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Depression in people with skin conditions: The effects of disgust and self-compassion

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Objectives. Skin conditions can be accompanied by significant levels of depression; there is therefore a need to identify the associated psychological factors to assist with the development of appropriate interventions. This study sought to examine the effects of disgust propensity, disgust sensitivity, self-focused/ruminative disgust, and self-compassion on depression in people with skin conditions.

Design. A cross-sectional survey with follow-up survey.

Methods. Dermatology outpatients (N = 147) completed self-report measures of disgust traits, self-compassion, and depression. At three-month follow-up, participants (N = 80) completed the depression measure again.

Results. Multiple regression analyses revealed that disgust propensity, disgust sensitivity, self-focused/ruminative disgust, and self-compassion each explained significant amounts of variance in baseline depression. Self-compassion also explained a significant amount of variance in depression at follow-up, after accounting for baseline depression. In addition, self-compassion moderated the effect of disgust propensity on depression at baseline, such that at high levels of self-compassion, disgust propensity no longer had a positive relationship with depression.

Conclusions. Disgust traits contribute to depression in people with skin conditions, while being self-compassionate may be protective against depression. High self-compassion also buffers the effects of disgust propensity on depression in people with skin conditions. The findings indicate the potential of compassion-focused interventions for depression in people with skin conditions.

Statement of contribution

What is already known on this subject?

- People with skin conditions can experience depression that is not well explained by condition severity.
- Skin conditions can elicit disgust reactions that, in turn, may contribute to the development of depression.
- Self-compassion is negatively associated with depression.

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What does this study add?
- Disgust traits explain significant variance in depression in people with skin conditions.
- Self-compassion may protect against depression through main and moderation effects.
- Disgust and self-compassion may provide important targets for interventions.

Psychological distress among people who live with an altered appearance is a problem that affects many people worldwide. Skin conditions can cause visible differences and are extremely prevalent; skin conditions are the fourth leading cause of non-fatal global disease burden, with three skin conditions in the top 10 most prevalent diseases worldwide (Hay *et al.*, 2014). Skin conditions are also commonly associated with depression. In a study across several European countries, depression was found in 10.1% of dermatological patients compared with 4.3% of controls (Dalgard *et al.*, 2015). Broader narrative reviews of conditions affecting appearance report similar results, that people with visible differences tend to experience higher than average levels of psychological distress, including depression (Clarke, Thompson, Jenkinson, Rumsey, & Newell, 2013; Rumsey & Harcourt, 2004; Thompson & Kent, 2001). The prevalence of skin conditions combined with the increased incidence of depression in people with skin conditions means that this problem warrants attention from researchers and clinicians (All Party Parliamentary Group on Skin, 2013; Lavda, Webb, & Thompson, 2012).

However, although overall levels of distress may be higher among people with a visible difference, there is considerable individual variation in the psychosocial impact of an altered appearance, with many people coping well (Clarke *et al.*, 2013; Rumsey & Harcourt, 2004; Thompson & Broom, 2009; Thompson & Kent, 2001). Clinical severity of a visible difference is a poor predictor of psychological distress, and even evidence about the visibility of one's difference predicting distress is equivocal (Clarke *et al.*, 2013; Thompson & Kent, 2001). Self-assessed severity of skin condition is more strongly associated with psychological distress than clinician-assessed severity, suggesting that individuals' perceptions and emotions regarding their skin condition play a key role in the development of skin-related distress (Magin, Pond, Smith, Watson, & Goode, 2008, 2011).

One psychological factor that may play a role in depression among people with skin conditions is the emotion of disgust. Many skin conditions cause broken skin (e.g., skin that is cracked, flaking, weeping, or bleeding), which is a potential disgust elicitor, as 'body envelope violations' tend to elicit disgust (Haidt, McCauley, & Rozin, 1994, p. 701). Disgust is commonly seen as a 'basic' emotion that requires minimal cognitive processing to occur (Power & Dalgleish, 1997), and can be considered an adaptive response that evolved to help individuals avoid disease (Curtis, de Barra, & Aunger, 2011; Oaten, Stevenson, & Case, 2009), for example, through contaminated food or contact with infected individuals. However, the disgust system is biased towards false alarms (see Oaten *et al.*, 2009, for a review), meaning that disgust can be felt in response to triggers that pose no logical threat of contamination. Indeed, research has shown that some people with skin conditions experience disgust towards their own affected skin and have related negative feelings, such as hatred of their bodies and feelings of social inferiority (Wahl, Gjengedal, & Hanestad, 2002). Individual differences in disgust have previously been investigated in relation to cancer, sexual dysfunction, surgical wounds, and colorectal conditions, with findings indicating that disgust is associated with distress in people with these conditions (Azlan, Overton, Simpson, & Powell, 2017; de Jong, van Overveld, & Borg, 2013; Gaind, Clarke, & Butler, 2011; Reynolds, Bissett, & Consedine,

2015). However, to date, no previous research has examined the relationship between disgust and depression in people with skin conditions.

Research has distinguished three aspects of disgust: disgust propensity, one's tendency to feel disgust; disgust sensitivity, how aversive one finds the experience of disgust; and self-focused/ruminative disgust, negatively appraising oneself in response to feeling disgust (Goetz, Cougle, & Lee, 2013; van Overveld, de Jong, Peters, Cavanagh, & Davey, 2006). Having high disgust propensity can be described as being 'squeamish', that is, easily made to feel the emotion of disgust, while high disgust sensitivity and self-focused/ruminative disgust both result in more negative cognitive appraisals about feeling disgust. In studies that used implicit measures of disgust (Nicholson & Barnes-Holmes, 2012) and self-report measures (Olatunji *et al.*, 2010), both disgust propensity and disgust sensitivity have been found to be positively correlated with depressive symptoms in students. Clinically depressed patients have been found to have higher disgust sensitivity than non-depressed controls and to be significantly more disgusted than controls in the domain of death/deformation (Ille *et al.*, 2014). These findings suggest that heightened disgust responses may be maladaptive, and this may be especially relevant for people with skin conditions who are often exposed to a potential disgust elicitor, their affected skin, with which they are unable to avoid contact, unlike other disgust elicitors.

Gilbert's (2009a) model of affective regulation provides an explanation for the link between heightened disgust responses and depression. Gilbert (2009a) describes three main affect regulation systems: a threat/protection system, a drive/excitement system, and a soothing/contentment system. The threat/protection system responds quickly to threats, causing emotions such as anxiety, anger, and disgust, which motivate one to take protective action. The drive/excitation system is a positive affect regulation system that motivates one to seek the resources needed for survival and prosperity. The soothing/contentment system is also a positive affect regulation system, but one that includes feelings of calm, safeness, and contentment (Gilbert, 2005, 2009a). Depression is theorized to involve the three affect regulation systems being chronically out of balance: The threat/protection system is overactive, causing feelings of dread and being trapped; the drive/excitement system is underactive, causing feelings of despair and anhedonia; and the soothing/contentment system is underactive, causing feelings of being unsafe and disconnected from others (Gilbert, 2014). Frequent contact with stimuli that activate the threat/protection system (including disgust elicitors) may therefore contribute to the development of depression.

While disgust elicitors are proposed to trigger the threat/protection system, experiencing compassion is theorized to trigger the soothing/contentment system (Gilbert, 2009a). Crucially, the soothing/contentment system acts as the regulator of the threat/protection and drive/excitement systems, giving rise to calm and peaceful feelings (Gilbert, 2009a, 2009b). Each affect regulation system can be stimulated by internal signals as well as external ones (Gilbert, 2000), so how one relates to oneself has implications for mental health. Neff (2003b) defined self-compassion as 'an emotionally positive self-attitude' (p. 85) which has three components: self-kindness rather than self-judgement, a sense of common humanity rather than isolation, and mindfulness rather than overidentifying with painful thoughts and feelings. Self-kindness, common humanity, and mindfulness are conceptually similar to the abilities of the soothing/contentment system described by Gilbert (2009a), that is, they allow individuals to treat themselves with warmth and kindness, to feel connected with others, and to engage with their experiences from a position of 'safeness'. There is growing evidence that self-compassion is negatively associated with psychopathology, with a meta-analysis finding a large effect

size (r = .54) for the relationship between self-compassion and psychopathology, including depression (MacBeth & Gumley, 2012). According to Gilbert (2009a), self-compassion should protect against depression by keeping the affect regulation systems in balance: After the activation of the threat/protection system (e.g., due to a disgust elicitor), being self-compassionate can activate the soothing/contentment system, which then tones down the threat/protection response. Self-compassion is therefore expected to prevent frequent disgust experiences from contributing to depression, as although the threat/protection system will be active when disgust is experienced, it will not be chronically overactive.

Self-compassion has been shown to moderate the effects of various cognitive vulnerabilities on depression, such as maladaptive perfectionism (Ferrari, Yap, Scott, Einstein, & Ciarrochi, 2018), dysfunctional attitudes towards motherhood (Fonseca & Canavarro, 2018), irrational beliefs (Podina, Jucan, & David, 2015), and implicit cognitions (Phillips, Hine, & Marks, 2018). Furthermore, self-compassion has been shown to protect against body-related threats, as it moderates the negative effects of body comparison and appearance-contingent self-worth on body appreciation (Homan & Tylka, 2015). To date, no study has investigated whether self-compassion can protect against depression in people with visible skin conditions.

The current study

We aimed to examine the effects of disgust propensity, disgust sensitivity, self-focused/ruminative disgust, and self-compassion on depression in people with visible skin conditions. In addition, we aimed to examine whether self-compassion moderated the effects of disgust factors on depression. We focused on patients with visible skin conditions that have a chronic course and manifest as disruption of the skin surface, which may potentially trigger disgust. We used a longitudinal survey design, with participants completing questionnaires at the point of recruitment (time one) and at three-month follow-up (time two), to assess whether the disgust traits and self-compassion explain variance in depression over and above the effects of baseline depression. We hypothesized that disgust propensity, disgust sensitivity, and self-focused/ruminative disgust would each be positively associated with depression, whereas self-compassion would be negatively associated with depression both cross-sectionally (at time one) and prospectively (at time two). We also hypothesized that self-compassion would moderate the effects of the disgust factors on depression, so that the positive relationships between disgust factors and depression would weaken with increasing levels of self-compassion.

Method

Participants

Participants were a convenience sample of dermatology patients, recruited from a hospital outpatient clinic. Participants' diagnoses were identified from their medical records or discussion with the treating dermatologist.

Measures

Demographics

Participants were asked to provide information about their age, gender, ethnicity, employment status, marital status, and education level.

Skin condition information

Participants were asked how long they had had their skin condition and to identify which parts of their body were affected.

Disgust Propensity and Sensitivity Scale – Revised (DPSS-R)

The 12-item version of the DPSS-R (van Overveld *et al.*, 2006) was used to measure participants' disgust propensity (e.g., 'I avoid disgusting things'), disgust sensitivity (e.g., 'When I feel disgusted, I worry that I might pass out'), and self-focused/ruminative disgust (e.g., 'I think feeling disgust is bad for me'), in line with recommendations by Goetz *et al.* (2013). Participants were asked to rate how often statements were true for them, on a 5-point scale from 'never' (1) to 'always' (5). Higher scores indicate higher levels of disgust propensity/sensitivity/self-focus. Cronbach's alphas were .82, .79, and .79 for the propensity, sensitivity, and self-focus subscales, respectively.

Self-Compassion Scale – Short Form (SCS-SF)

The 12-item SCS-SF (Raes, Pommier, Neff, & Van Gucht, 2011) was used to measure participants' levels of self-compassion. Participants were asked to rate how often they behaved in the manner described in the statements on a 5-point scale from 'almost never' (1) to 'almost always' (5), for example, 'When I'm going through a very hard time, I give myself the caring and tenderness I need'. Negatively worded items were reverse-coded, and mean scores were computed. Higher scores indicate higher levels of self-compassion. Cronbach's alpha was .77.

Depression Anxiety Stress Scales-21 (DASS-21)

The DASS-21 (Lovibond & Lovibond, 1995) was used to measure participants' levels of depression. The 21-item scale contains seven items for each construct. Only the depression subscale was included in the current study. Participants were asked to rate how much statements applied to them over the past week on a 4-point scale from 'did not apply to me at all' (0) to 'applied to me very much, or most of the time' (3), for example, 'I couldn't seem to experience any positive feeling at all'. Higher scores indicate higher levels of depression. Total scores were calculated, which were then multiplied by two to aid comparisons with the longer (42-item) version of the DASS (Lovibond & Lovibond, 1995). This gave a possible range for the scores of 0–42. Cronbach's alpha was .91.

Procedure

Dermatological clinical staff identified potential participants according to the inclusion/exclusion criteria. Patients were invited to take part in the study if they had signs of a skin condition that disrupted the skin surface (e.g., presenting with papules, pustules, vesicles, bullae, plaques, erosions, excoriation, or maceration), were aged 16 years or over, and had sufficient English language ability to complete self-report questionnaires. Patients seeking treatment for hair disorders, moles, or warts were not included. Patients were excluded from the study if they had a primary psychiatric diagnosis affecting the skin (e.g., delusions of parasitosis or body dysmorphic disorder), were under investigations or treatment for skin cancer, were seeking treatment for burns or scarring, had a skin condition caused by an infestation, or had a comorbid health condition that caused equal

or greater distress than the skin condition. Informed consent was obtained by the researcher, and participants completed a set of self-report measures. Participants either completed the time one questionnaire in the clinic, took it away to complete at home and return by post, or were sent a link to an online version to complete at home. Participants who consented to undertake the time two questionnaire were contacted after three months by post or email, according to their preferences. The time one questionnaire consisted of demographics, skin condition information, and measures of disgust, self-compassion, and depression. The time two questionnaire consisted of the depression measure and skin condition information. Participants were entered into a prize draw for a £50 shopping voucher if they completed the follow-up questionnaire. Participants were debriefed at the end of their involvement in the study, either at the dermatology department or by post/email. Ethical approval was received from the Wales NHS Research Ethics Committee.

Data analysis

This study used multiple regression analyses to test whether self-compassion moderated the relationships between disgust traits and depression at time one and time two. SPSS 26 was used for analyses. Preliminary analyses, bivariate correlations and independent *t*-tests, were carried out to determine whether it was necessary to include age and gender as covariates in the regression analyses, as these constructs have been found to be associated with depression in previous studies (Kessler *et al.*, 2010; Nolen-Hoeksema, 2001). Additional analyses explored associations between the psychological variables and duration of skin condition, using correlations, and area of the skin affected, using independent *t*-tests. Three separate multiple regression analyses were conducted with time one depression as the dependent variable. The predictor and moderator variables were mean-centred, and an interaction term was computed between the predictor and moderator in each analysis. In the first regression analysis, disgust propensity was the predictor variable and self-compassion was the moderator variable. The second and third regression analyses were conducted in the same way but replaced disgust propensity with disgust sensitivity and self-focused/ruminative disgust, respectively. Three additional multiple regression analyses were conducted with time two depression as the dependent variable. These replicated the analyses for time one depression as described above, with the addition of time one depression being included as a covariate in each analysis, to control for its effects. Simple slopes analyses were used to probe significant moderation effects at the mean and at one standard deviation above and below the mean for high and low levels of the moderator variable.

Results

Information about the study and time one questionnaire was given to 177 dermatology patients. The time one questionnaire was returned by 154 participants (87.0%), of whom 133 participants (86.4%) completed the questionnaire in the dermatology department and 21 participants (13.6%) completed the questionnaire at home (17 returned by post and 4 completed online). Independent-samples *t*-tests showed no differences on any of the psychological measures between participants who completed the questionnaire in the dermatology department and those who completed it at home (all $ps > .05$, all $\eta^2s \leq .01$). The time two questionnaire was returned by 87 participants (56.5%), of whom 23

participants (24.6%) returned the questionnaire by post and 64 participants (73.6%) completed the questionnaire online. Independent-samples *t*-tests and chi-square analyses were conducted to examine whether participants who responded to the follow-up questionnaire differed in key variables from participants who did not respond. Participants who responded at follow-up were significantly older (M = 45.6 years, SD = 20.9) than participants who did not respond at follow-up (M = 34.0 years, SD = 14.97), $t(138) = 3.72$, $p < .001$, $\eta^2 = .09$, although they did not differ by gender, $\chi^2(1, n = 143) = 0.01, p = .91, \phi = .009$. In addition, there were no differences in disgust propensity, disgust sensitivity, self-focused ruminative disgust, self-compassion, or time one depression between participants who took part in the follow-up and those who did not (all ps > .05, all η^2s < .01).

Time one descriptive findings

Data were screened for outliers and missing values. Five participants were removed from the data set as they had extreme values on one or more of the psychological measures and two participants were removed due to missing one of the psychological measures, resulting in a final time one sample of 147. Missing data within this sample were minimal, at 0.002%. The mean age of the sample was 40.5 years (SD = 19.4, range = 16–88), and the mean duration of the skin condition was 14.9 years (SD = 16.0). The sample contained a slightly higher proportion of women (60.5%) than men (39.5%). Most participants (86.4%) described their ethnicity as 'White'. The most common skin conditions in the sample were dermatitis/eczema (32.0%), psoriasis (32.0%), and acne (20.4%). Two participants declined permission for their diagnosis information to be collected, although they were identified as eligible participants by the treating dermatologist. Most participants (83.7%) had skin conditions that were potentially visible to others, affecting their head/scalp, face, or hands. Other demographic information and skin condition information are shown in Table 1.

Descriptive statistics for the psychological variables are shown in Table 2. The mean depression score was just above the clinical cut-off (10) for depression; 63 (42.9%) participants exceeded this cut-off. These figures are higher than normative data from the UK general population, in which the mean depression score was 5.55 and the percentage of the sample at or above the clinical cut-off was 18.3% (Crawford & Henry, 2003).

Independent *t*-tests revealed no significant differences in any of the psychological variables between those who did and did not have the skin condition on each body area, nor were there any differences when participants were grouped according to those that had visible conditions (affecting the head/scalp, face, or hands) and non-visible conditions (all ps > .05). None of the psychological variables were significantly correlated with duration of the skin condition (all ps > .05).

Time one associations with depression

Preliminary analyses showed that depression was not significantly associated with age, $r(144) = .01$, $p = .87$, or duration of skin condition, $r(145) = .001$, $p = .99$, nor did depression differ by gender, $t(145) = 1.25$, $p = .22$, $\eta^2 = .01$.

As hypothesized, disgust propensity, disgust sensitivity, and self-focused/ruminative disgust were significantly positively correlated with depression, and self-compassion was significantly negatively correlated with depression. See Table 2 for the correlation matrix.

Table 1. Demographic and clinical characteristics of the study sample ($N = 147$)

Characteristic	*n*	%	Characteristic	*n*	%
Gender			Employment status		
Female	89	60.5	Employed full time	45	30.6
Male	58	39.5	Employed part time	35	23.8
			Student	30	20.4
Ethnicity			Retired	25	17.0
White	127	86.4	Full-time homemaker/carer	7	4.8
Asian/Asian British	12	8.2	Unemployed	4	2.7
Black/Black British	4	2.7	Unable to work	1	0.7
Others	4	2.7			
			Highest qualification level		
Marital status			No qualifications	13	8.8
Single	61	41.5	GCSE or equivalent	27	18.4
Married/Cohabiting	68	46.3	A-level or equivalent	34	23.1
Divorced/Separated	12	8.2	Degree or above	53	36.1
Widowed	6	4.1	Unspecified	1	0.7
Diagnosis			Site(s) of skin condition		
Dermatitis/eczema	47	32.0	Head/scalp	60	40.8
Psoriasis	47	32.0	Face	72	49.0
Acne	30	20.4	Arms	85	57.8
Lupus	6	4.1	Hands	64	43.5
Other	27	18.4	Body/trunk	101	68.7
Undiagnosed	3	2.0	Legs	91	61.9
Diagnosis not disclosed	2	1.4	Feet	55	37.4

Notes. For demographic characteristics, *n*s sum to 147. For diagnosis and site(s) of skin condition, *n*s sum to over 147 as some participants had more than one skin condition.

Time one regression analyses

Preliminary analyses showed that while the data met most of the assumptions required for multiple regression analysis, it failed to meet the assumption of normally distributed errors. Bias-corrected and accelerated interval bootstrapping was therefore performed, as bootstrapped regression is a more robust method that is reliable even when the normal assumptions of regression are not met (Field, 2013). Multivariate outliers were detected using a $p < .001$ criterion for Mahalanobis distance and an absolute value > 3 criterion for standardized residual. Two outliers were removed from the disgust propensity regression, one outlier was removed from the disgust sensitivity regression, and two outliers were removed from the self-focused/ruminative disgust regression. Results from the time one regression analyses are shown in Table 3.

Disgust propensity

Disgust propensity, self-compassion, and the disgust propensity × self-compassion interaction term explained 31% of the variance in depression, $R^2 = .31$, $F(3, 141) = 21.46$, $p < .001$. All three variables were significant independent predictors. The nature of the interaction was decomposed using simple slopes analysis. This showed that there was a significant positive relationship between disgust propensity and depression at low, $B = 6.71$, $t = 4.64$, $p < .001$, and at mean levels of self-compassion, $B = 4.33$, $t = 4.48$, $p < .001$. In contrast, at high levels of self-compassion, there was a

Table 2. Correlations and descriptive statistics of main study variables (N = 147[a])

Variable		1	2	3	4	5	Mean	*SD*
1	Disgust propensity	–	–	–	–	–	2.49	0.74
2	Disgust sensitivity	.71***	–	–	–	–	1.96	0.75
3	Self-focused/ruminative disgust	.58***	.52***	–	–	–	1.90	1.00
4	Self-compassion	−.22**	−.27**	−.28**	–	–	3.08	0.68
5	Time one depression	.41***	.33***	.47***	−.45***	–	10.19	10.32
6	Time two depression	.23*	.16	.45***	−.47***	.78***	11.21	10.57

Notes. [a]For time two depression, N = 80.; *$p \leq .05$; **$p \leq .01$; ***$p < .001$.

Table 3. Regression models for the prediction of time one depression

Model	R^2	Predictor	*B*	95% CI	*SE*	β	*p*
1	.31	Disgust propensity	4.33	[2.45, 6.10]	0.93	.32	.001
		Self-compassion	−5.31	[−7.18, −3.40]	0.96	−.36	.001
		Disgust propensity × self-compassion	−3.50	[−6.62, −0.08]	1.60	−.14	.033
2	.23	Disgust sensitivity	2.64	[0.33, 4.90]	1.13	.19	.019
		Self-compassion	−5.74	[−7.87, −3.76]	1.08	−.38	.001
		Disgust sensitivity × self-compassion	−1.73	[−4.97, 1.56]	1.60	−.08	.255
3	.38	Self-focused/ruminative disgust	4.17	[2.49, 5.45]	0.76	.42	.001
		Self-compassion	−4.82	[−6.89, −2.91]	1.06	−.33	.001
		Self-focused/ruminative disgust × self-compassion	−0.45	[−2.97, 2.28]	1.26	−.03	.705

Notes. Confidence intervals and standard errors based on 1,000 bootstrap samples.

non-significant relationship between disgust propensity and depression, B = 1.95, t = 1.21, p = .23. This interaction effect is shown in Figure 1.

Disgust sensitivity

Disgust sensitivity, self-compassion, and the disgust sensitivity × self-compassion interaction term explained 23% of the variance in depression, R^2 = .23, $F(3, 142)$ = 14.45, $p < .001$. Disgust sensitivity and self-compassion were significant independent predictors.

Self-focused/ruminative disgust

Self-focused ruminative disgust, self-compassion, and the self-focused ruminative disgust × self-compassion interaction term explained 38% of the variance in depression, R^2 = .38, $F(3, 140)$ = 28.16, $p < .001$. Self-focused/ruminative disgust and self-compassion were significant independent predictors.

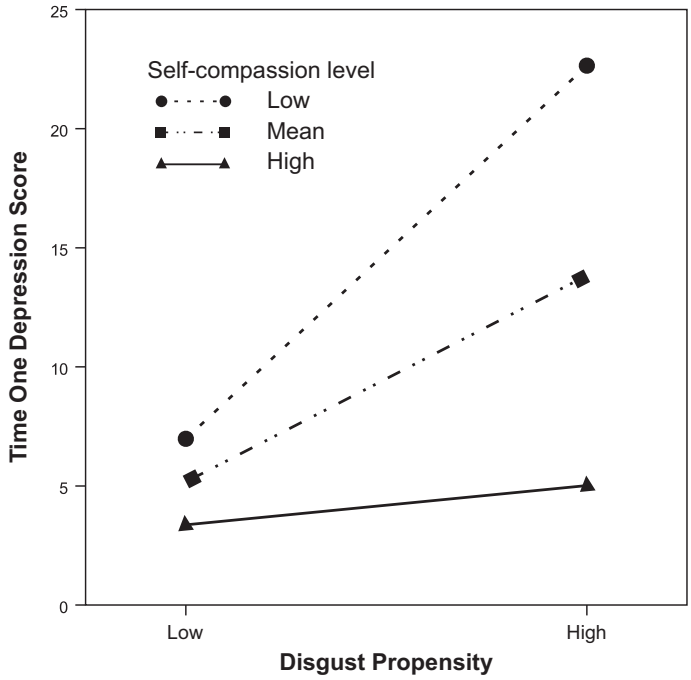

Figure 1. The moderating effect of self-compassion on the relationship between disgust propensity and time one depression.

Time two descriptive findings

Of the 87 participants who responded to the follow-up questionnaire, three participants who were excluded from the analyses at time one due to extreme scores were again excluded from further analyses. No participants had extreme scores on the time two depression measure, although four participants failed to complete it and so were excluded from analyses. This left 80 participants in the sample for time two analyses. The mean depression score at time two was 11.21 (SD = 10.57, range 0–40). A repeated-measures t-test showed that depression scores had not changed significantly between times one and two, $t(79) = -0.92$, $p = .34$, $\eta^2 = .01$.

Time two associations with depression

As at time one, depression at follow-up was not significantly associated with age, $r(78) = -.22$, $p = .054$, or duration of skin condition, $r(79) = -.06$, $p = .59$, nor did depression at follow-up differ by gender, $t(78) = 0.59$, $p = .55$, $\eta^2 = .005$. Correlations between the disgust variables, self-compassion and time two depression are shown in Table 2. As hypothesized, disgust propensity and self-focused/ruminative disgust were significantly positively correlated with time two depression, while self-compassion was significantly negatively correlated with time two depression. Contrary to hypotheses, disgust sensitivity was not significantly correlated with time two depression.

Time two regression analyses

As before, preliminary analyses were used to test the suitability of the data for regression analyses. The data met all the assumptions for multiple regression analyses. For

consistency, bias-corrected and accelerated bootstrapping was performed as for the time one regression analyses. Two multivariate outliers were removed from the disgust propensity and disgust sensitivity regressions, and three multivariate outliers were removed from the self-focused/ruminative disgust regression. Results are shown in Table 4.

Disgust propensity

Time one depression, disgust propensity, self-compassion, and the disgust propensity × self-compassion interaction explained 77% of the variance in time two depression, $R^2 = .77$, $F(4, 73) = 60.00$, $p < .001$. Time one depression and self-compassion were significant independent predictors.

Disgust sensitivity

Time one depression, disgust sensitivity, self-compassion, and the disgust sensitivity × self-compassion interaction explained 77% of the variance in time two depression, $R^2 = .77$, $F(4, 73) = 61.02$, $p < .001$. Time one depression, self-compassion, and the disgust sensitivity × self-compassion interaction term were significant independent predictors. The nature of the significant interaction term was explored using simple slopes analysis. However, non-significant relationships were found between disgust sensitivity and depression at low levels of self-compassion ($b = -1.81$, $t = -1.54$, $p = .13$), at mean levels of self-compassion ($b = 0.16$, $t = 0.20$, $p = .84$), and at high levels of self-compassion ($b = 2.13$, $t = 1.63$, $p = .11$). The interaction effect was therefore further explored using the PROCESS macro for SPSS (Hayes, 2013) to implement the Johnson–Neyman technique (Johnson & Neyman, 1936). This calculates a zone of significance to identify for which values of self-compassion there was a significant relationship between disgust sensitivity and depression. This indicated that there was a significant negative relationship between disgust sensitivity and depression only for

Table 4. Regression models for the prediction of time two depression

Model	R^2	Predictor	*B*	95% CI	*SE*	β	*p*
1	.77	Time one depression	0.86	[0.68, 1.03]	0.10	.82	.001
		Disgust propensity	−0.57	[−2.24, 1.09]	0.80	−.04	.481
		Self-compassion	−2.48	[−4.50, −0.69]	0.96	−.16	.016
		Disgust propensity × self-compassion	2.85	[−0.30, 6.20]	1.76	.10	.090
2	.77	Time one depression	0.84	[0.67, 1.01]	0.09	.79	.001
		Disgust sensitivity	0.16	[−1.50, 1.78]	0.88	.01	.821
		Self-compassion	−2.53	[−4.36, −0.88]	0.96	−.16	.015
		Disgust sensitivity × self-compassion	2.95	[0.59, 5.59]	1.33	.12	.027
3	.77	Time one depression	0.88	[0.67, 1.07]	0.11	.79	.001
		Self-focused/ruminative disgust	0.20	[−1.48, 1.87]	0.87	.02	.825
		Self-compassion	−2.82	[−4.64, −1.00]	1.01	−.18	.009
		Self-focused/ruminative disgust × self-compassion	0.85	[−1.03, 2.57]	0.97	.05	.365

Notes. Confidence intervals and standard errors based on 1,000 bootstrap samples.

individuals with the lowest 1.3% self-compassion scores. Therefore, for most participants, level of self-compassion did not affect the relationship between disgust sensitivity and time two depression.

Self-focused/ruminative disgust

Time one depression, self-focused/ruminative disgust, self-compassion, and the self-focused/ruminative disgust × self-compassion interaction explained 77% of the variance in depression, $R^2 = .77$, $F(4, 71) = 60.02$, $p < .001$. Time one depression and self-compassion were significant independent predictors.

Discussion

This study is the first to examine the effects of disgust propensity, disgust sensitivity, self-focused ruminative disgust, and self-compassion on depression in people with visible skin conditions and also to examine whether self-compassion moderates the effects of these disgust variables on depression. This study demonstrated the importance of psychological variables – disgust traits and self-compassion – in explaining depression in a dermatology outpatient population. In this study, participants were experiencing high levels of depression, which is consistent with previous research (Dalgard *et al.*, 2015). People with skin conditions commonly report that their general practitioners and dermatologists do not appreciate the psychological aspects of skin conditions (Magin, Adams, Heading, & Pond, 2009). The findings of the current study therefore suggest that health care professionals should be aware not only of the high prevalence of depression in people with skin conditions, but also of the psychological vulnerability factors that might influence patients' psychological distress. The results suggest that disgust traits may contribute to depression in people with skin conditions: Each of the disgust traits explained significant amounts of variance in baseline depression. These findings support the idea that increased experiences of threat-based emotions play a role in depression (Gilbert, 2009a, 2014). Although none of the disgust traits were independent predictors of depression at follow-up, this could be due to the lack of change in depression scores over the follow-up period. The results also showed that self-compassion was strongly associated with depression: People who were higher in self-compassion had lower depression scores. The finding that self-compassion was a significant predictor of depression prospectively after controlling for baseline depression provides further evidence to suggest that trait self-compassion may protect against depression.

As hypothesized, self-compassion was also found to moderate the effect of disgust propensity on baseline depression: At high levels of self-compassion, disgust propensity no longer had a significant positive relationship with depression. Being self-compassionate may offer some protection against depression among dermatology outpatients. The findings for self-compassion support the notion that the soothing/contentment system regulates the threat/protection system (Gilbert, 2009a, 2014). However, contrary to hypotheses, no clear moderation effects were found for disgust sensitivity or self-focused/ruminative disgust, in contrast with other research showing self-compassion to moderate the effects of dysfunctional cognitions on depression (Fonseca & Canavarro, 2018; Podina *et al.*, 2015). Further research is required to examine which types of negative cognitions are moderated by self-compassion, and the mechanisms through which this occurs. Overall, the current findings provide strong evidence that self-compassion may protect

against depression as a main effect, but weaker evidence that it moderates the relationship between disgust traits and depression.

This is the first study to investigate self-compassion and disgust traits among people with skin conditions. However, there are a number of limitations to this study that should be noted. First, a correlational design was used, which means that strong inferences about causality cannot be drawn. The prospective design allows for greater confidence that self-compassion protects against depression, but experimental evidence is needed to establish causality. Second, the sample was a self-selected, convenience sample, which increases the risk of bias in the results and may limit generalizability, although all participants were recruited from a dermatology clinic and had a confirmed visible skin condition. Third, the use of a general trait measure of disgust was a potential limitation. The study aimed to investigate whether trait disgust influenced depression: The DPSS-R was used as it assesses participants' everyday experiences of disgust and so was considered to have good ecological validity. However, stronger relationships may have been found had a skin-specific disgust measure been used. The development of a skin-specific disgust measure is an avenue for future research. Fourth, to reduce participant burden, the study used the 12-item SCS-SF, rather than the original 26-item Self-Compassion Scale (SCS; Neff, 2003a). Due to reliability issues, it is recommended that the SCS-SF is used to provide an overall self-compassion score (Raes *et al.*, 2011), in contrast to the SCS, which can be used to generate six subscale scores that relate to the presence of the three positive and the absence of the three negative components of self-compassion. Supplementary analyses confirmed that the six subscales of the SCS-SF in the current study had poor internal reliability, with Cronbach's alphas ranging from .34 to .76. The SCS-SF data were also subjected to a factor analysis, which identified two factors, consisting of the positive and negative self-compassion components. Subsequent supplementary regression analyses indicated that it is the lack of uncompassionate self-responding that may protect against depression. (The above analyses are reported in Supplementary Material.) However, as the use of positive and negative subscale scores from the SCS is controversial (Neff *et al.*, 2019), future research should measure self-compassion in people with skin conditions using the full-length SCS, to allow investigation into the effects of the six self-compassion components. Finally, the prospective findings need to be interpreted with caution as the participants who responded at time two were significantly older than those who did not respond. As self-compassion tends to increase with age (Neff & Pommier, 2013) while disgust responses tend to decrease with age (Oaten *et al.*, 2009), it is possible that the potential for self-compassion to prevent disgust responses from contributing to depression is most clinically relevant for younger people. Further research is needed to investigate this possibility. In particular, future studies could measure disgust traits and/or self-compassion longitudinally in younger adults, to assess their role in the development of depression.

There are two main clinical implications that can be drawn from the present study. First, this study further highlights the potential importance of disgust responses in depression, which may be particularly relevant for people with appearance-altering conditions (Ryan, Oaten, Stevenson, & Case, 2012; Shanmugarajah, Gaind, Clarke, & Butler, 2012). This study provides the first empirical evidence of a link between disgust traits and depression in people with skin conditions, suggesting that clinicians could usefully explore disgust responses when treating depression in people with skin conditions. However, further research is needed to establish the relative importance of disgust traits in explaining depression compared to other physical factors, such as pain or itch, and other psychosocial factors, such as stigma, social isolation, and coping

behaviours. There is evidence that malodorous cutaneous conditions, such as an infected wound, trigger disgust (Ousey & Roberts, 2016), but future research could usefully explore which aspects of skin conditions are the strongest triggers for disgust and how to help people manage these aspects.

Second, this study shows that self-compassion should also be explored as a technique to use with people with skin conditions who are seeking treatment for depression. Skin conditions can impact many areas of life beyond the physical: In particular, people with skin conditions are commonly subject to negative reactions from others (Kent, 2005) and can experience difficulties with socializing, work, and leisure activities (Dures, Morris, Gleeson, & Rumsey, 2011). Self-compassion is a way of responding to difficulties that can be used in any distressing situation, as it does not rely on evaluations of the self or others (Neff, 2003b): Whether one's distress originates from a physical symptom, a negative self-evaluation, or a negative social experience, it can be met with self-compassion. Being self-compassionate may, therefore, be particularly valuable for people with skin conditions who are faced with frequent, but varying, difficulties associated with their conditions. There is an increasing research base for interventions that aim to increase compassion (including self-compassion), with evidence that these interventions reduce depression (see Kirby, Tellegen, & Steindl, 2017, for a review). The results of the current study suggest that increasing self-compassion is a viable target in the psychological treatment of depression in people with skin conditions. Indeed, there is emerging evidence that compassion interventions can benefit people with skin conditions: Studies in this population have found compassion self-help to reduce depression, shame, self-criticism, and negative affect, and improve quality of life (Hudson, Thompson, & Emerson, 2019; Muftin, Gilbert, & Thompson, in press; Sherman, Roper, & Kilby, 2019).

Conclusions

Being self-compassionate may benefit people living with skin conditions in terms of reduced depression. Self-compassion explains variance in depression cross-sectionally and prospectively and so appears to protect against depression. Having high self-compassion also gave the additional benefit of buffering the negative effect of disgust propensity on concurrent depression.

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Conflicts of interest

All authors declare no conflict of interest.

Author contributions

Elaine N. Clarke conceived the study, collected and curated the data, performed the formal analysis, and wrote, reviewed and edited the manuscript. Andrew R. Thompson conceived and supervised the study, and reviewed, and edited the

manuscript. Paul Norman conceived and supervised the study, and reviewed, and edited the manuscript.

Data availability statement

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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Supporting Information

The following supporting information may be found in the online edition of the article:

Appendix S1. Exploratory Factor Analyses of DPSS-R and SCS-SF and Supplementary Regression Analyses.