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REVIEW

Psychological Distress of Psoriasis Patients

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Abstract

This review explores the psychological challenges experienced by people with psoriasis. Psychological distress is associated with a wide range of challenges including depression, anxiety, low self-esteem, relationship difficulties and sleep disorders. Though psychological distress is prevalent and may significantly impact the quality of life, treatment outcomes and the delivery of healthcare, it is often unrecognised and untreated. The review explores why the assessment of the psychological impact of psoriasis is essential to meet the holistic needs of individuals with psoriasis. Multidisciplinary psychodermatology teams, using a stepped-care approach to addressing psychological distress, may be best placed to care for the needs of this population.

Key words: psoriasis; psychological distress; anxiety; depression

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Introduction

Psoriasis affects around 2% of the UK population and around 60 million people globally (Parisi et al, 2020). Though often considered to be primarily a skin disease, psoriasis is more accurately understood to be an immune-mediated, chronic, inflammatory condition affecting many systems throughout the body. It commonly causes raised, inflamed plaques of skin that can appear anywhere on the body and are covered in silvery-white, purple or grey scales (though there are different forms of psoriasis such as guttate and inverse). There is an increased risk of comorbidities such as psoriatic arthritis, diabetes, hypertension and cardiovascular disease (Daugaard et al, 2022).

Alongside the physical symptoms, such as itch, pain and flaking skin, people living with psoriasis and psoriatic arthritis are at an increased risk of developing significant psychological difficulties such as depression and anxiety. However, these psychological difficulties are often not identified or treated adequately with major consequences for the individual (Wheeler et al, 2022). This review aims to explore psychological distress experienced by individuals with psoriasis, the impact of psychological distress on quality of life and the course of the condition, as well as potential strategies for assessment and management within dermatology services.

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The Psychological Impact of Psoriasis

Studies consistently find higher rates of depression in people with psoriasis than in the general population, although the rates vary between 9% and 55% depending on study design and inclusion criteria (Patel et al, 2017). There are significantly higher rates of suicidal ideation in people with psoriasis, with up to 21% found in one study (Luna et al, 2023). A systematic review of 18 studies looking at depression in people with psoriasis found that while the risk of suicidality was low, people with psoriasis were more likely to attempt to take their own lives than those without the condition, whilst younger people with psoriasis and those with more severe symptoms were at greater risk of suicidality (Singh et al, 2017). A recent study compared rates of completed suicide in people with moderate to severe psoriasis and who were on the British Association of Dermatologists Biologics and Immunomodulators Register with the UK general population (Williams et al, 2024). In line with previous findings, this study found higher rates of suicide attempts and suicidal ideation in patients with psoriasis but completed suicide was found to be a rare event with no significant difference between the groups.

In the general population, depression affects approximately 10% of people and is believed to develop through an interaction between biological, psychological and social risk factors (Garcia-Toro and Aguirre, 2007). Risk factors specific to people with psoriasis may include the experience of stigma and discrimination, work-related difficulties, relationship difficulties, low self-esteem, alcohol abuse and sleep disturbance (Anstey et al, 2012; Henry et al, 2016; Kirby et al, 2008).

There also appear to be links between the underlying mechanisms for both depression and psoriasis. Many of the inflammatory markers associated with the pathogenesis of psoriasis, such as interleukin (IL)-1, IL-6, and tumour necrosis factor (TNF)-α, are also found to be associated with the development of depression (Koo et al, 2017; Maqbool et al, 2021). Chronic inflammation can influence the brain's neurotransmitter systems and potentially impact mood regulation, with evidence that some of the inflammatory cytokines involved in psoriasis, such as TNF-α, are associated with serotonin transporters activity and decreased serotonin availability levels in the body (Maqbool et al, 2021). Similarly, low vitamin D3 levels, found in both psoriasis and depression, are associated with higher levels of inflammatory markers, suggesting that shared pathophysiological pathways may be involved (Hedemann et al, 2022; Sahi et al, 2020). The complex interplay of immune-inflammatory processes involved in the pathogenesis of both psoriasis and depression warrants further research.

As part of assessment, clinical psychologists formulate depression using a framework which takes into consideration the predisposing, precipitating, perpetuating and protective factors involved in the development and maintenance of a depressive episode (Challoner and Papayianni, 2018; DCP, 2011; Selzer and Ellen, 2014). Predisposing factors are those which increase vulnerability in the face of a presenting problem, such as early traumatic experiences or a history of depression. Precipitating factors are those which may trigger the onset of the current episode of depression, such as a new health diagnosis or relationship problems. Perpetuating

factors are those which may exacerbate the situation, such as ongoing work stress. Protective factors include those which may counteract the other factors, such as the individual's support network. Each of these can include biological, psychological and social factors.

Often referred to as the 4 P's framework, this can be a useful method of conceptualising the factors leading to a depressive episode in those with psoriasis (Ashton Cox, 2021). Each formulation is unique to the client and is based on a detailed psychological assessment. It is used to explain and understand the depressive episode and guide any therapeutic intervention. Fig. 1 provides examples of 4 P's to illustrate the range of potential factors which may lead to a depressive episode in someone with psoriasis. These may include factors directly related to the experience of living with psoriasis as well as other non-related factors.

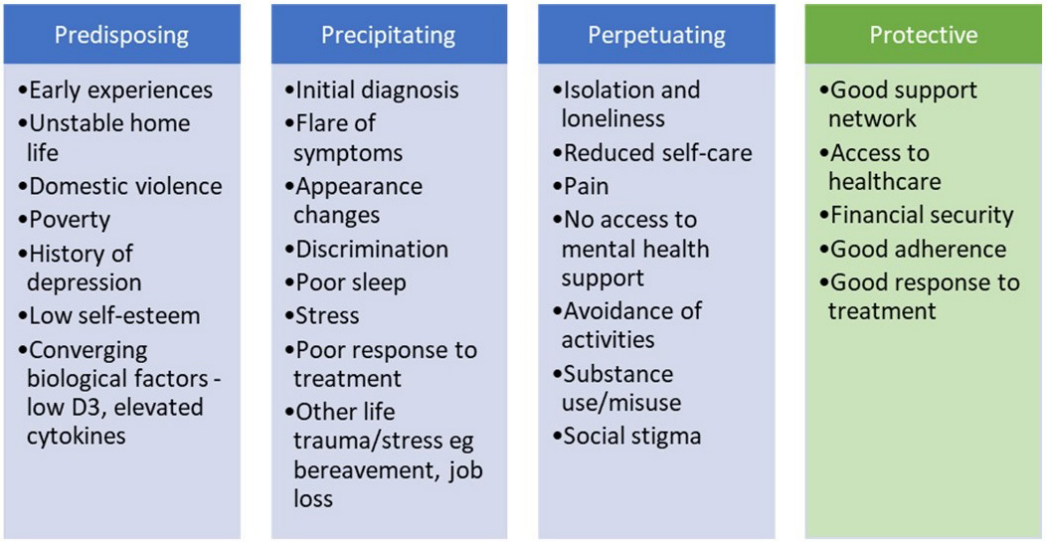

Fig. 1. The 4 P's formulation framework for understanding depression in psoriasis.

The relationship between psoriasis severity, often measured using the Psoriasis Area and Severity Index (PASI) (Fredriksson and Pettersson, 1978), and depression is complex (Luna et al, 2023). Many studies have found a weak relationship between PASI score and measures of depression (Breuer et al, 2015; Mueller et al, 2020), whilst others have reported a strong association (Sahi et al, 2020). Other factors seem to be more strongly associated with depression, such as the length of time an individual has had psoriasis and the parts of the body where plaques occur; people with psoriasis on their hands and fingernails report being more distressed than those with psoriasis on the face and scalp, even when their psoriasis is mild (Hawro et al, 2017; Ohata et al, 2019).

The relationship between stress and psoriasis presents a similarly complex picture. Stress can refer to an emotional demand on an individual, as well as the physiological and mental reaction to feeling under pressure of threat. Anxiety, in contrast, refers to persistent worries even when there is no threat or stressor present. Though anxiety might arise as a consequence of stress, the terms stress and anxiety are often used interchangeably (Konstantopoulou et al, 2020).

Researchers have hypothesised that stress acts as both a trigger for psoriasis as well as a sequela (Tampa et al, 2018). Whilst it has been suggested that inflammatory responses related to stress are responsible for triggering psoriasis, much of the research arises from retrospective, subjective studies, in which people are asked to identify a trigger for either the onset or flare of symptoms. Those few studies which have attempted to monitor stress and psoriasis symptoms prospectively have been inconclusive (Verhoeven et al, 2009).

There are several proposed pathways between psoriasis and stress such as peripheral nervous system pathways, immune mediated pathways, sympathetic–adrenal–medullary system pathways and the hypothalamic-pituitary-adrenal (HPA) axis (Hunter et al, 2013; Tampa et al, 2018). The HPA axis, for example, is believed to play a significant role in the progression of the condition. The HPA axis activates the sympathetic nervous system when the body is under stress, leading to the release of stress hormones like adrenocorticotrophic hormone and cortisol. In psoriasis populations, there is evidence of lower levels of cortisol and higher levels of adrenocorticotrophic hormone in those reporting high stress levels compared with control groups, suggesting dysfunction of the HPA axis (Pietrzak et al, 2020; Rajasekharan et al, 2023). It has been suggested that such dysregulation of the immune system arises as a result of chronic stress, leading to sustained inflammation in autoimmune diseases such as psoriasis (Chaudhary et al, 2023). Further understanding of the relationship between stress, stress responses and the worsening of psoriasis symptoms is needed.

The evidence for psoriasis causing stress is more compelling with between 20% and 50% reporting anxiety symptoms (Hedemann et al, 2022) and around 40% of people with psoriasis reporting moderate to severe anxiety (Richards et al, 2001). Nowowiejska et al (2022) found higher levels of self-reported stress in people hospitalised for treatment of psoriasis compared to a control group. Higher levels of stress were associated with longer periods of time spent on skin care, feelings of embarrassment and disruption to physical activity.

Whilst depression and anxiety are commonly experienced by people with psoriasis, the psychological challenges are not limited to those two diagnoses. There is evidence that people with psoriasis commonly experience a range of additional psychological challenges. A study of over 900 people with psoriasis found shame, worry and anger were commonly experienced emotions (Sampogna et al, 2012). In this study higher levels of shame were associated with duration of disease, a lower level of educational attainment and difficulties in daily activities. Sleep difficulties have also been identified; a meta-analysis of 15 studies found that psoriasis was associated with poor sleep quality and a higher risk of sleep disturbance and insomnia (Guo et al, 2024). There are also interpersonal challenges. People with psoriasis report significantly higher levels of loneliness than a healthy control group and people with hidradenitis suppurativa (Kouris et al, 2021).

Additional psychological difficulties include low self-esteem, alcohol and drug related difficulties, relationship difficulties and eating disorders (Basavaraj et al, 2011; Crosta et al, 2013; Hunter et al, 2013; Verhoeven et al, 2009; Wheeler et al, 2022).

Often this wide range of emotional challenges and psychological distress is less visible to others and is often not recognised even by family members (Richards et al, 2004b). The visible challenges such as plaques and flaking can be conceptualised as just the tip of the iceberg, whilst the less visible difficulties beneath the surface, including psychological and emotional challenges, may be overlooked (Fig. 2) (O'Leary, 2024).

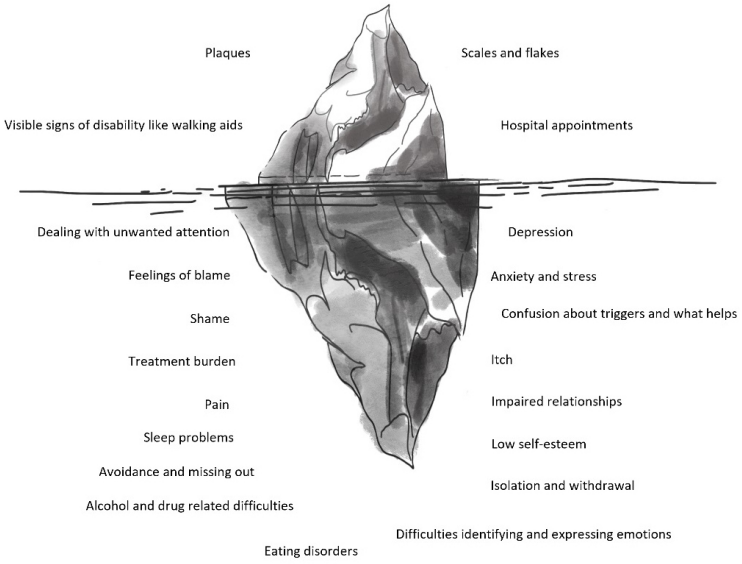

Fig. 2. The Psoriasis Iceberg. Adapted from "Coping With Psoriasis: Understanding and navigating the emotional challenges" by O'Leary (2024).

In oncology services, the broader term of 'psychological distress' is used to describe the similarly wide range of psychological challenges faced by people with cancer (Abdelhadi, 2023). The International Psycho-Oncology Society (IPOS) has recommended that psychological/emotional distress is used as the sixth vital sign alongside temperature, blood pressure, pulse, respiratory rate and pain to assess the overall well-being and health of a patient (Fradgley et al, 2019). In oncology, this wider term encourages a more holistic approach to care and given the range of emotional and psychological challenges faced by those with psoriasis, psychological distress is likely to be a helpful concept in psoriasis care.

The Impact of Psychological Distress

Comorbid psychological distress has an impact on the quality of life of people with psoriasis with many studies reporting a strong relationship between mental health and quality of life (Schmitt and Ford, 2007; Bechman et al, 2023). In contrast, the relationship between psoriasis severity and quality of life is weaker with evidence that mental health and quality of life can remain poor even after successful treatment or remission (Heydendael et al, 2004), suggesting that a model of psoriasis care focusing only on treating the skin may have little impact on an individual's overall quality of life.

Untreated psychological distress can impact treatment outcomes. One study found that depression at baseline predicted clinical response to a biologic treatment with PASI response rates being lower in depressed individuals than those who were not depressed (Jin et al, 2019). This may in part relate to an individual's ability to adhere to and manage their treatments when depressed (Bell et al, 2021). A longitudinal study exploring the factors associated with adherence to dermatological treatments found that psychological distress was the strongest predictor of non-adherence (Renzi et al, 2002). The authors argue that this finding 'highlights the need for a timely identification and appropriate management of anxiety disorders and depressive disorders in everyday dermatologic practice'. A systematic review of the factors associated with adherence in immune-mediated inflammatory diseases including psoriasis also found that emotional factors, in particular depression, were associated with non-adherence to treatments in these conditions (Vangeli et al, 2015). The authors suggest that emotional distress, especially depression, is likely to affect memory and planning ability, as well as beliefs about treatment and efficacy which increases the risk of non-adherence.

In addition to increasing the burden of psoriasis, psychological distress can have a wider impact in terms of economic costs. Increasing evidence across a range of different chronic illnesses has found that psychological difficulties alongside physical health conditions lead to increased healthcare utilisation and costs. It has been estimated that mental health difficulties alongside chronic illness costs the National Health Service (NHS) in England between £8 billion and £13 billion a year and increases healthcare costs by 45% due to increased rates of admission, hospital bed days, as well as non-attendance rates (Naylor et al, 2012). A study in an American psoriasis population found that a diagnosis of depression and/or anxiety raised total health care costs by around $8000 in 1 year due to inpatient admissions, emergency room (ER) visits, outpatient services, and pharmacy claims, as well as indirect costs of absenteeism (Cai et al, 2019).

Recognising Psychological Distress

The British Association of Dermatologists (Bewley et al, 2013) and NICE guidelines (National Institute for Health and Care Excellence, 2012; Samarasekera et al, 2012) recommend assessing the impact of psoriasis on psychological and social well-being as part of a standard dermatology consultation. However, in psoriasis populations, this may be complicated by the presence of alexithymia: that is, emotional blindness or a lack of awareness of one's own emotional state. Numerous studies have reported high rates of alexithymia in psoriasis, which affects around a quarter of people with the condition (Tang et al, 2022). Tang et al (2022) found that women, patients with more severe disease, patients with psoriatic arthritis, and patients with visible skin lesions have a higher prevalence of alexithymia. Similar rates of alexithymia are evident in other dermatological and health conditions, as well as those who have experienced trauma and those who are depressed (Baiardini et al, 2011).

Since individuals with high rates of alexithymia may struggle to recognise or describe distress, assessment of emotional distress should be more in-depth with clinicians asking patients a range of direct questions about specific aspects of daily life and psychological health. Clinicians may also underestimate the impact of the condition on mental health (Finlay, 2000), and as such a more thorough assessment may reduce this risk. The NICE guidelines provide a list of questions to guide assessment:

- How does psoriasis affect your daily life and activities?
- How are you coping with your skin condition?
- How are you coping with any treatments you are using?
- Do you need further advice or support?
- How does your psoriasis impact on your mood?
- Does your psoriasis cause you distress (be aware the patient may have levels of distress and not be clinically depressed)?
- How does your condition impact on your family or carers?

In terms of measuring psychological well-being, there are a number of widely used, validated self-report measures of anxiety and depression such as the patient health questionnaire 9 (PHQ9) (Kroenke et al, 2001) and the generalized anxiety disorder 7 (GAD7) (Spitzer et al, 2006), which may be useful in identifying clinical anxiety and depression that could be missed when using quality of life measures alone (Lamb et al, 2017).

The NICE guidelines for identifying and recognising depression in people with physical health problems (NICE, 2010) recommend asking the following two questions (patient health questionnaire 2 (PHQ2)) where there is concern that someone is clinically depressed:

'During the last month, have you often been bothered by feeling down, depressed or hopeless?'

'During the last month, have you often been bothered by having little interest or pleasure in doing things?'

If the answer to either question is yes, then referral on to the person's general practitioner or mental health services is appropriate, or (if available) the specialist psychodermatology practitioner.

Routine screening for depression at every clinic appointment can help improve access to psychological support. Kromer et al (2021) found that the practice of routine screening using a depression questionnaire in dermatology clinics based in Germany helped identify those patients at risk. For those individuals considered to be at greater risk, a letter was written to the individual's general practitioner requesting further evaluation. A significant proportion (23%) were subsequently seen by secondary mental health care services. Improvements were seen in quality of life and depressive symptoms but also in disease activity.

Bechman et al (2023) recommend electronic screening which was utilised in a large dermatology centre in the UK. Patients completed measures of anxiety, depression and quality of life using a tablet with high scores for psychological distress triggering advice on mental health referral. They found increasing engagement in the program over time.

Though depression and anxiety scales such as the PHQ9 and GAD7, are useful tools, screening measures for depression and anxiety are focused on a narrow range of symptoms, and as such, other forms psychological distress may be missed. This may be especially relevant in the context of a condition with unique challenges such as alexithymia. Measures of disease-specific psychological distress are available for other conditions such as cystic fibrosis (Finlay et al, 2022) and diabetes (Fisher et al, 2024) but not psoriasis. In the absence of a psoriasis-specific measure of psychological distress, dermatology clinicians need to be alert to the range wide of psychological challenges and struggles that may not be evident with measures of anxiety and depression alone.

To help in this regard, there are several validated measures that can aid screening for distress including the Distress Thermometer (Blom et al, 2023) and the Kessler Psychological distress scale-10 (Kessler et al, 2002). Structured quality of life questionnaires, like the Dermatology Life Quality Index (DLQI) (Finlay and Khan, 1994), are also useful adjuncts to assessment of emotional distress, however, these are best used in conjunction with a more in-depth consultation.

The Treatment of Psychological Distress in Psoriasis

Depression and other psychological challenges, once identified, are treatable (Simon et al, 2005). In psoriasis populations a range of psychosocial interventions, including cognitive behavioural therapy (CBT), therapeutic writing and mindfulness have been shown to have small to medium effects on health-related quality of life and anxiety (Zill et al, 2019).

Furthermore, psychosocial intervention has been shown to improve the efficacy of treatments (Kabat-Zinn et al, 1998; Rousset and Halioua, 2018). One study (Kabat-Zinn et al, 1998) demonstrated the benefit of mindful meditation not only on emotional wellbeing but also on treatment response, with those listening to a mindfulness recording while undergoing phototherapy (Ultraviolet B (UVB) and Psoralen and Ultraviolet A (PUVA)) clearing significantly faster than the control condition.

More recent research has also shown additional benefits of meditation interventions aimed at improving psychological distress in psoriasis (Bartholomew et al, 2022). This review of six studies, where people were randomised to a control group or to a meditation group, found psychological improvements related to the meditation in only two studies. Despite this, in five studies the severity of psoriasis improved significantly more in the meditation group after 8 or 12 weeks of practice.

There is limited evidence for the long-term effectiveness of psychotherapy in psoriasis populations and this warrants further research. More evidence is also needed on how to determine which psychotherapy is more suitable for which psoriasis patient. However, Xiao et al (2019) argue that there is unlikely to be a 'universal effective therapy to all psoriasis patients' and that 'interventions should be tailored according to the specific causes of mental consequences for particular psoriasis patients'.

Patient Coping

The way in which an individual copes with a chronic health problem can impact emotional wellbeing and quality of life (Stallman, 2020). Research looking at patient coping styles and strategies in psoriasis has found that individuals who tend to use emotion focused coping strategies such as using social support and positivity are more likely to have a better quality of life (Liluashvili and Kituashvili, 2019).

Furthermore, evidence suggests that peer support groups can reduce psychological stress and improve quality of life, with participants feeling less isolated and more understood (Zhang et al, 2023). Online self-help groups based on compassion and mindfulness can also offer benefits by reducing feelings of shame and improving quality of life (Muftin et al, 2022). More recent research has highlighted the role of blogging and emotional disclosure via social media to manage psychological distress, reduce isolation and foster connection with others in people with skin conditions (Tour et al, 2022).

The Role of Dermatology Health Care Professionals

Whilst it is clear from decades of research that the psychological impact of psoriasis is significant, dermatology services have been slow to offer a holistic approach, to address both the physical and psychological symptoms. Despite recommendations to assess psychological distress, few patients are asked about their mental health during consultations (Richards et al, 2004a). Many patients feel that the psychosocial challenges they face due to their condition are unacknowledged or misunderstood by their clinicians (Nelson et al, 2013; Wheeler et al, 2022).

The reasons for this are likely to be multiple and may include practical factors such as time constraints and funding. Additionally, dermatology clinicians can feel lacking in confidence and/or training in addressing a patient's mental health and may consider themselves to be ill-equipped to support the psychological needs of their patients once identified. An online questionnaire sent to Canadian dermatologists highlighted several challenges to managing psychodermatology conditions. These included lack of specific psychodermatology training with 46% having never participated in any, as well as poor access to psychiatric expertise and time constraints. Of those who had received psychodermatology training, the majority felt that it was poor or inadequate (Turk et al, 2021). In light of challenges such as these, a recommendation arising from All-Party Parliamentary Group on Skin (APPGS) in 2020 was for clinicians to have the confidence and skills to recognise and respond to signs of psychological distress, and to recognise mental health issues and risk factors (Wheeler et al, 2022).

Once psychological distress has been identified, dermatology clinicians face challenges in referring patients to appropriate psychological support. A survey commissioned by APPGS asked over 500 people with skin disease, of which 33% had psoriasis, about the availability of specialist psychological support within the NHS in the UK (Wheeler et al, 2022). There were a small number of participants who

could access specialist psychological support, and these reported it to be beneficial. Unfortunately, most of the sample (86%) reported they could not access specialist psychological support.

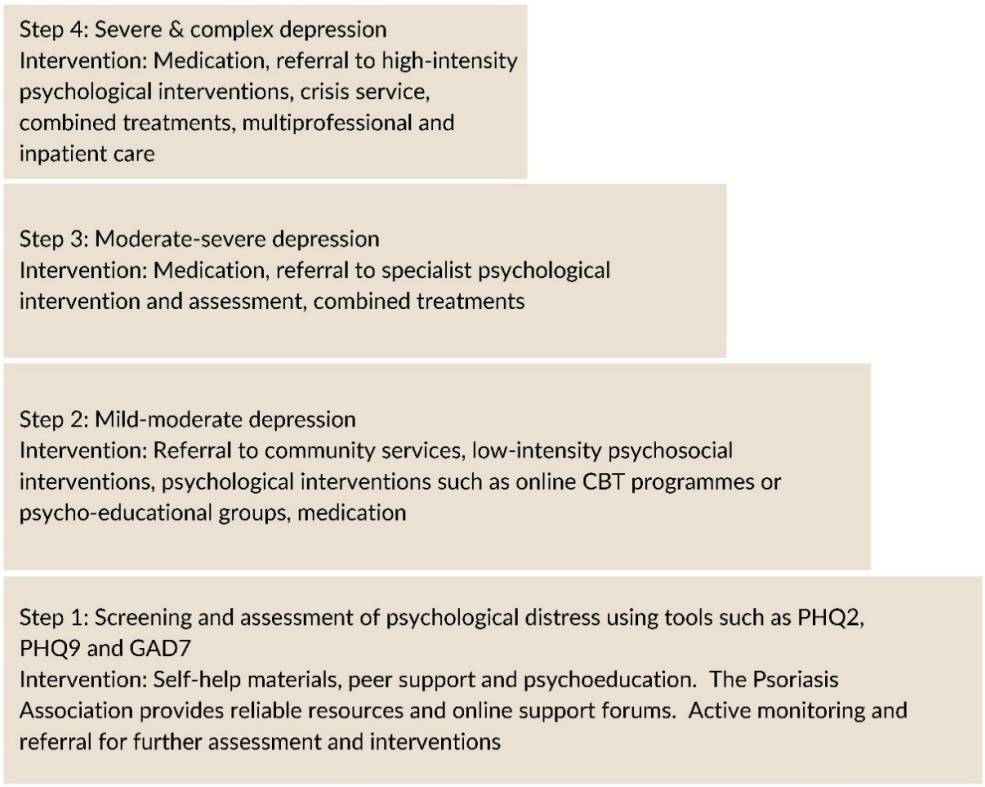

Fig. 3. A stepped approach to identifying and recognising depression in people with psoriasis. CBT, cognitive behavioural therapy; PHQ2, patient health questionnaire 2; PHQ9, patient health questionnaire 9; GAD7, generalized anxiety disorder 7.

A stepped-care approach, recommended by NICE (2010) can provide a useful model for managing psychological difficulties within dermatology services (Fig. 3). Turner et al (2015) describe the use of a stepped-care approach in a London Hospital. In this model, psychological care remained embedded within the dermatology service as this allowed psychological interventions to be tailored towards the challenges of living with a skin condition (Thompson, 2014). At step 1, electronic screening allowed patients to be categorised according to the severity of psychological distress, with a clinical psychologist supporting the multi-disciplinary team (MDT) to interpret severity and identify risk. Step 2 involved self-help material and peer support delivered by all members of the MDT. Referral to community psychological services were offered at step 2 for those with higher levels of psychological distress. Step 3 involved specialist psychological assessment and intervention from the MDT psychologist. Step 4 involved referral to liaison psychiatry for those individuals with complex mental health issues such as suicidal ideation and mental

health crisis. The authors report benefits to staff, with increased feelings of confidence and competence in addressing patient's needs, as well as benefits to patients.

Bewley et al (2013) have recommended that psoriasis patients are cared for by a multidisciplinary psychodermatology team including dermatologists, psychiatrists, psychologists, primary-care doctors, nurses and other allied health professionals, with close liaison between primary and secondary care. The British Association of Dermatologists (BAD) Psychodermatology Working Party called for 'at least regional dedicated psychodermatology clinics across the UK' in response to a decrease in psychodermatology provision in the UK over the previous decade (Bewley et al, 2013).

The routine provision of embedded clinical psychologists within MDTs is found in other health conditions such as cystic fibrosis (Conway et al, 2014), cleft lip and palate (Hotton et al, 2023) and stroke services (Psychological Professions Network, 2020). Psychology as part of an MDT can provide direct psychological intervention and has additional benefits such as offering consultations to other multidisciplinary professionals, leadership roles, training, and research (McCulloch et al, 2018). Turner et al (2015) argue that the provision of a psychologist embedded within the MDT may be especially important in dermatology services since it normalises psychological distress and this may be 'particularly important in people with psoriasis (and others with skin conditions) due to the high risk of discrimination and stigma they experience'.

Despite the emergence of evidence demonstrating the benefits of psychodermatology services in terms of cost-effectiveness (Goulding et al, 2017), the provision of specialist psychological input into dermatology services in the UK remains poor. A recent survey (Massoud et al, 2021) found a continued lack of access, with only around 13 psychodermatology services across the entire UK, and respondents reported poor or curtailed services. Currently, access to multi-disciplinary psychodermatology teams in the UK continues to be limited and with geographical inequity (Hughes, 2022).

In order to best manage the challenges of living with psoriasis, dermatology care needs to move away from a 'single-disease framework' towards a multi-morbidity approach. Evidence would suggest that an integrated approach to the medical and psychological management of psoriasis would not only serve patients better but would also lead to a reduction in healthcare costs and wider economic benefits. Collaborative care models, with strong links between dermatologists and psychologists, would ensure the timely management of the psychological challenges and ensure patients receive optimal care.

Conclusion

Psoriasis is linked with significant psychosocial challenges and psychological distress, which can affect a patient's quality of life and the progression of the condition itself. The psychological burden of psoriasis, if left unaddressed, can interfere with the effectiveness of treatments and contribute to increased healthcare costs. To better address these issues, a stepped-care service model can be implemented to

manage psychological distress in psoriasis populations, offering targeted interventions based on individual needs. Multidisciplinary teams, which include psychologists, can play a vital role in supporting the holistic needs of people with psoriasis by providing both psychological and physical care, thereby improving overall treatment outcomes and patient well-being. There are implications for future research and clinical practice, including the need for disease-specific tools to assess psychological distress and the impact of early identification and management of these difficulties.

Key Points

- Psoriasis is associated with complex psychosocial challenges and psychological distress.
- Psychological distress can impact quality of life and the course of the condition.
- Untreated psychological distress may undermine the success of a treatment and has implications for healthcare costs and service delivery.
- A stepped-care service model can be used to manage psychological distress in a psoriasis population.
- MDTs, which include psychologists, can support the holistic needs of people with psoriasis.

Availability of Data and Materials

All the data of this study are included in this article.

Author Contributions

CO was the sole author and was responsible for the design of the work, drafting and revision of content, and approval of the version to be published. CO has participated sufficiently in the work and agreed to be accountable for all aspects of the work.

Ethics Approval and Consent to Participate

Not applicable.

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Conflict of Interest

The author declares no conflict of interest.

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