note. Participants in remission and with presence of disease reported active treatments. Participants were also able to report multiple active treatments.

Table 3. Bivariate correlations among psychosocial variables.

Variable	<i>M (SD)</i>	Range	1	2	3	4	5	6
1. Fear of COVID-19	16.86 (5.76)	7-34						
2. Intolerance of Uncertainty	28.97 (8.65)	14-50	.533**					
3. Depressive Symptoms	7.45 (8.67)	0-38	.332**	.437**				
4. Anxiety Symptoms	5.41 (6.08)	0-30	.554**	.497**	.611**			
5. Stress	9.13 (8.02)	0-36	.552**	.567**	.743**	.658**		
6. Perceived Risk of COVID-19	2.86 (.90)	1-4	.214*	.140	.089	.211*	.059	
7. Perceived Severity of COVID-19	2.88 (.76)	1-4	.232*	.191	.077	.196	.036	.302**

* $p < 0.05$; ** $p < 0.01$.

Note. For Perceived Risk of COVID-19 and Perceived Severity of COVID-19, participants were asked how much they agreed whether they are at risk for COVID-19 and whether COVID-19 would be more severe if they contracted it compared to the general population. Response options were ranged from strongly disagree (1) to strongly agree (4).

Table 4. Moderated mediation regression analyses examining the relationship of intolerance of uncertainty and psychological distress via fear of COVID-19.

	<i>B (SE)</i>	<i>t</i>	<i>p</i>	<i>Final Model</i>	<i>B (SE)</i>	<i>t</i>	<i>p</i>
Health Status Variables as Moderators							
FCOV as the outcome				Direct Effect in Health Status Moderator Model			
IU	.30 (.13)	2.34	.021	Depressive symptoms	.36 (.11)	3.37	.001
immuno	1.51 (3.54)	.43	.671	Anxiety	.20 (.07)	2.92	.004
remission	-5.18 (3.61)	-1.44	.154	Stress	.35 (.09)	4.10	<.001
IU x immuno	-.02 (.12)	-.14	.887				
IU x remission	.11 (.12)	.90	.368				
FCOV Model Statistics	$F(5, 93) = 9.13, p < .001$						
Reopening Status as a Moderator							
FCOV as the outcome				Direct Effect in Reopening Status Moderator Model			
IU	.43 (.08)	5.77	<.001	Depressive symptoms	.36 (.11)	3.37	.001
reopening	4.39 (3.44)	1.28	.204	Anxiety	.20(.07)	2.92	.004
IU x reopening	-.20 (.12)	-1.72	.089	Stress	.35 (.09)	4.10	<.001
FCOV Model Statistics	$F(3, 95) = 14.71, p < .001$						
Final Model – Depressive Symptoms							
IU	.36 (.11)	3.37	.001				
FCOV	.21 (.16)	1.29	.200				
Final Model Statistics	$F(2, 96) = 12.34, p < .001$						
Final Model – Anxiety							
IU	.20 (.07)	2.92	.004				
FCOV	.43 (.10)	4.21	<.001				
Final Model Statistics	$F(2, 96) = 27.45, p < .001$						
Final Model – Stress							
IU	.35 (.09)	4.10	<.001				
FCOV	.49 (.13)	3.77	<.001				
Final Model Statistics	$F(2, 96) = 33.14, p < .001$						

Note: IU = intolerance of uncertainty (total score from Intolerance of Uncertainty Scale-12; 25), FCOV = fear of COVID-19 (total score from the Fear of COVID-19 Scale; 15). The moderators were dummy coded; perceived immunocompromised state (immuno), remission status (remission), and reopening status of geographic area (reopening) were dichotomized (0 and 1, with 1 referring to being immunocompromised/in remission/green—opened up (due to low amount of individuals in red geographic areas, red and yellow were combined)). Conditional indirect effects are not presented due to non-significant moderator effects.

Discussion

In the present study, we examined IU and FCOV in relation to psychological distress among women with ovarian cancer. Health status (perceived immunocompromised state, remission status) and the reopening status of the participant's geographic region were tested as moderators in the IU-

Table 5. Post-hoc linear regression analyses examining psychosocial predictors of psychological distress.

Predictors	Depressive symptoms		Anxiety symptoms		Stress	
	β	<i>p</i>	β	<i>p</i>	β	<i>p</i>
Intolerance of uncertainty	.37	.001	.30	.002	.37	<.001
Fear of COVID-19	.08	.480	.34	.001	.34	.001
Perceived immunocompromised state	.10	.292	.12	.132	.03	.756
Remission status	-.03	.710	-.08	.330	.05	.565
Reopening status of geographic area	-.26	.006	-.17	.041	-.13	.105

Note. Perceived immunocompromised state, remission status, and reopening status of geographic area were dichotomized (0 and 1, with 1 referring to being immunocompromised/in remission/green—opened up (due to low amount of individuals in red geographic areas, red and yellow were combined)). All models were statistically significant at $p < .001$; Depressive symptoms: $F(5, 93) = 6.88, p < .001, Adj. R^2 = .231$; Anxiety symptoms, $F(5, 93) = 12.70, p < .001, Adj. R^2 = .374$; Stress: $F(5, 93) = 14.00, p < .001, Adj. R^2 = .399$.

FCOV relationship in the model. While the moderated mediation models did not indicate significant mediation or moderator effects, the post-hoc linear regression analyses indicated that IU, FCOV, and reopening status of the region were predictive of psychological distress among women with ovarian cancer during the pandemic.

Prior to interpreting the main results of the present study, it is worthwhile to note that psychological distress did not appear to be substantially higher in the present study compared to previous work in this population using the DASS-21.^{8,29} That is, we did not find evidence that women with ovarian cancer are experiencing more psychological distress in the context of the COVID-19 pandemic. Relatedly, although FCOV was correlated with mental health outcomes in our study, the mean score in our sample was lower than or similar to other samples, including among university students.^{30–32} While the women in our sample did perceive themselves to be at risk for COVID-19 and thought the disease course would be more severe, their FCOV was not higher compared to other studies that have also assessed FCOV.

With regard to the moderated mediation model examined, our overall model was not supported in the present study. First, FCOV was not a significant mediator in the relationship between IU and psychological distress. Indeed, the post-hoc linear regression models indicated that FCOV and IU explained unique variance in the stress and anxiety models in particular. Therefore, although FCOV and IU have a significant relationship—which is similar to recent research^{13,33}—it does not appear that FCOV helps to explain the association between IU and psychological distress in the context of the COVID-19 pandemic.

Additionally, the examination of the moderators indicated that the strength of the relationship between FCOV and IU was not impacted by participants' health status (perceived immunocompromised state, remission status) nor by the reopening status of their geographic region. The fears

surrounding the pandemic therefore may not be directly related to the objective risk of the individual—in terms of their health or the viral spread in their community. This finding is similar to research on fears of recurrence (FCR) among women with ovarian cancer; FCR can be elevated for individuals with both early and advanced disease³⁴—and therefore, appears unrelated to an individual's objective risk for recurrence.

In light of the non-significant findings for the overall moderated mediation model, the predictors (IU, FCOV, perceived immunocompromised state, remission status, reopening status) were examined in regressions focused on depressive symptoms, anxiety, and stress. As mentioned previously, one notable finding from the post-hoc regressions was that both IU and FCOV were predictive of anxiety and stress symptoms, indicating that the variables explain unique variance in the psychological outcomes. This finding could have direct implications for psychosocial care of individuals with cancer in the context of the pandemic. That is, while it is intuitive that IU and FCOV are related variables, they may need to be addressed as distinct considerations in clinical or support settings. Intolerance-of-uncertainty therapy has been used to target psychological distress,³⁵ but in addition to focusing on IU, it may be worthwhile to separately address fears related to COVID-19—such as fears associated with contracting the virus or fears that the virus could impact cancer-related healthcare.

The results of the post-hoc regression analyses also indicated that a more locked-down state in one's geographic region was associated with psychological distress—specifically, anxiety and depressive symptoms, but not stress. Similarly, the experience of lockdown has been associated with a deterioration of mental health among individuals from the general population.^{36,37} It is possible that a more locked-down state represents uncontrolled viral spread, and thus could be a factor in exacerbating anxiety and depressive symptoms, which might be particularly worrisome among individuals with ovarian cancer.

Furthermore, lockdowns impose restrictions on various daily behaviors and have been linked to feelings of loneliness among individuals with chronic conditions.³⁸ Given the increased health anxiety among vulnerable groups during the COVID-19 pandemic,²⁰ it is possible that women with ovarian cancer in more locked-down geographic locations (and, in turn, with less controlled viral spread) might be particularly vulnerable to the impact of the social isolation that comes with stay-at-home orders. However, given that the present study did not focus on social interactions or loneliness, this would be an important future area of study in the field of psychosocial oncology. Specifically, it will be important to understand how loneliness and social interactions are impacted by lockdowns—and how such variables relate to psychological distress.

In addition to examining factors associated with psychological distress among women with ovarian cancer during the COVID-19 pandemic, our research also collected various descriptive information about COVID-19 perceptions and preventive health behaviors. Notably, the majority of women in our sample believed that they were at risk for contracting COVID-19 and believed the course of illness would be more severe compared to the general population. The top reasons for believing they were at risk were health-related; “my experience with cancer” was the top-endorsed reason, followed by “health status,” and “the functioning of my immune system.” Consistent with the literature on individuals with cancer and their pandemic health-related behaviors,³⁹ the engagement in preventive health practices in the present sample was extremely high, with nearly all participants engaging in social distancing, washing hands often, wearing a face mask in public, and most avoiding large social gatherings. Therefore, although FCOV was not particularly high in our sample (compared to previous research.^{30–32}) it appears that women with ovarian cancer engage in various preventive health behaviors that help to protect their own health—and the health of others—during the COVID-19 pandemic.

Limitations

There are some limitations that should be noted in relation to our study. First, cross-sectional data were used in this study. Therefore, it is not possible to determine the temporal nature of the relationships. The data could be susceptible to same source bias, for example. That is, although we positioned IU and FCOV as predictors of psychological distress, it is possible, and perhaps expected, that reciprocal relationships might exist, and that distress might fuel FCOV and/or IU. Longitudinal studies would be one avenue to help address this issue and to better understand the temporal nature of the observed relationships.

It should also be noted that all data collected were self-report. While this is typical of psychological constructs, like IU and psychological distress, participants also self-reported their health status (specifically, how immunocompromised they were) as well as the reopening status of their geographic region. That is, we relied on participants’ interpretation of their province/state/region’s reopening status and how that mapped onto the traffic light system (red, yellow, green) used in Pennsylvania. Due to potential for subjective interpretation, it is possible inaccuracies impacted the present study.

Finally, it is important to note that the sample in our study may not be representative of the population of women with ovarian cancer in various ways. The majority of the sample were Caucasian, college-educated, married, and younger than the average woman with ovarian cancer (median

age of 56 in the present study vs. median age of 63 at diagnosis⁴⁰). While 25% of the sample were in active treatment at the time of data collection, the majority of the sample reported being in remission—and thus, would likely have had reduced concerns about accessing treatment/treatment delays related to the pandemic. Additionally, it is noteworthy that financial concerns have been linked to worse mental health in the context of the pandemic.⁴¹ Given the family incomes reported in the present study, it is possible that many women in the sample were protected against some of the financial hardships associated with the pandemic.

It is also particularly important to note that women of color (including Latina and African American women) were underrepresented in our sample. Given that Latino and African American communities have been disproportionately impacted by the COVID-19 pandemic in the United States,⁴² this limitation of the sample needs to be emphasized and considered in interpreting the results. It will be important for future research on oncology populations to make a concerted effort to obtain samples that are representative of the population of interest—particularly in understanding experiences related to the pandemic, which differ widely depending on socioeconomic status, race, and ethnicity.

Conclusion

The present study examined factors associated with psychological distress among women with ovarian cancer in the context of the COVID-19 pandemic. While our overall moderated mediation model was not supported, our results indicated that IU was associated with anxiety, depressive symptoms, and stress, and FCOV was also associated with anxiety and stress. Our models also indicated that living in a more locked-down geographic region was associated with both depressive symptoms and anxiety. Furthermore, our descriptive results indicate that women with ovarian cancer are concerned about contracting the virus, its potential severe course due to their health status, and accordingly, engage in multiple preventive health behaviors to help prevent contracting the virus. Given the ongoing challenges associated with the COVID-19 pandemic for individuals with cancer, examining how the pandemic and related circumstances, such as delayed healthcare and stay-at-home orders, impact both mental health and social well-being would be important avenues for future research.

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