ORIGINAL ARTICLE

How Does Anxiety Affect Adults with Skin Disease? Examining the Indirect Effect of Anxiety Symptoms on Impairment Through Anxiety Sensitivity

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Abstract

Emerging research suggests social anxiety, health anxiety, and generalized anxiety disorder symptoms are particularly relevant for dermatology patients. Unfortunately, very few studies have investigated how these anxieties affect quality of life among individuals with skin disease. The aims of the present study were to characterize the rates of these anxiety syndromes among adults with active skin disease symptoms, examine correlations between anxiety and skin disease symptoms, and test the mediating role of anxiety sensitivity in skin-related impairment. A considerable number of participants ($N = 237$) screened positive for social anxiety disorder (62.9%), health anxiety (18.1%), and generalized anxiety disorder (32.5%). Consistent with hypothesis, each anxiety syndrome was indirectly related to skin-related impairment through anxiety sensitivity. Overall, the findings emphasize the importance of anxiety symptoms in dermatological outcomes.

Keywords Social anxiety disorder · Generalized anxiety disorder · Health anxiety · Anxiety sensitivity · Dermatology · Impairment

Introduction

Skin diseases are among the most prevalent and burdensome diseases in the world (Hay et al. 2014). Diseases of the skin (dermatology) can be acute or chronic and encompass a wide spectrum of conditions that affect the skin, scalp, hair, or nails, such as eczema, psoriasis, acne vulgaris, rosacea, and uticaria (World Health Organization (WHO) 2016). Although skin disease is typically non-fatal, chronic skin conditions are associated with significant disability and discomfort (Basra and Shahrukh 2009; Bhate and Williams 2013; Rapp et al. 1999). In addition to the vast economic and health burden of skin disease, many dermatology patients experience considerable psychosocial impairment and high rates of psychological comorbidity (Dalgard et al. 2015; Hong et al. 2008; Nguyen et al. 2016). Epidemiological surveys have demonstrated that anxiety disorders represent the most common form of mental disorder (Kessler

et al. 2012), and commensurate with these statistics (Kessler et al. 2012), an estimated 15–35% of dermatology patients have an anxiety disorder (Picardi et al. 2004a; Woodruff et al. 1997). Moreover, as many as 52–70% of dermatology patients report moderate to severe anxiety symptoms (Gascón et al. 2012; Rasoulian et al. 2010), and most studies find higher psychiatric morbidity rates among dermatology patients compared to control groups (Dalgard et al. 2015; Pärna et al. 2015). Despite these high rates, anxiety disorders are often not identified or addressed in dermatology practice (Picardi et al. 2004b).

Anxiety symptoms can function to trigger or exacerbate dermatologic symptoms and may also result from difficulties in coping with the management and appearance of skin disease (Gupta and Gupta 2003). Research on skin disease has shown significant associations between greater anxiety symptoms and adverse outcomes, such as skin symptom severity (Bohm et al. 2014; Loney et al. 2008), worse quality of life (Hon et al. 2015; Linnet and Jemec 1999; Yazici et al. 2004), lower self-esteem (Loney et al. 2008; Wittkowski et al. 2004), and stigmatization (Bohm et al. 2014; Böhm et al. 2013). To date, the dermatology literature has primarily focused on anxiety as a personality characteristic or unitary syndrome (Fortune et al. 2005; Osinubi et al.

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2017), with fewer studies examining specific anxiety conditions (Dixon and Witcraft, in press).

Albeit limited, a growing number of findings suggest that social anxiety, health anxiety, and generalized anxiety (GAD) symptoms are particularly common and problematic for individuals with dermatological disorders. Studies have shown that 33.4–47.5% of dermatology patients experience clinically significant social anxiety (Bez et al. 2011; Montgomery et al. 2016; Salman et al. 2016), 10.6–45.8% express health anxiety concerns (Long and Elpern 2017; Picardi et al. 2006), and 8.7–40% meet criteria for GAD or "pathological worry" (Fortune et al. 2000; Woodruff et al. 1997). Although these anxiety syndromes have been theoretically linked to worse dermatological outcomes, the negative impact of social anxiety and GAD symptoms in dermatology patients has been demonstrated by only a few studies (Hayes and Koo 2010; Kent and Keohane 2001; Loney et al. 2008; Long and Elpern 2017; Salman et al. 2016). As such, additional work is necessary to evaluate how and the extent to which each of these anxieties affect individuals with skin disease. In particular, one important direction for expansion of this research is the examination of factors underlying the connection between anxiety and skin disease.

Anxiety sensitivity describes the propensity to fear the psychological and physiological experiences of anxiety (Reiss and McNally 1985; Taylor et al. 2007). Anxiety sensitivity has received substantial empirical support as a key cognitive vulnerability in the development and maintenance of anxiety disorders (Olatunji and Wolitzky-Taylor 2009). Furthermore, it has been implicated in the exacerbation of chronic health conditions (Asmundson et al. 2000). In particular, studies have found that higher anxiety

sensitivity is associated with worse functioning in tinnitus (Hesser and Andersson 2009), chronic pain (Ocañez et al. 2010), hypertension, heart disease, and high cholesterol (Norman and Lang 2005). Similarly, anxiety sensitivity may be a critical factor that links anxiety symptoms to impairment in dermatological disorders. From a theoretical standpoint, adults with skin disease may misinterpret anxiety-related symptoms, catastrophizing that the symptoms will result in negative consequences (e.g., painful skin breakout, rejection from others), which may lead to greater psychosocial impairment, distress, and skin disease complaints. Given preliminary evidence demonstrating a link between anxiety sensitivity and dermatological symptoms (Dixon et al. 2016, 2018), additional research is warranted to further extrapolate the role of anxiety sensitivity in skin disease.

This study addresses several limitations in the current literature. The first aim was to characterize anxiety sensitivity, social anxiety, health anxiety, and GAD symptoms among adults with skin disease. Secondly, we sought to explore associations between anxiety sensitivity, social anxiety, health anxiety, GAD, and skin disease symptoms (i.e., overall symptom severity and impairment of skin-related quality of life). Finally, we tested the mediating role of anxiety sensitivity in the relation between social anxiety, health anxiety, and GAD symptoms (respectively) and impairment in quality of life. We predicted that each anxiety symptom domain would be indirectly related to greater impairment in skin-related quality of life through anxiety sensitivity (see Fig. 1). Dermatology symptom severity and depression were selected as theoretically-relevant control variables in these models (Böhm et al. 2013; Ghajarzadeh et al. 2012; Schmitt and Ford 2007).
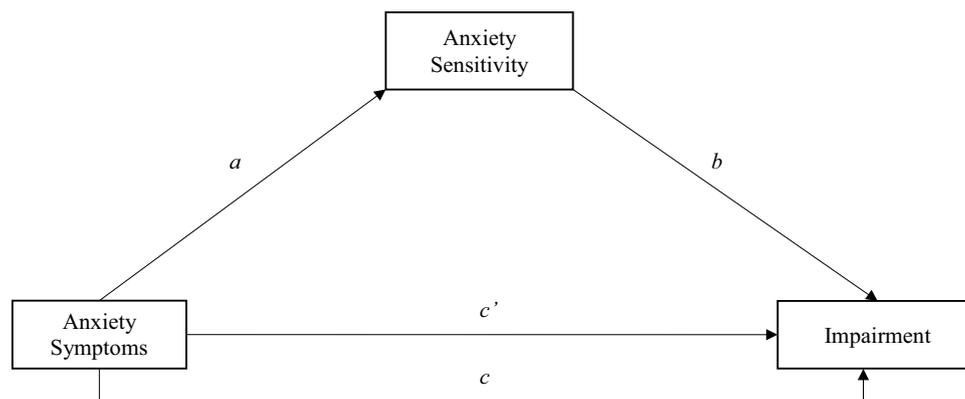

Fig. 1 Conceptual diagram of the proposed model testing the direct and indirect effects of anxiety symptoms on impairment through anxiety sensitivity. Separate models were conducted to independently examine social anxiety, health anxiety, and generalized anxiety disorder symptoms. Social anxiety symptoms = Social Phobia Inventory; health anxiety symptoms = Short Health Anxiety Inventory; generalized anxiety disorder symptoms = Generalized Anxiety Disorder 7-item scale; anxiety sensitivity = Anxiety Sensitivity Index—three total score; impairment = Skindex-16

Method

Participants and Procedure

Individuals with current skin or dermatology conditions were recruited online from Amazon's Mechanical Turk (MTurk; Buhrmester et al. 2011) through TurkPrime (Litman et al. 2017). Prior studies have shown the utility of online platforms for conducting research on medical and behavioral phenomena (Arditte et al. 2016; Shapiro et al. 2013), and in particular, the anonymous nature of these platforms may lend to more accurate results than in-person responding (Joinson 1999). Participants initially responded to a 5-item health questionnaire ($N = 1229$), and those who endorsed dermatology or skin disease issues ($n = 357$) were invited to participate in a second survey examining mental health symptoms among individuals with skin disease symptoms. Validity and attention check questions were used to screen out careless responders (Meade and Craig 2012). Participants were compensated $0.10 for the initial health questionnaire and $3.50 for the full questionnaire study (Horton and Chilton 2010). All procedures were approved by the university's institutional review board.

In this study, the final sample was comprised of 237 adults (67.9% female) who endorsed at least one active skin condition (mode = 1.00; $M = 3.04$; $SD = 1.81$). See Table 1 for dermatology characteristics of this sample. Participants were between the ages of 20–67 years ($M_{age} = 34.18$ years; $SD = 9.57$), and 84.8% of participants identified as White, 7.6% Black, 6.3% Asian/Southeast Asian, and 1.3% as American Indian/Alaska Native. Participants were primarily married/cohabitating (48.9%) or single (48.5%), employed full-time (65.4%), and reported college/university (68.4%) or graduate (18.6%) education.

Measures

Demographic and Dermatology Information Questionnaire

Participants responded to standard sociodemographic questions. The dermatology questions were developed by the authors for the purposes of this study and ascertained: primary skin condition, location of skin symptoms, frequency of past-year skin-related visits, and self-reported severity of skin disease symptoms (dermatology symptom severity). Participants endorsed the skin diseases or conditions they had experienced in the past 4 weeks on a checklist and then identified their current primary skin condition(s) or symptom(s). Specifically, participants responded to the question: "what skin or dermatological

Table 1 Dermatology characteristics ($N = 237$)

	% (n)
Primary skin disease	
Acne	33.8 (80)
Eczema (atopic dermatitis)	13.9 (33)
Hives/rash	8.9 (21)
Psoriasis	8.4 (20)
Dermatitis (other)	8.0 (19)
Skin growth	7.6 (18)
Dry, flaky skin	4.2 (10)
Rosacea	3.4 (8)
Other	11.8 (28)
Location(s) of skin symptoms	
Face	67.9 (161)
Torso/back	43.5 (103)
Arms/hands	42.6 (101)
Legs/feet	35.4 (84)
Hair/scalp	35.0 (83)
Neck	30.4 (72)
Groin	11.0 (26)
Other	7.6 (18)
Past-year skin-related medical visits	
None	46.8 (111)
One	27.8 (66)
2–3	21.5 (51)
4+	3.8 (9)

Primary skin disease = self-reported most problematic/bothersome/annoying skin condition or symptom; location(s) = area(s) of body affected by skin disease symptoms; past-year skin-related medical visits = number of visits to a medical provider in the past year for a dermatology or skin issue

condition(s) have been the most problematic, bothersome, or annoying?". A checklist that included primary body regions (e.g., face, neck, hands/arms) was used to assess the locations affected by participants' skin condition(s). The frequency of past-year medical visits for skin-related problems was reported on an ordinal scale. Lastly, participants rated the overall severity of their skin condition(s) on a scale ranging from 0 (*normal*) to 10 (*very severe*). Prior dermatology studies have used this item to measure subjective skin disease severity (Fortune et al. 1997; Salman et al. 2016).

Depression

The Depression Anxiety Stress Scales-21-Depression Scale (DASS-D) includes seven items that assess depression symptoms on a 4-point Likert-type scale (0 = did not apply to me at all, 3 = applied to me very much or most of the time; Lovibond and Lovibond 1995). Previous research has shown the DASS-D to be a valid and reliable measure of depression

in clinical and nonclinical samples (Antony et al. 1998; Henry and Crawford 2005). The total score ranges from 0 to 21, with higher scores indicating more severe symptoms of depression. Reliability in the present sample was excellent (Cronbach's $\alpha = 0.92$).

Anxiety Sensitivity

The Anxiety Sensitivity Index-3 (ASI-3) was used to measure an individual's sensitivity to and fears of the social, cognitive, and physical consequences of experiencing anxiety symptoms (Taylor et al. 2007). The ASI-3 has demonstrated good psychometric properties in clinic and non-clinical samples (Taylor et al. 2007; Wheaton et al. 2012). The ASI-3 includes 18 items that are rated on a 5-point Likert-type scale (0 = *very little* to 4 = *very much*). The ASI-3 total score was used in the present study. Prior literature suggests categorizing ASI-3 scores into three classes of severity: normative anxiety sensitivity includes scores less than 17; scores between 17 and 23 indicate moderate anxiety sensitivity, and high anxiety sensitivity is indicated by scores equal to or greater than 23 (Allan et al. 2014a, b). Reliability in the present sample was excellent (Cronbach's $\alpha = 0.94$).

Social Anxiety

The Social Phobia Inventory (SPIN) is a brief screening measure that assesses severity of social phobia (social anxiety disorder) symptoms, including fear (e.g., fear of embarrassment), avoidance of social situations (e.g., speeches), and physiological discomfort (e.g., sweating in social situations; Connor et al. 2000). The SPIN consists of 17 items that are rated on a 4-point Likert-type scale (0 = *not at all* to 4 = *extremely*) with higher scores indicating higher distress. The SPIN has good test–retest stability, internal consistency, and has a recommended clinical cutoff of 19 to determine those with and without social phobia (Connor et al. 2000). Reliability in the present sample was excellent (Cronbach's $\alpha = 0.94$).

Health Anxiety

The Short Health Anxiety Inventory (SHAI) measures health anxiety symptoms via 18 items that assess body vigilance and perceived likelihood and severity of becoming ill (Abramowitz et al. 2007; Salkovskis et al. 2002). Participants respond to a group of four statements that are rated on a 0–3 scale (0 = *no symptom*, 1 = *mild symptom*, 2 = *severe symptom*, 3 = *intense symptoms*) with the overall score ranging from 0 to 54 (Alberts et al. 2013; Salkovskis et al. 2002). Prior literature has demonstrated good psychometric properties for the SHAI (Abramowitz et al. 2007), and a clinical cutoff score of 27 is recommended to detect health anxiety

or hypochondriasis/illness anxiety disorder (Alberts et al. 2013). Reliability in the present sample was excellent (Cronbach's $\alpha = 0.93$).

Generalized Anxiety Disorder

The Generalized Anxiety Disorder 7-item scale (GAD-7) assesses arousal and worry symptoms over the past 2 weeks (Spitzer et al. 2006). Items are rated on a 4-point Likert type scale (0 = *not at all* to 3 = *nearly every day*) with higher scores indicating more severe distress. The GAD-7 has been identified as a valid and reliable measure, and the established clinical cutoff score of 10 is commonly used to identify probable cases of GAD (Spitzer et al. 2006). Reliability in the present sample was excellent (Cronbach's $\alpha = 0.92$).

Impairment

The Skindex-16 is a validated measure used to study the effects of skin disease on impairment of quality of life (impairment) across a variety of skin diseases (Chren et al. 2001). The Skindex-16 is comprised of 16 items that evaluate the experience of generic skin symptoms across physical (e.g., itching), emotional/psychological (e.g., embarrassment), and functioning (e.g., ability to interact with others) domains. Items are rated on a 0 (*never bothered*) to 5 (*always bothered*) scale, transformed to a 0–100 scale, and summed to compute a total score (Joshi et al. 2010; Mizawa et al. 2013). Higher total scores indicate greater impairment (i.e., worse quality of life). Reliability was excellent in this study (Cronbach's $\alpha = 0.93$).

Data Analytic Approach

First, descriptive inferential statistics were used to characterize the sample. The percentages of the sample scoring in the clinical range on the ASI-3, SPIN, GAD-7, and SHAI were examined. Next, bivariate correlations were conducted to examine associations among primary study variables. Following this, PROCESS version 2.16 (Hayes 2013) was used to test the mediating role of anxiety sensitivity in the relation between anxiety symptoms and impairment of quality of life (see Fig. 1). Separate mediation models for each anxiety symptom domain (i.e., social anxiety, health anxiety, GAD) were computed to examine the direct and indirect paths while controlling for dermatology symptom severity and depression symptoms. The standard errors and confidence intervals (CI 95%) for the indirect (path $a*b$), direct (path c'), and total (path c) effects were calculated using bias-corrected bootstrapping with 10,000 resamples. Confidence intervals that do not contain zero indicate a statistically meaningful result. Lastly, reversed mediation models, inverting the predictor and mediator variables, were

computed as a more rigorous test of the proposed model given the cross-sectional study design (Hayes 2013).

Results

Sample Characteristics and Bivariate Correlations

Means, standard deviations, and bivariate correlations are reported in Table 2. Regarding anxiety sensitivity severity, 35.4% of participants reported anxiety sensitivity in the normal range, 16.9% reported moderate anxiety sensitivity, and 47.7% reported high anxiety sensitivity. Next, the portion of individuals reporting symptoms above each established clinical cutoff was examined. Within this sample, 62.9% reported social anxiety symptoms above the clinical cutoff on the SPIN, 18.1% reported clinical levels of health anxiety on the SHAI, and 32.5% scored above the clinical cutoff on the GAD-7. Significant positive correlations were observed across all the study variables. Specifically, small effects were observed for the associations between dermatology symptom severity and each domain of anxiety symptoms (Cohen 1992), while a large effect was observed for the correlation between dermatology symptom severity and quality of life. Medium effects were found for the associations between quality of life and social anxiety, health anxiety, and GAD symptoms.

Examination of Mediation Models

As hypothesized, the bootstrapped mediation analyses indicated a significant indirect path from each anxiety domain to skin-related impairment through anxiety sensitivity (ps < .05). See Table 3 for the results of each path of the models. The direct effect (path c') of anxiety symptoms on

quality of life was no longer significant when anxiety sensitivity was held constant. Dermatology symptom severity and depression symptoms were included as control variables in each model and accounted for significant variance in all paths, except depression was not significant in the b path of the social anxiety model and the a path of the GAD model. Lastly, supporting the proposed models, the analyses testing the reversed mediation models revealed nonsignificant indirect effects of anxiety sensitivity to quality of life through social anxiety ($b = 0.059$, 95% CI [−0.041, 0.172]), health anxiety ($b = 0.060$, 95% CI [−0.027, 0.155]), and GAD ($b = −0.005$, 95% CI [−0.091, 0.090]) symptoms, respectively.

Discussion

Dermatology patients commonly experience clinical levels of anxiety (Dalgard et al. 2015), and yet, few studies have examined how anxiety impacts skin-related quality of life. To address limitations in the empirical literature, this study characterized specific types of anxiety symptoms among adults with skin disease and evaluated the role of anxiety sensitivity in mediating the influence of these anxiety syndromes on impairment in quality of life.

Results of this study demonstrated high rates of elevated anxiety sensitivity and clinically significant anxiety symptoms. Specifically, social anxiety symptoms were the most common (62.9%), followed by GAD (32.5%) and health anxiety (18.1%) symptoms. Previous studies have indicated positive screens among 20.6% of university students on the short version of the SPIN (Baptista et al. 2012), 23.0% of primary care patients on the GAD-7 (Spitzer et al. 2006), and 19.4% of college students using a lower cutoff score on the SHAI (i.e., cutoff of 18 versus 27 in the current study;

Table 2 Means, standard deviations, and bivariate correlations of study variables

	1	2	3	4	5	6	8
1. Dermatology symptom severity	–						
2. Depression symptoms	.09	–					
3. Social anxiety symptoms	.16*	.51***	–				
4. Health anxiety symptoms	.16*	.45***	.58***	–			
5. GAD symptoms	.15*	.67***	.58***	.51***	–		
6. Anxiety sensitivity	.20**	.45***	.66***	.59***	.63***	–	
7. Impairment	.52***	.30***	.36***	.34***	.32***	.42***	–
Mean	5.30	13.31	27.03	16.87	7.62	25.13	46.14
SD	1.97	12.23	18.34	9.98	5.69	16.25	22.94

Dermatology symptom severity = single item on 0–10 scale; depressive symptoms = Depression Anxiety Stress Scales-21-Depression Scale; social anxiety = Social Phobia Inventory; health anxiety symptoms = Short Health Anxiety Inventory; GAD symptoms = Generalized Anxiety Disorder 7-item scale; anxiety sensitivity = Anxiety Sensitivity Index—3 total score; impairment (of quality of life) = Skindex–16

GAD generalized anxiety disorder

*$p < .05$; **$p < .01$; ***$p < .001$

Table 3 Regression results for each anxiety symptom domain on quality of life impairment through anxiety sensitivity

Model	R^2	Path	B	SE	t	p	CI (l)	CI (u)
Social anxiety symptoms	.394					<.001		
		a	0.499	0.050	9.989	<.001	0.401	0.598
		b	0.318	0.098	3.237	.001	0.125	0.512
		c	0.257	0.077	3.352	<.001	0.106	0.407
		c'	0.098	0.090	1.088	.228	−0.079	0.274
		$a*b$	0.159	0.050			0.063	0.262
Health anxiety symptoms	.395					<.001		
		a	0.770	0.093	8.326	<.001	0.588	0.952
		b	0.317	0.094	3.382	<.001	0.132	0.501
		c	0.446	0.135	3.305	.001	0.180	0.712
		c'	0.203	0.151	1.346	.180	−0.094	0.499
		$a*b$	0.244	0.004			0.004	0.018
GAD symptoms	.391					<.001		
		a	1.639	0.195	8.418	<.001	1.256	2.023
		b	0.382	0.092	4.050	<.001	0.196	0.567
		c	0.593	0.289	2.051	.041	0.023	1.162
		c'	−0.033	0.312	−0.102	.919	−0.663	0.597
		$a*b$	0.625	0.180			0.278	0.989

Social anxiety symptoms = Social Phobia Inventory; health anxiety symptoms = Short Health Anxiety Inventory; GAD symptoms = Generalized Anxiety Disorder 7-item scale; anxiety sensitivity = Anxiety Sensitivity Index—3 total score; impairment (of quality of life) = Skindex–16. R^2 represents the results for each full regression model controlling for dermatology symptom severity and depression symptoms (Depression Anxiety Stress Scales-21-Depression scale). Unstandardized regression coefficients (B) are reported. SE = standard error; CI (l) = lower bound of 95% confidence interval; CI (u) = upper bound of 95% confidence interval; $a*b$ represents the indirect path

GAD generalized anxiety disorder

Wheaton et al. 2010). Hence, the current findings are consistent with prior research showing higher rates of psychological morbidity among dermatology patients compared to control populations (e.g., Dalgard et al. 2015; Pärna et al. 2015). The prevalence rates of social anxiety, GAD, and health anxiety in skin disease are not well-established and rely on a small number of non-epidemiological studies; therefore, the present data importantly contribute to the dermatology–anxiety literature.

The correlation analyses revealed modest, but significant associations among the study variables. In agreement with these findings, several studies have shown significant associations between poorer skin-related quality of life and greater social anxiety symptoms (Salman et al. 2016; Wittkowski et al. 2004). However, this is the first study to show that health anxiety and GAD symptoms are each significantly associated with skin disease severity and impairment in a sample of adults with dermatological conditions. Given the relation between psychosocial and skin disease outcomes, additional research is needed to further understand how these and other anxiety syndromes (e.g., panic disorder, obsessive–compulsive disorder) affect wellbeing and engagement in health behaviors among dermatology patients.

Finally, the analyses supported the hypothesized mediation models, indicating that social anxiety, GAD, and health anxiety symptoms were each indirectly associated with skin-related impairment in quality of life through anxiety sensitivity, after accounting for dermatology symptom severity and depression. These findings suggest that anxiety sensitivity may underlie the link between symptoms of social anxiety, health anxiety, and GAD, and skin-related impairment in quality of life. That is, anxiety symptoms may be aggravated by this cognitive vulnerability, exacerbating the perception and experience of physiological arousal (e.g., sweating, flushing), and thereby worsening the physical, emotional, and functional consequences of skin disease symptoms.

Although the anxiety syndromes tested in this study have distinct symptomatology, the findings suggest that anxiety sensitivity functions as an important transdiagnostic or 'transdisease' factor. Indeed, the present findings add to evidence indicating the explanatory role of anxiety sensitivity in psychological outcomes (Bakhshaie et al. 2017) and chronic health conditions (Asmundson et al. 2000; Livermore et al. 2012). Delineating anxiety sensitivity dimensions in relation to anxiety disorders and skin disease outcomes warrants exploration in future investigations. Anxiety sensitivity physical concerns has often been linked to chronic

health conditions (Avallone et al. 2012; Norman and Lang 2005); yet, skin disease may demonstrate a different pattern as one study found that patients with psychodermatological conditions (e.g., rosacea, psoriasis) had significantly higher social and cognitive concerns compared to patients with non-psychodermatological conditions (e.g., keloids, warts; Dixon et al. 2016). At the same time, anxiety sensitivity social concerns have been uniquely linked to social anxiety symptoms (Olthuis et al. 2014), whereas physical concerns were distinctly associated with health anxiety symptoms (Fergus and Bardeen 2013). Consequently, the examination of anxiety sensitivity as a multidimensional versus unidimensional construct in skin disease may have unique implications for treatment recommendations and dermatology–anxiety theoretical models.

Several limitations warrant consideration in future investigations examining anxiety and skin disease. First, the methodology relied on an online platform and self-report measures of dermatology and anxiety symptoms. Replication of this study in an outpatient dermatology clinic using formal diagnostic assessments conducted by dermatology and/or psychology specialists may enhance the clinical application of these findings. Second, the study's cross-sectional design prohibits causal interferences, and the results of the mediation analyses should be cautiously interpreted as proposed pathways. A third limitation is that the sample primarily included female (67.9%) and White (84.8%) participants, which limits the scope of understanding how anxiety affects skin disease outcomes among individuals with diverse demographics. Although women represent approximately 60% of all dermatology visits (Stern 2004), future research including a more demographically diverse sample would improve the generalizability of the findings. Lastly, this sample included participants with a wide array of skin conditions. Future research should explore the role of anxiety sensitivity across specific skin diseases (e.g., acne, psoriasis) to identify particularly vulnerable patient populations and evaluate how this cognitive vulnerability factor differentially affects skin pathology.

Taken together, the high rates of social anxiety, GAD, and health anxiety among adults with skin disease underscore the need for greater recognition of these conditions in future research, as well as in clinical settings. In particular, the current results suggest the potential benefit of interventions that target anxiety sensitivity for improving the experience of dermatological symptoms, emotional well-being, and daily functioning among individuals with skin disease. Several transdiagnostic treatments requiring minimal resources have been efficacious in decreasing anxiety sensitivity including a computer-delivered cognitive bias modification program (Capron and Schmidt 2016), telephone-delivered cognitive behavioral therapy (Olthuis et al. 2014), and a one-session intervention incorporating

psychoeducation and interoceptive exposure (Keough and Schmidt 2012). Because these interventions focus on anxiety sensitivity reductions irrespective of diagnostic label, they may be similarly helpful for enhancing quality of life for dermatology patients.

Compliance with Ethical Standards

Conflict of Interest Laura J. Dixon, Sara M. Witcraft, and Megan M. Perry declare that they have no conflict of interest.

Human and Animal Rights Study procedures were in accordance with the ethical standards of the institutional review board of the University of Mississippi and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent Informed consent was obtained from all individuals included in this study.

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