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Psychological Distress, Alexithymia and Alcohol Misuse in Patients with Psoriasis: A Cross-Sectional Study

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Abstract
This study investigates (a) the prevalence of psychological distress, alexithymia and alcohol misuse in psoriasis patients; and (b) the relationship between psoriasis severity, alexithymia, alcohol and psychological distress in patients with psoriasis. A cross-sectional study was conducted. Outpatients ($n = 184$) with moderate to severe psoriasis completed a psychological screening battery. Measures included the Hospital Anxiety and Depression Scale, the Penn State Worry Questionnaire, the twenty-item Toronto Alexithymia Scale, the Dermatology Life Quality Index, the Psoriasis Area and Severity Index, the Self-Administered Psoriasis Area and Severity Index, and the Alcohol Use Disorders Identification Test. Demographic, clinical details and information on knowledge of psychosocial issues, alcohol and confidence on coping with distress and talking to others about psoriasis was also gathered. Alexithymia was associated with anxiety, depression and worry; subjective psoriasis severity was associated with worry. Alcohol misuse was related to anxiety and worry, but not to depression. Appropriate identification and treatment of alcohol difficulties and psychological distress of patients with psoriasis is needed.

Keywords Psoriasis · Alcohol · Depression · Anxiety · Alexithymia

Introduction

Psoriasis and Its Clinical Characteristics

Psoriasis is a chronic inflammatory skin condition (Gelfand et al., 2005). It is characterised by localised, widespread, well-demarcated red plaques, often topped by silvery scales (Papadopoulos & Walker, 2003), which are often disfiguring. The term psoriasis is derived from the word "psora" which means to itch. Although it was originally described by Hippocrates, it was not until the eighteenth century that it was recognised as a distinct disease from leprosy (Burden & Kirby, 2016). The clinical severity of psoriasis is determined by the intensity and extent of psoriatic lesions (Schmitt & Ford, 2007a, b). The degree of skin involvement can vary from unsightly scaling plaques on elbows and knees to extensive skin involvement, nail dystrophy and a particular form of arthritis (Fortune, Main, O'Sullivan, & Griffiths, 1997). 20% of psoriasis patients will suffer from severe disease with > 10% of their body surface area affected (Burden & Kirby, 2016; Parisi, Symmons, Griffiths, & Ashcroft, 2013). Early onset is related to more severe psoriasis (Camisa, 2004). Several distinct clinical subtypes are described. These include guttate, chronic plaque psoriasis, erythrodermic psoriasis and generalised pustular psoriasis. Chronic plaque psoriasis is the commonest clinical phenotype and comprises more than 80% of cases (Burden & Kirby, 2016; Parisi et al., 2013). While the pathogenesis of psoriasis is unknown, genetic, environmental and psychological factors can be involved in its occurrence (Camisa, 2004; Gaston, Lassonde, Bernier-Buzzanga, Hodgins, & Crombez, 1987). Patients may present with multiple symptoms including pruritus (itch), skin pain, skin flaking and sensations of excessive heat in the skin. Patients with more severe forms of the disease can develop fever, excessive heat loss, dehydration and cardiac failure. These patients can rarely develop

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systemic infection with subsequent multi-organ failure and death. With modern medical care, these events are fortunately rare.

Comorbidities

Common comorbidities associated with psoriasis include psoriatic arthritis, metabolic syndrome, hypertension, Crohn's disease and non-insulin dependent diabetes (Burden & Kirby, 2016). Patients with psoriasis are more likely to develop premature cardiovascular disease and patients with more severe disease die approximately 5 years younger than their peers predominantly from cardiovascular complications (Gelfand et al., 2006).

Course and Treatment

There is no current cure for psoriasis; its clinical course involves periods of remission and recurrence (Fortune, Richards, Griffiths, & Main, 2002a), which are often unpredictable (Esposito, Saraceno, Giunta, Maccarone, & Chimenti, 2006). The anticipation of recurrence of psoriasis can contribute to emotional stress for psoriasis patients (Kimball, Jacobson, Weiss, Vreeland, & Wu, 2005). Treatment of psoriasis includes topical therapy, phototherapy, photochemotherapy and oral immunosuppressive therapy (Papadopoulos & Walker, 2003). Topical therapy is the treatment of choice for patients with mild psoriasis but it can be time consuming, cause skin staining, irritation, and may have strong odour. Phototherapy is an option for those with mild psoriasis who do not adequately respond to topical therapy but may inconvenient as it requires frequent clinic visits. Treatment with systemic drugs is recommended for patients with moderate to severe disease (Kimball et al., 2005).

Psychosocial Impact

The impact of psoriasis on health-related quality of life is similar to that of cancer, arthritis, hypertension, heart disease, diabetes and depression (Rapp, Feldman, Exum, Fleischer, & Rebousin, 1999). Significant factors that can determine health-related quality of life in patients with psoriasis are physical symptoms and discomfort, comorbidities, and the psychosocial and occupational impact of psoriasis (Kimball et al., 2005; Rapp et al., 1999; Wahl, Gjengedal, & Hanestad, 2002).

Occupational Impact

Finlay and Coles (1995) found that about two-thirds of patients with severe psoriasis had, on average, missed 26 days' work due to their psoriasis the preceding year. In a larger scale study ($n=6194$), it was found that 6% of patients with severe psoriasis experienced work discrimination and 8% attributed their unemployment to psoriasis (Krueger et al., 2001).

Interpersonal Concerns and Stigmatisation

Most patients express feelings of disgust, social embarrassment and shame about their skin. More than 40% patients with psoriasis were affected sexually by their condition and had greater joint involvement, more scaling and pruritus, higher depression and more psoriasis affecting the perineal area (Gupta & Gupta, 1997). Genital psoriasis is also associated with sexual inhibition (Jowett & Ryan, 1985) and a poorer quality of life (Ryan et al., 2015). In a sample of over 100 patients with psoriasis, a significant proportion felt stigmatised and thought others viewed them as a leper (57%), avoided social activities such as swimming (72%) and felt that their psoriasis interfered with their sexual relationships (50%) (Ramsey & O'Reagan, 1988). Ginsburg and Link (1993) found that patients with psoriasis often experienced rejection by others. Bleeding which may result from scratching appear to affect patients' experience of stigma and psoriasis-related despair (Ginsburg & Link, 1989). Actual experiences of rejection and bleeding is strongly related to feelings of being flawed and sensitivity to the opinions of others; although clinical severity and visibility were not predictors of feelings of stigmatisation (Ginsburg & Link, 1989), a more recent multicenter cross-sectional study (Alpsoy et al., 2017) showed that internalised stigma is associated with clinical characteristics such a psoriasis severity, visibility, location on the face, scalp, hands and genital region, as well as poorer quality of life, psychological distress and negative evaluation of general health. Similarly, Hrehorow, Salomon, Matusiak, Reich and Szepietowski (2012) reported that stigmatisation was associated with prutirus intensity, stress prior to exacerbation, depression and poorer quality of life. Fear of negative evaluation significantly predicted perceptions of stigmatisation, distress regarding the visibility of psoriasis, worry about people's reactions to their condition and degree of disruption in their social lives and family relationships (Leary, Rapp, Herbst, Exum, & Feldman, 1998). Stress resulting from anticipation of reactions by others leading to avoidance of social situations and stress resulting from actual beliefs or experiences of rejection were associated with impairment in health-related quality of life (Fortune et al., 1997).

Psoriasis and Mental Health Difficulties

Patients with psoriasis are more susceptible to mental health difficulties than patients with other dermatological conditions (Bahmer, Kuhl, & Bahmer, 2007; Dalgard et al., 2015; Fava, Perini, Santonastaso, & Formasa, 1980;

Hughes, Barraclough, Hamblin, & White, 1983; Pompili et al., 2016) such as fungal infections (Porter, Beuf, & Lerner, 1986), vitiligo (Fava et al., 1980), patients with otolaryngology problems (Golpour et al., 2012), general medical in-patients (Hughes et al., 1983), patients without psoriasis (e.g. healthy and matched controls) (Wu, Feldman, Koo, & Marangell, 2017) and the general population (Dowlatshahi, Wakkee, Arends, & Nijsten, 2014; Kurd, Troxel, Crits-Christoph, & Gelfand, 2010; Schmitt & Ford, 2010). Results from population-based control studies have shown that patient with psoriasis are at increased risk of depression, suicidality, stress-related disorders, behaviour disorders independently for age and gender (Kurd et al., 2010; Schmitt & Ford, 2010). In another population study, psoriasis patients (16.5%) suffered from major depression independently of age, sex, body mass index, physical activities, alcohol use, smoking and history of myocardial fraction, diabetes and cardiovascular disease (Cohen, Martires, & Ho, 2016). Hughes et al. (1983) found a link between psychological distress and diagnoses of acne, eczema and psoriasis with extensive lesions on exposed parts of the body.

Prevalence of Mental Health Comorbidity

The mental health difficulties encountered by patients with psoriasis have received increased attention over the last decade (Gupta & Gupta, 2003; Russo, Ilchef, & Cooper, 2004; Vladut & Kallay, 2010). While estimates are inconsistent (Fortune, Richards, & Griffiths, 2005a), one in four patients with psoriasis is substantially distressed and one in five suffers from mental health problems (Picardi, Abeni, Melchi, Puddu, & Pasquini, 2000). In a recent systematic literature review (Ferreira, Pio-Abreu, Reis, & Figueiredo, 2017), it is reported that psychiatric comorbidity among patients with psoriasis range from 24 to 90%; most common were sleep (average prevalence: 62%) and sexual disorders (average prevalence: 45.6%), followed by personality (average prevalence: 35%), anxiety (average prevalence: 30.4%), adjustment (average prevalence: 29%), depressive (average prevalence: 27.6%) and substance-related and addictive disorders (average prevalence: 24.8%). In another systematic review on etiopathogenesis and clinical correlates of psoriasis and associated psychiatric disorders (Ferreira, Pio-Abreu, Reis, & Figueiredo, 2016), it is suggested that depression, anxiety, sexual disorders and substance abuse may be the result of having to adjust to a chronic skin condition but may also maintain, trigger and exacerbate it. This is supported by the evidence of shared etiopathogenic mechanisms between psoriasis and psychiatric disorders, e.g. high levels of pro-inflammatory cytokines.

Suicidality

Although suicidal ideation is common among patients with dermatological conditions, it is particularly frequent in patients with psoriasis (Gupta & Gupta, 1998; Picardi, Mazzoti, & Pasquini, 2006) who are more likely to attempt and complete suicide than those without psoriasis (Singh, Taylor, Kornmehl, & Armstrong, 2017). Estimates of suicidal ideation range from 3 to 10% (Gupta & Gupta, 1998; Picardi et al., 2006). The majority of psoriasis patients (68%) attributed their suicidal ideation to their psoriasis (Dalgard et al., 2015). Factors associated with suicidal ideation in psoriasis patients are higher severity pruritus, lower overall health status, severe anxiety and depression, lower health-related quality of life (Lesner et al., 2017), psoriasis severity (Kurd et al., 2010) and hospitalisation (Gupta & Gupta, 1998).

Worry, Depression and Anxiety

Excessive worrying was found in 38% of patients with psoriasis, with 25% meeting the criteria for diagnosis of generalised anxiety disorder (Fortune, Richards, Main, & Griffiths, 2000). A recent systematic review and meta-analysis (Dowlatshahi et al., 2014) concluded that approximately one-tenth of psoriasis patients manifest signs of clinical depression and more than a quarter experience depressive symptoms. Estimates of depression and anxiety in patients with psoriasis are inconsistent ranging from 2% (Tsai et al., 2011) to 62% (Esposito et al., 2006) and 7% (Kurd et al., 2010) to 40–50% (Consoli et al., 2006; Richards, Fortune, Griffiths, & Main, 2001) retrospectively. These discrepancies in estimates may reflect differences in study populations and the methods used to measure depression and anxiety (Fortune et al., 2005a). For instance, Flemming et al. (2017) observed that the studies which used HADS-A screening tool reported higher rates of anxiety (20–50%), whereas lowest rates (7%) were reported in Kurd et al.'s (2010) study which used clinical diagnosis. Lamb et al. (2017) attributed their findings of lower prevalence of anxiety (13.1%), depression (9.9%) and suicidal ideation (3.5%) to the use of more stringent screening assessment measures and the fact that the majority of their patients were treated with medication. Women with psoriasis tend to report more symptoms of anxiety, worry (Fortune et al., 2000; Fortune, Richards, Griffiths et al., 2002a, Fortune, Richards, Main, & Griffiths, 2002b, Fortune, Richards, Kirby et al., 2002c) and depression than men (Picardi et al., 2000, 2001).

Effects of Psychological Distress on Psoriasis Treatment

Pathological worrying significantly impaired clearance of psoriasis in a cohort study of patients treated with

photochemotherapy (PUVA) in the United Kingdom and in the Republic of Ireland (Fortune et al., 2003). Patients have reported that their doctors underestimate the adverse impact of psoriasis on their psychological and social functioning (Koo, 1996), which may result in dissatisfaction with their treatment (Renzi et al., 2002). Dissatisfaction with care and psychological difficulties are associated with poor adherence in dermatologic patients (Renzi et al., 2002; Richards & Fortune, 2006).

Factors Associated with Depression

While some studies demonstrate that depression is associated with psoriasis severity (Akay, Pekcanlar, Bozdag, Altintas, & Karaman, 2002; Gupta & Gupta, 1998; Devrimci-Ozguven, Kundakci, Kumbasar, & Boyvat, 2000; Scarloo et al., 2000) or visibility of plaques (Niemeier, Nippesen, Kupfer, Schill, & Gieler, 2002), other studies contradict this finding (Cohen et al., 2016; Richards et al., 2001; Schmitt & Ford, 2007a; Zacharie et al., 2004). A Danish Nationwide cohort study (Jensen et al., 2016) showed that comorbidities mediate the risk of new-onset of depression, except in patients younger than 50 years with severe psoriasis. Interestingly, the prevalence of psychiatric disorders is higher in female patients with skin lesions on visible parts of the body which may be explained by the influence of their body image on their self-esteem (Picardi et al., 2001). Nevertheless, it is generally recognised that the association between psoriasis severity and depression is only modest and may be influenced by other factors (Fortune et al., 2005a) such as patients' perceptions of psoriasis' impact on health-related quality of life (Schmitt & Ford, 2007a; Zacharie et al., 2004) and experiences of stigmatisation (Gupta, Gupta, & Watteel, 1998). Alexithymia, stronger illness identity, stronger beliefs of serious consequences resulting from having psoriasis and less use of adaptive coping strategies such as distancing and reappraisal of their condition were significant predictors of depression (Fortune, Richards, Griffiths et al., 2002a). Time since diagnosis is negatively associated with depression; this can be due to psychological adjustment and learning to cope with the psychosocial implications of psoriasis over time, resulting in reduced depression (Devrimci-Ozguven et al., 2000).

Factors Associated with Anxiety and Worry

Neither clinical severity nor visibility of psoriasis was associated with pathological worrying; researchers suggested that worry in patients with psoriasis is more associated with social evaluative concerns (Fortune et al., 2000, Fortune, Richards, Griffiths, & Main, 2005b). However, there is an association between anxiety and psoriasis affecting the face and hands (Kent & Keohane, 2001). Psoriatic arthritis also increases the anxiety and depression risk in psoriasis patients (McDonough et al., 2014). In a multinational study, higher levels of anxiety and depression were reported from patients from Italy, whereas patients from Demark had the lowest scores of anxiety and depression (Lesner et al., 2017). Pathological worrying and anxiety were associated with emotional focused (i.e. focus on and venting on emotions) and avoidance coping behaviour (Fortune, Richards, Griffiths et al., 2002a, Fortune, Richards, Main et al., 2002b, Fortune, Richards, Kirby et al., 2002c). Stronger perceptions of emotional causes of psoriasis were also associated with higher levels of anxiety and worry (Fortune et al., 2000, Fortune, Richards, Griffiths et al., 2002a). Richards et al. (2004) explored whether divergent illness representations held by psoriasis patients and their partners were associated with depression and anxiety. They found that dissimilarity in their beliefs about the emotional impact of psoriasis was the main predictor of worry in patients with psoriasis. They hypothesised that psoriasis patients may conceal the emotional difficulties associated with their condition from their partners.

Relationship Between Clinical Improvement, Health-Related Quality of Life and Psychological Distress: Role of Individual Differences

Successful treatment of psoriasis improved psoriasis-related stress and HRQL, but did not change patients' levels of anxiety, depression or worrying (Fortune, Richards, Griffiths, & Main, 2004). Similarly, Sampogna, Tabolli and Abeni (2007) found that about one-third of patients with psoriasis continued to experience significant psychological distress, despite the complete clearance of their psoriasis. In another study, successful treatment of psoriasis with narrowband ultraviolet (UVB) resulted in significant decrease of psychological distress, while it did not have an effect on alcohol consumption (Barry et al., 2005). In a randomised, double-blind, placebo and adalimumab-controlled study, Gordon et al. (2018) showed that clinical improvement of psoriasis was associated with improvement of anxiety and depression; greater improvements in depression and anxiety were reported from patients treated with guselkumab versus placebo group. Similarly, Kim et al. (2018) reported a significant reduction in depressive symptoms after ustekinumab injection, which is used to improve moderate to severe psoriasis. Interestingly, the improvement in depressive symptoms was not significantly associated with the clinical improvement of psoriasis, supporting the hypothesis that depression is related to cytokine dysfunction. Wu et al. (2017) concluded that the impact of psoriasis treatment on depression and anxiety has not been firmly established; some studies showed that clinical improvement of psoriasis was associated with significant reduction of mental health

problems, whereas others have observed a weak or modest relief of anxiety and depression. Similarly, Flemming et al. (2017) observed a modest reduction of anxiety symptoms with psoriasis treatment, particularly with the use of biologics such as ustekinumab; they also hypothesised that this may be attributed to the reduction of pro-inflammatory cytokines. More research is needed to evaluate the effects of long-term psoriasis treatment but results from contemporary drug therapies on depression and anxiety seem promising. However, there are significant individual differences among patients with psoriasis in terms of coping and adjustment to psoriasis. It has been suggested that other factors mediate the relationship between psoriasis severity, psychological distress and health-related quality of life (Fortune et al., 2005a; Thompson, 2005). Patients' own appraisals of clinical severity (Root, Kent, & Al-Abadie, 1994), coping strategies, i.e. alcohol, focusing and venting on emotions (Fortune et al., 1997; Hill & Kennedy, 2002; Kirby et al., 2008; McAleer et al., 2011), alexithymia and illness perceptions can contribute to psychological distress in psoriasis patients (Fortune, Richards, Griffiths et al., 2002a; Korkoliakou et al., 2014, 2017). In contrary, Immamorati et al. (2016) found that BMI, difficulties in emotional regulation, anxiety, depression, food cravings but not alexithymia mediate the effects of psoriasis on quality of life, so that psoriasis was related to worse mental health.

Alexithymia

Alexithymia is a trait characterised by difficulties in identifying and describing emotions, impoverished fantasy life, and symbolic thinking; it has been perceived as a risk factor for psychosomatic and psychiatric disorders (Taylor, Bagby, & Parker, 1997). Research findings are not conclusive in terms of a higher prevalence of alexithymia for patients with psoriasis (Richards, Fortune, Griffiths, & Main, 2005). Fortune, Richards, Griffiths et al. (2002a), Fortune, Richards, Main et al. (2002b), Fortune, Richards, Kirby et al. (2002c) and Richards et al. (2005) found that one-third of patients with psoriasis scored above the threshold of alexithymia on the 20-item Toronto Alexithymia Scale (TAS-20; Bagby, Parker, & Taylor, 1994a, Bagby, Taylor, & Parker, 1994b). Higher prevalence was reported in Fortune et al.'s (2004) study, in which 42% of psoriasis patients were considered to be 'alexithymic' according to the TAS-20. Korkoliakou et al. (2014) found that 32% of psoriasis patients presented with alexithymia and 22% were classified as borderline alexithymic. There was no association between alexithymia and psoriasis severity. Picardi et al. (2005) found that in-patients with psoriasis with a recent exacerbation were more likely to have higher alexithymic characteristics in comparison to in-patients with other skin diseases (*odds ratio* = 3.7). Patients with psoriasis presented with higher levels of alexithymia than healthy controls (Korkoliakou et al., 2014; Immamorati et al., 2016). Lower prevalence of alexithymia was detected by Larsen, Krogstad and Wahl (2017), who found that only 14% of patients with psoriasis participating in 3 weeks of climate heliotherapy presented with alexithymia and 22% could be considered borderline alexithymic. They attributed this result to possible selection bias as 39% patients with psoriasis declined to participate in their study and they pointed out that the prevalence of alexithymia was still higher than the general population where 10–12% present with alexithymia (Taylor et al., 1997). Other studies have not supported the association between alexithymia and psoriasis (Fava et al., 1980; Picardi et al., 2003a). Sampogna et al. (2017) observed 25% prevalence of alexithymia within a cohort of 670 patients with psoriasis; their study showed that alexithymia was significantly associated with higher disease burden, poorer quality of life including work impairment, higher levels of psychological distress and higher risk of alcohol dependency. Emotional inhibition, a maladaptive schema associated with difficulties identifying and expressing emotions, was present in psoriasis patients but not in healthy controls (Mizara, Papadopoulos & McBride, 2012). Korkoliakou et al. (2017) found that psoriasis patients with alexithymia showed higher levels of somatisation, interpersonal sensitivity, anxiety and phobic anxiety in comparison to those without alexithymia. Fortune, Richards, Griffiths and Main (2005c) suggested that alexithymia can limit a patient's ability to construe benefits from negative events, which is associated with better psychological adjustment to chronic illness.

Alcohol Misuse

There is a higher prevalence of alcohol consumption and alcohol difficulties in patients with psoriasis than the general population (Braathen, Botten, & Bjerkedal, 1989; Lindegard, 1986). A study conducted both in the UK and in Ireland reported that about one-third of psoriasis patients had alcohol difficulties based on validated questionnaires and 7% were hazardous drinkers based on alcohol biomarkers (McAleer et al., 2011). Kirby et al. (2008) found that about one-fifth to one-third of patients with psoriasis had alcohol difficulties using validated questionnaires. Alcohol can precipitate the onset of psoriasis (Poikolainen, Reunala, Karvonen, Lauharanta, & Karkainen, 1990; Qureshi, Dominquez, Choi, Han, & Curhan, 2010) and can exacerbate psoriasis and interfere with psoriasis treatment (Gupta, Schork, Gupta, & Ellis, 1993; Smith & Fenske, 2000). Excessive alcohol consumption was related to an increased risk of incident psoriatic arthritis in women (Wu, Cho, Li, Han, & Qureshi, 2015). While some studies suggest an association between psoriasis severity and alcohol difficulties based on self-reports (Kirby et al., 2008; Poikolainen, Reunala, &

Karvonen, 1994), one study assessing alcohol difficulties by self-reports and biological markers did not confirm this association (McAleer et al., 2011). The adverse effects of alcohol on the course of psoriasis (Smith & Fenske, 2000) and on psoriasis patients' psychological well-being have been demonstrated (Kirby et al., 2008). Adamzik, McAleer and Kirby (2013) in their review article remarked that patients with moderate to severe psoriasis are more likely to present with alcohol-related diseases and have a higher mortality rate. They concluded that excessive alcohol use may be associated with systemic inflammation and can be a risk factor for cardiovascular disease and depression. Brenaut et al. (2013) in their systematic review concluded that most studies showed that psoriasis patients seem to consume greater amount of alcohol compared to controls; however, further research is needed to establish that (a) alcohol addiction is more prevalent in psoriasis patients compared to the general population and (b) alcohol is a risk factor for psoriasis. Few studies have explored the relationship between alcohol and psychological distress in psoriasis patients.

Rationale for Study

The elevated levels of psychological distress and alcohol misuse reported by patients with psoriasis warrant further investigation. According to Lazarus and Folkman's (1984) stress-coping model, individuals' resources can be a significant factor in psychological adjustment. However, little is known about patients' own resources, such as their knowledge of psychosocial factors, their coping with psoriasis, their confidence regarding coping with psychological distress, or talking to others about psoriasis. Research has shown that alexithymia and coping strategies including alcohol are associated with psychological distress and HRQL in patients with psoriasis (Fortune, Richards, Griffiths et al., 2002a, Fortune et al., 2005a; Hill & Kennedy, 2002; Kirby et al., 2008). Theoretical frameworks of adaptation to stressful situations and chronic illness (e.g. Lazarus & Folkman, 1984; Maes, Leventhal, & de Ridder, 1996; Thompson, 2005) support the view that psoriasis characteristics, alexithymia and alcohol can influence patients' psychological distress. However, few studies have simultaneously explored the relationship between psoriasis severity, alexithymia, alcohol and psychological distress in patients with psoriasis.

Aims

The current study investigates the prevalence of anxiety, depression, alexithymia, pathological worry and alcohol difficulties in patients with moderate to severe psoriasis. In addition, it examines patients' knowledge of psychosocial factors and of coping with psoriasis and their confidence in coping with psychological distress and on talking to others about their psoriasis. The relationships between gender, psoriasis severity, age at onset of psoriasis, alcohol, alexithymia and anxiety, depression and worry are explored. It is hypothesised that

1a. higher levels of depression, anxiety and worry are associated with higher alexithymia scores after controlling for the effects of demographic characteristics (e.g. gender), clinical characteristics of psoriasis (e.g. psoriasis subjective and objective severity) and maladaptive coping (e.g. alcohol misuse);
1b. the increase in the proportion of variance in depression, anxiety and worry accounted for by alexithymia, when this variable was added to the hierarchical regression model, will be statistically significant;
2a. higher levels of anxiety, depression and worry are associated with higher levels of alcohol consumption after controlling for the effects of gender and psoriasis clinical characteristics;
2b. the increase in the proportion of variance in anxiety, depression and worry accounted for by alcohol consumption, when this variable was added to the hierarchical regression model, will be statistically significant;
3. female patients will experience higher levels of psychological distress than male patients.

Methods

Participants

A convenience sample of adult patients with moderate to severe psoriasis ($n = 216$) attending a psoriasis specialist clinic at two large regional hospitals in the Dublin area were invited to participate. Referrals to the clinics came from specialist dermatologists working in the hospital and in other hospital settings. Participants were approached by the dermatology registrar or by their doctor in the dermatology clinic waiting area during their routine outpatient visit. Participants were given verbal information about the study and a research pack, which included an information sheet, a consent form and a questionnaire battery. Those who decided to participate in the study signed the consent form and completed the questionnaire battery. Patients attending the psoriasis clinics between October 2011 and February 2012 were approached and asked to participate. Overall, 184 agreed to participate in the study, given a response rate of 85%. Patients were receiving standard treatment for psoriasis (i.e. systemic therapy). Patients with mild psoriasis, psychosis, bipolar illness, learning disability and illiteracy problems were excluded from this study.

Clinical Assessment

The severity of psoriasis was clinically assessed by dermatologists and registrars who were experienced in using the Psoriasis Area and Severity Index (PASI; Fredriksson & Pettersson, 1978). Psoriasis severity is assessed for each distinct region of the body (head and neck, trunk, upper limbs and lower limbs) and a score is given for erythema, induration (thickness) and desquamation (scaling). The score is from 0 to 4 with 0 representing the absence of the parameter measured, 1—mild, 2—moderate, 3—severe, 4—very severe. The affected area for each region is calculated. A value of 1 is given if < 10% of the region is affected, 2 if 10–30% is affected, 3 if 31–50% is affected, 4 if 51–70% is involved, 5 if 71–90% affected and 6 if > 90% is affected. The total for each region is multiplied by a value for the percentage of affected skin in the region. The total for the head and neck is multiplied by 0.1, the total for the upper limbs is multiplied by 0.2, the total for the trunk is multiplied by 0.3 and the lower limbs multiplied by 0.4. The values range from 0 to 72. The PASI has been validated in many populations and has been used in > 200 clinical trials for over 15 years. The extent of psoriasis severity was assessed by a dermatologist at the clinic.

Patients were requested to assess their psoriasis using the Self-Administered Psoriasis Area and Severity Index (SAPASI; Fleischer, Rapp, Reboussin, Varnathos, & Feldman, 1994). It consists of a silhouette of a body for patients to shade the afflicted areas and three visual analogue scales for marking the redness, thickness and scaliness of patient's average lesion. Based on the silhouette shading, an investigator, who had not assessed these patients, assigned a number from 0 to 6 corresponding to 0–100% involvement for head, trunk, upper and lower extremities. The SAPASI is considered a valid and reliable measure of psoriasis severity (Feldman et al., 1996).

Psychosocial Assessment

The Dermatology Life Quality Index (DLQI) is a self-report instrument for assessing the impact of skin diseases on a patient's health-related quality of life over the last week. It comprises 10 items covering different aspects of a patient's life such as symptoms and feelings, daily activities, work and school, personal relationships, leisure and treatment. Responses range from 0 = not at all to 3 = very much (Finlay & Khan, 1994). Higher scores suggest greater impairment in health-related quality of life and the range of scores is 0–30. Patients are asked to measure how much their skin problem has affected their life over the last week. Typical items are 'over the last week how itchy, sore, painful or stinging has your skin been?' and 'over the last week, how much has your skin created problems with your partner or any of your close friends or relatives?'. The DLQI is widely used with patients with skin diseases and psoriasis and has demonstrated good psychometric properties (Basra, Fenech, Gatt, Salek, & Finlay, 2008). In the current study, the DLQI had a Cronbach's alpha of 0.9.

The Hospital Anxiety and Depression Scale (HADS; Zigmond & Snaith, 1983) is a self-assessment measure for detecting states of depression and anxiety. The HADS was developed for use in general hospital outpatient departments. It consists of 14 items. Responses ranges from 0 = not at all to 3 = most of the time. The range of scores for each subscale is 0 to 21. Scores between 0 and 7 are considered 'non cases', 8–10 indicate a possible 'case' and scores > 10 indicate probable cases of anxiety and depression (Zigmond & Snaith, 1983). Typical items for depression are 'I feel as if I am slowed down' and 'I have lost interest in my appearance'. Typical items for anxiety are 'I get a sort of frightened feelings as if something awful is about to happen' and 'Worrying thoughts go through my mind'. The cut-off point for probably clinical cases of anxiety and depression was > 10. The HADS has demonstrated validity and reliability in several studies (Hermann, 1997). The HADS has been extensively used in patients with psoriasis (Fortune et al., 2003, 2005b) and has demonstrated good internal consistency (Cronbach's $\alpha = 0.83$ and 0.81 for anxiety and depression, respectively; Fortune, Richards, Griffiths et al. 2002a). In the current investigation, the Cronbach's α for anxiety was 0.84 and for depression was 0.82.

The Penn State Worry Questionnaire (PSWQ) is a self-report instrument for measuring pathological worry. It consists of 16 items and responses ranged from 1 = *not at all typical of me* to 5 = *very typical of me*. Two typical items are 'if I do not have enough time to do everything, I do not worry about it' and 'I have been a worrier all my life'. The scores range from 16 to 80, with higher scores indicating higher levels of worry. It has been recommended that a score above 60 indicates pathological worry (Meyer, Miller, Metzger, & Borkovek, 1990). Behar, Alcaine, Zuellig and Borkovec (2003) suggested that a cut-off of 45 optimised sensitivity and specificity for patients with generalised anxiety disorder seeking treatment. In the present study, worry levels between 0 and 44 were categorised as low, 45 and 59 as moderate, and from 60 to 80 as significant. In the current investigation, the PSWQ had a Cronbach's alpha of 0.90. The PSWQ is widely used and has good psychometric properties (Molina & Borkovek, 1994). The PSWQ has been used in patients with psoriasis (Fortune et al., 2003) and the appropriateness of PSWQ with this population has been established (Cronbach's $\alpha = 0.93$; Fortune et al., 2000, 2005b).

The 20-item Toronto Alexithymia Scale (TAS-20; Bagby, Parker et al., 1994a, Bagby, Taylor et al., 1994b) is a self-report instrument, which is extensively used for measuring

alexithymia (Taylor, Bagby, & Parker, 2003). Responses range from 1 = strongly disagree to 5 = strongly agree. Thus, the scores range from 20 to 100, with higher scores indicating higher levels of alexithymia. The suggested cut-off point for alexithymia is above or equal to 61; scores between 52 and 60 are regarded as indeterminate for alexithymia, whereas scores equal or below 51 are suggestive of non-alexithymia (Taylor et al., 1997). The cut-off point for alexithymia was above or equal to 61 in this study. TAS-20 gives a global alexithymia score and three scores on the three inter-correlated factors of alexithymia: difficulty identifying feelings, difficulty describing feelings, and externally orientated feeling. Typical items for difficulty identifying feelings are 'I am often confused about what emotion I am feeling' and 'when I am upset, I don't know if I am sad, frightened, or angry'. Typical items for difficulty describing feelings are 'it is difficult to find the right words for my feelings' and 'it is difficult for me to reveal my innermost feelings, even to close friends'. Typical items for externally oriented thinking are 'I prefer to just let things happen rather than understand why they turned out that way' and 'I prefer talking to people about their daily activities rather than their feelings'. The TAS-20 has demonstrated good internal consistency, test–retest reliability and factorial validity (Bagby, Parker et al., 1994a, Bagby, Taylor et al., 1994b). The TAS-20 has been used with psoriasis patients and the full scale has shown good test–retest reliability ($r = 69$, $p < .001$) and good internal consistency (Cronbach's $\alpha = 0.82$; Richards et al., 2005; Cronbach's $\alpha = 0.86$; Fortune, Richards, Griffiths et al., 2002a). However, results from confirming factor analysis did not support the three factor structure in this population (Richards et al., 2005) and researchers prefer to use the full scale of TAS-20 in their analysis of studies with psoriasis patients (Fortune, Richards, Griffiths et al., 2002a, Fortune et al., 2004). In the current study, the TAS-20 had a Cronbach's alpha of 0.83.

A series of single items (response options ranging from "Nothing at all" to "Great extent") assessed participants' perceived knowledge regarding stress, social support, coping with psoriasis, psychological factors and health. Additional single item questions asked about their confidence (response options ranging from "Nothing at all" to "Great extent") in relation to coping with stress, coping with depression, and talking to others about their psoriasis.

Alcohol Assessment

The Alcohol Use Disorders Identification Test (AUDIT) is a self-report screening instrument for hazardous and harmful alcohol consumption in the recent past. The AUDIT comprises 10 items, which encompass three conceptual domains: alcohol consumption, drinking behaviour and alcohol-related problems. Typical items are 'how often do you have a drink containing alcohol', 'during the past year, how often have you found that you were not able to stop drinking once you had started' and 'have you or someone else been injured as a result of your drinking?'. Responses range from 0 to 4, yielding a possible score range from 0 to 40 (Saunders, Aasland, Babor, De la Fuente, & Grant, 1993). The AUDIT has shown adequate psychometric properties such as test–retest reliability and internal consistency (Reinert & Allen, 2007). The AUDIT has been used with patients with psoriasis; it was significantly associated with alcohol biomarkers and was found to be superior in detecting alcohol misuse to other commonly used scales in this population (McAleer et al., 2011). In the current study, the AUDIT had a Cronbach's alpha of 0.76.

Analysis

Univariate and multivariate statistics were used to analyse data. In terms of missing data, pairwise deletion was used to perform the analyses in cases where a whole scale was missing. Where some items were missing, the estimation maximisation (EM) method for inputting missing data was used to increase the power of the analyses. Preliminary analyses were conducted to ensure no violation of the assumptions of the statistical procedures used. This entailed tests of normality including histograms and boxplots, Levene's test for equality of variances and exploration of descriptive statistics (mean, median, standard deviation, skewness and kurtosis). All analyses excluded multivariate outliers, based on standardised residuals greater than |3|. Three separate hierarchical regression analyses examined the relationship between gender, psoriasis characteristics, alcohol, alexithymia and the dependent variables of anxiety, depression and worry. For each of the regression models, the data were examined for multivariate outliers using Mahalanobis distances and the distribution of residuals from the regression model was checked for normality and to ensure that the assumptions of linearity and homogeneity of error variance were met. Standardised predicted values and standardised residual values were plotted to examine if there was a relationship between them. Durbin Watson statistics were examined for evidence of non-independence of errors, and the collinearity indicators of the tolerance of the variables and the variance inflation factor (VIF) are reported.

Results

The sample consisted of 184 patients (125 males and 59 females), aged from 18 to 77 years ($M = 46.12$, $SD = 12.24$), 58% married, 60% working and 36% had a university degree. Duration of psoriasis ranged from less than 6 months to

59 years ($M = 24.63$ years, $SD = 13.44$) and age at onset ranged from 2 to 65 years ($M = 21.67$ years, $SD = 11.87$). The mean level of clinical severity of psoriasis was 4.36 ($SD = 2.91$, range 0–16) as assessed by the dermatologist using the PASI, and 5.43 ($SD = 7.22$, range 0–38) as assessed by the patients using the SAPASI; this suggests that the mean of patients' psoriasis severity was rated as moderate. Just over 40% had a co-morbid health problem. A small proportion of participants were attending psychology (5%) and psychiatric services (2%).

Health-Related Quality of Life, Psychological Distress, Alexithymia and Alcohol Difficulties

The mean impairment in health-related quality of life suggests that overall psoriasis did not greatly affect patients' health-related quality of life. The mean value for alexithymia, anxiety, alcohol and depression is low range, while the mean in worry is moderate range. Almost three-quarters (73%) of participants reported that psoriasis had a small or no negative impact on their health-related quality of life. Just over one-fifth (21%) and under one-tenth (9%) of participants were identified as possible clinical cases for anxiety and depression (HADS 8–10), respectively. One-fifth of participants were categorised as pathologic worriers (PSWQ > 60) and just over one-fifth (21%) of the sample scored above the cut-off for alexithymia (TAS > 61). Just over one-quarter (29.5%) of participants scored above the cut-off for hazardous alcohol (AUDIT ≥ 8) (Table 1).

Health-related quality of life was significantly associated with alexithymia ($r = .20$), anxiety ($r = .30$), depression ($r = .36$) and worry ($r = .31$). Anxiety was also significantly associated with depression ($r = .64$) and worry ($r = .71$), and to a lesser degree with alcohol ($r = .16$). Alcohol was significantly associated with worry ($r = .16$) but not with depression ($r = .09$). Depression was significantly associated with worry ($r = .58$).

Knowledge, Confidence of Coping with Psychological Factors and Psoriasis

About half of participants had limited ('Not at all' or 'slight') knowledge of stress. About two-thirds of participants had limited knowledge of psychological factors and health and just over three-quarters had limited knowledge of social support. In contrast, about two-thirds had sufficient ('Moderate' or 'Great') knowledge of coping with psoriasis. Just over one-third had limited confidence of coping with stress and just over half had limited confidence of coping with depression. In contrast, two-thirds were confident about talking regarding their psoriasis to others (Table 2).

The Relationship Between Psoriasis Characteristics, Alcohol, Alexithymia and Psychological Distress

Theories of coping with stress (Lazarus & Folkman, 1984) and chronic illness (Maes et al., 1996) support the view that gender, psoriasis characteristics, maladaptive coping strategies (i.e. alcohol) and personality characteristics (i.e. alexithymia) can be associated with psychological distress (i.e. anxiety and depression) and worry. Three separate hierarchical multiple regressions were used to assess the association of psoriasis characteristics, alcohol, alexithymia and (a) anxiety, (b) depression and (c) worry. Gender entered at Block 1 since socio-demographic characteristics are less likely to be influenced by and more likely to influence the other variables included in this analysis; subjective and objective psoriasis severity and age at onset of psoriasis entered at Block 2 since clinical characteristics may affect psychological distress and alcohol use; alcohol entered at Block 3 to examine the association of maladaptive coping after controlling for age and clinical characteristics ; alexithymia entered at Block 4 to investigate the relationship between alexithymia, anxiety, depression and worry after controlling for gender, clinical characteristics and alcohol.

Table 1 Descriptive statistics for psychological and alcohol consumption variables, with zero-order correlations between them

	Alexithymia	Anxiety	Depression	Worry	Alcohol	HRQOL
Alexithymia	1	–	–	–	–	–
Anxiety	0.47**	1	–	–	–	–
Depression	0.50**	0.64**	1	–	–	–
Worry	0.50**	0.71**	0.58**	1	–	–
Alcohol	0.26**	0.16*	0.09	0.16*	1	–
HRQOL	0.20**	0.30**	0.36**	0.31**	−0.01	1
M (*SD*)	48.70 (12.69)	7.27 (4.31)	4.01 (3.50)	48.06 (12.31)	5.91 (4.78)	4.85 (6.54)
Range	22–80	0–20	0–15	21–76	0–24	0–27

Table 2 Descriptive statistics for knowledge, confidence of coping with psychological factors and psoriasis and treatment satisfaction

Variables	Not at all (%)	Slight extent (%)	Moderate extent (%)	Great extent (%)
Knowledge of stress ($n=179$)	8	44	41	7
Knowledge of alcohol ($n=177$)	7	28	45	20
Knowledge of social support ($n=178$)	38	44	12	6
Knowledge of psychological factors and health ($n=179$)	15	46	34	5
Knowledge of coping with psoriasis ($n=178$)	2	23	41	34
Confidence on coping with stress ($n=178$)	7	39	46	8
Confidence on coping with depression ($n=178$)	16	37	38	9
Confidence on talking to others about psoriasis ($n=179$)	8	24	35	33
Treatment satisfaction ($n=176$)	1	7	27	65

Anxiety

Examination of the regression model's assumptions revealed no issues. The standardised residuals ranged from − 2.02 to 2.19, and were normally distributed. The pattern in the scatterplot of the standardised predicted and standardised residual revealed no relationship. The Durbin Watson statistic was 1.90, which is above the 0.99 upper bound for the sample size and number of predictors; consequently, there is no evidence for non-independence of errors. The collinearity statistics indicate tolerance and VIF values were acceptable. Based on the effect sizes obtained, the study was under-powered to detect small effect sizes; obtained power ranged from 0.13 to 0.47 for the non-significant variables in the model.

Gender was significantly related to anxiety, accounting for 7% of the variance, $F(1,180)=7.45$, $p<.001$, with males reporting significantly less anxiety than females. Subjective and objective psoriasis severity and age at onset of psoriasis were significantly related to anxiety, accounting for an additional 7% of the variance in anxiety, $F(3,177)=6.38$, $p<.01$. Subjective psoriasis severity was significantly related to anxiety ($B=0.27$, $p<.01$). Alcohol contributed significantly to the regression model for anxiety, accounting for an additional 4%, $F(1,176)=2.94$, $p<.01$. Alexithymia was statistically significant, accounting for an additional 12% of the variance in anxiety, $F(1,175)=27.08$, $p<.001$. Of note, when alexithymia entered the model, subjective psoriasis severity ($B=0.15$, $p=.06$) was no longer significant (Table 3).

Depression

Examination of the regression model's assumptions revealed no issues. The standardised residuals ranged from − 2.30 to 2.39, and were normally distributed. The pattern in the scatterplot of the standardised predicted and standardised residual revealed no relationship. The Durbin Watson statistic was 2.12, which is above the 0.99 upper bound for the sample size and number of predictors; consequently, there is no evidence for non-independence of errors. The collinearity

Table 3 Hierarchical multiple regression analyses predicting anxiety from psoriasis characteristics, alcohol and alexithymia

Predictor	R^2 (adjusted R^2)	R^2 change	Beta block 1	Beta block 2	Beta block 3	Beta block 4	Collinearity tolerance (VIF)
Block 1	.07 (.07)	.07***					
Gender			−0.27***	−0.23**	−0.27***	−0.27***	0.90 (1.11)
Block 2	.14 (.12)	.07**					
PASI				0.27**	0.27**	0.15	0.76 (1.32)
SAPASI				−0.01	−0.02	0.02	0.71 (1.40)
Age at onset				−0.04	−0.00	−0.04	0.86 (1.16)
Block 3	.18 (.15)	.04**					
Alcohol					0.21**	0.16*	0.87 (1.14)
Block 4	.30 (.28)	.12***					
Alexithymia						0.37***	0.88 (1.13)

*$p<.05$; **$p<.01$; ***$p<.001$, $N=180$

statistics indicate tolerance and VIF values were acceptable. Based on the effect sizes obtained, the study was under-powered to detect small effect sizes; obtained power ranged from 0.07 to 0.39 for the non-significant variables in the model.

Gender was not significantly correlated with depression, accounting for only 1% of its variance, $F(1,180) = 1.14$, $p = .09$. Subjective and objective psoriasis severity and age at onset of psoriasis contributed significantly to depression model, accounting for an additional 14% of the variance, $F(3,177) = 4.16$, $p < .001$. Subjective psoriasis severity was associated significantly with depression ($B = 0.38$, $p < .001$). Alcohol did not contribute significantly to the depression model, $F(1,176) = 0.28$, $p = .20$. Alexithymia explained an additional 14% of the variance in depression $F(1,175) = 28.61$, $p < .001$ (Table 4).

Worry

Examination of the regression model's assumptions revealed no issues. The standardised residuals ranged from −2.31 to 2.17, and were normally distributed. The pattern in the scatterplot of the standardised predicted and standardised residual revealed no relationship. The Durbin Watson statistic was 1.86, which is above the 0.99 upper bound for the sample size and number of predictors; consequently, there is no evidence for non-independence of errors. The collinearity statistics indicate tolerance and VIF values were acceptable. Based on the effect sizes obtained, the study was under-powered to detect small effect sizes; obtained power ranged from 0.07 to 0.31 for the non-significant variables in the model.

Gender was statistically significant, explaining 8% of the variance in worry, $F(1,180) = 10.87$, $p < .01$, with males reporting significantly less worry than females. Subjective and objective psoriasis severity and age at onset of psoriasis contributed significantly to the worry model, accounting for an additional 7% of the variance, $F(3,177) = 4.01$, $p < .01$. Subjective psoriasis severity was statistically significant ($B = 0.19$, $p < .05$). An additional 2% of the variance in worry was explained by alcohol use, which was statistically significant $F(1,176) = 3.03$, $p < .05$. Of note, when alexithymia entered the model, objective psoriasis severity became statistically significant ($B = 0.16$, $p < .05$), while subjective psoriasis severity ($B = 0.06$, $p = .17$) and alcohol were no longer statistically significant ($B = 0.11$, $p = .09$) (Table 5).

Discussion

There were a considerable number of patients who experienced significant psychological distress, were pathologically worried, had alexithymic traits and consumed excessive alcohol. Despite the high prevalence of psychological distress and alcohol, only a very small percentage of patients attended psychological (5%) and psychiatric services (2%). It is difficult to ascertain whether those who attended psychological or psychiatric services experienced higher levels of psychological distress than those who did not, and similarly the effects of these therapies on their mood is unknown. While the scores on alcohol difficulties were relatively close to those reported in previous studies (Kirby et al., 2008; McAleer et al., 2011), the anxiety, depression, pathological worry, alexithymia scores, psoriasis-related disability and clinical severity were somewhat lower than those in previous studies (Consoli et al., 2006; Fortune et al., 2000, Fortune, Richards, Griffiths et al., 2002a, Fortune et al., 2004; Lambert et al., 2011; Nichol, Margolies, Lippa, Rowe, & Quell, 1996; Richards et al., 2005). It is also possible that the effectiveness of psoriasis treatment minimised the impact of psoriasis on patients' health-related quality of life, which in turn may be linked to the lower prevalence of psychological

Table 4 Hierarchical multiple regression analyses predicting depression from psoriasis characteristics, alcohol and alexithymia

Predictor	R^2 (adjusted R^2)	R^2 change	Beta block 1	Beta block 2	Beta block 3	Beta block 4	Collinearity tolerance (VIF)
Block 1	.01 (.01)	.01					
Gender			−0.12	−0.01	−0.01	−0.01	0.90 (1.11)
Block 2	.15 (.14)	.14**					
PASI				0.38**	0.38**	0.25*	0.76 (1.32)
SAPASI				0.00	0.00	0.04	0.71 (1.41)
Age at onset				0.03	0.01	0.01	0.87 (1.15)
Block 3	.16 (.14)	.01					
Alcohol					0.01	0.04	0.87 (1.14)
Block 4	.30 (.28)	.14**					
Alexithymia						0.39**	0.89 (1.13)

*$p < .01$; **$p < .001$, $N = 180$

Table 5 Hierarchical multiple regression analyses predicting worry from psoriasis characteristics, alcohol and alexithymia

Predictor	R^2 (adjusted R^2)	R^2 change	Beta block 1	Beta block 2	Beta block 3	Beta block 4	Tolerance (VIF)
Block 1	.08 (.07)	.08					
Gender			−0.28***	−0.24**	−0.28***	−0.28***	0.91 (1.11)
Block 2	.15 (.13)	.07**					
PASI				0.19*	0.19*	0.06	0.75 (1.33)
SAPASI				0.11	0.11	0.16*	0.71 (1.41)
Age at onset				−0.02	0.01	0.01	0.87 (1.15)
Block 3	.17 (.02)	.02*					
Alcohol					0.16*	0.11	0.89 (1.13)
Block 4	.32 (.30)	.15***					
Alexithymia						0.41***	0.88 (1.14)

*$p < .01$; **$p < .001$, $N = 180$

distress in this study. As biological therapies (e.g. human immunosuppressive drugs) have been associated with significant reductions in depressive symptoms scores (Fleming et al., 2015), it is possible that psoriasis treatment has influenced the mental health difficulties, as measured in the present study. The results may also be attributed to self-selection bias (e.g. patients who were more depressed and experienced significant psychosocial burden as a result of their psoriasis may have declined to participate).

In line with previous studies, health-related quality of life was associated with depression, worry and anxiety (Fortune et al., 1997; Yang et al., 2005). Alexithymia was also associated with lower quality of life, which is consistent with Sampogna et al.'s (2017) findings and Maes et al.'s (1996) model of coping wherein personality factors can influence psychosocial adjustment to illness. There was a non-significant relationship between alcohol and impairment in health-related quality of life. Alcohol use may offer a distraction from problems, protecting psoriasis patients from being overwhelmed by their condition; patients with psoriasis who avoid social activities due to their fear of negative evaluation report reduced health-related quality of life (Fortune et al., 1997; Rapp, Cottrell, & Leary, 2001). Socially anxious individuals tend to use alcohol in order to cope in social situations if alcohol is available (Buckner & Heimberg, 2010). Thus, it may be possible that alcohol use can counteract the effect of psoriasis patients' fear of negative evaluation on social avoidance. Alexithymia was significantly associated with alcohol, which is consistent with previous studies with psoriasis patients (e.g. Sampogna et al., 2017) and other populations (Betka et al., 2018; Ghorbani, Khosravani, Bastan, & Ardakani, 2017).

About two-thirds of patients had sufficient knowledge of alcohol and coping with psoriasis. A similar proportion of patients had limited knowledge of social support and psychological factors and health. Thus, there is a need for patients with psoriasis to be better informed about the role of psychosocial factors in their condition. This finding is important as Fortune, Richards, Main, O'Sullivan and Griffiths' (1998) study reported that one of the main reasons given by psoriasis patients for their non-uptake of psychological services is that they did not think these were relevant for them. Most patients were confident about talking to others about their psoriasis. However, about half of patients were less confident about coping with stress and depression. This finding is important considering that according to Bandura's self-efficacy theory (1997) patients' confidence in their ability to cope can be important for effective coping.

Males reported significantly less worry and anxiety than females. This finding is consistent with other studies (Fortune et al., 2000, Fortune, Richards, Griffiths et al., 2002a, Fortune, Richards, Main et al., 2002b, Fortune, Richards, Kirby et al., 2002c). However, gender was not significantly related to depression, which conflicts with findings of other studies in which female patients with psoriasis had higher scores in depression than males (Finzi et al., 2007; Picardi et al., 2000, 2001; Sampogna et al., 2006; Wojtuna, Lakuta, Marcinkiewicz, Bergler-Czop, & Brzezinska-Wcislo, 2017) and with national population studies (Parker & Brotchie, 2010). Although the failure to find this effect may reflect low levels of achieved statistical power, it is worth noting that the association between gender and depressive symptoms in psoriasis patients was also not supported by other studies (Golpour et al., 2012; Kurd et al., 2010; Zieciak, Rzepa, Krol, & Zaba, 2017). Interestingly, in a population study, it was found that the men with severe psoriasis are more likely to receive a clinical diagnosis of depression than females (Kurd et al., 2010), whereas the psoriasis severity was unrelated to the risk of depression in females in another study (Wojtuna et al., 2017). Wojtuna et al. (2017) suggest that although results from national population studies have shown that men experience lower levels of depression than females, this may be arbitrary as depression can manifest differently in men (e.g. irritability, substance abuse) and

men conceptualise depression differently than females ; for example, they note that research highlights that there are no significant gender differences in depressive symptoms when the assessment of depression includes externalising symptoms. A systematic review showed that the rate of depressive symptoms in psoriasis patients was independent of gender (Dowlastshahi et al., 2014), and thus possibly influenced by additional factors. Previous research reported that gender explained the smallest proportion of the variance in depression, whereas a stronger illness identity, stronger belief in psoriasis having serious consequences and less use of coping through distancing/reappraisal contributed significantly more to higher depression scores (Fortune, Richards, Griffiths et al., 2002a, Fortune, Richards, Main et al., 2002b, Fortune, Richards, Kirby et al., 2002c). Similarly, Scarloo et al. (2000) have found that a stronger illness identity, less use of coping by seeking distraction and a larger area of affected skin explained the variance in depression. Some studies suggest that the location of psoriasis on head, neck, arms, hands and genital is associated with higher depression scores (Finzi et al., 2007; Lakuta, Marcinkiewicz, Bergler-Czop, Brzezinska-Wcislo, & Stomian, 2018). Maladaptive schemas (e.g. vulnerability to harm and social isolation), maladaptive beliefs about appearance and its salience to one's self-worth, and lower levels of social support were associated with depression (Mizara et al., 2012; Janowski et al., 2012; Lakuta, Marcinkiewicz, Bergler-Czop, & Brzezinska-Wcislo, 2016; Wojtuna et al., 2017). Experience of stigmatisation, maladaptive beliefs about appearance and its salience to one's self-worth and negative emotional attitudes towards the body mediate the relationship between psoriasis severity and depression (Lakuta et al., 2016). Some studies have shown that women believe that physical appearance is more significant for their self-esteem and social worth (Wojtuna et al., 2017) and experience higher levels of stigmatisation compared to men (Schmid-Ott, Schallmayer, & Calliess, 2007). It is possible that since all patients were receiving systemic therapy, the biological agents had a positive effect on their depression. Other factors associated with depression are unemployment, higher joint inflammation, psoriatic arthritis, disability, pain and fatigue (McDonough et al., 2014). In general, the lack of association between gender and depression in our study may be due to omitted variables associated with depression including illness perceptions, beliefs about appearance and maladaptive schemas, coping, location of psoriatic lesions, pain, fatigue, unemployment, experience of stigmatisation and lack of social support.

Objective psoriasis severity was not significantly related to worry, anxiety and depression; this finding supports the view that, similar to other chronic illness, the biomedical model is insufficient to explain the psychological functioning in patients with psoriasis (Fortune et al., 1997, Fortune, Richards, Griffiths et al., 2002a, Fortune et al., 2004). Consistent with Fortune, Richards, Griffiths et al.'s (2002a) finding, age at onset of psoriasis was also not associated with psychological distress. However, our finding is in contrast to the study of Lakshmy, Balasundaram, Sarkar, Audhya and Subramaniam (2015) who claimed that objective psoriasis severity is more likely to be associated with psychiatric morbidity. Subjective psoriasis severity significantly contributed to the variance in worry, anxiety and depression. This finding is consistent with general models of coping with chronic illness (Leventhal, Leventhal, & Cameron, 2001; Maes et al., 1996) as well as with Thomson's (2005) specific model of coping with skin conditions, in which the subjective experience of disease can influence the emotional responses to it.

Consistent with Fortune, Richards, Griffiths et al.'s (2002a) study, alexithymia was significantly related to anxiety, depression and worry. However, its relationship to worry and depression was somewhat smaller in Fortune, Richards, Griffiths et al.'s (2002a) study than the current one. This may be due to the fact that in their regression model of worry and depression, together with alexithymia, they examined the role of illness perceptions and coping strategies in psychological functioning of psoriasis patients. Nevertheless, these findings support the view (Fortune, Richards, Griffiths et al., 2002a) that alexithymia can be a significant factor in explaining poorer psychological well-being in patients with psoriasis. It is possible that this could be related to alexithymia's association with anxiety sensitivity (Fortune, Richards, Griffiths et al., 2002a). Our finding is also consistent with that reported in Picardi et al.'s (2007) study in which alexithymia was associated with poor psychosocial functioning in patients with skin diseases. Moreover, this finding in conjunction with the high prevalence of alexithymia in the patients with psoriasis in this study supports the conceptualisation that alexithymic individuals are susceptible to both physical illness and to emotional distress due to deficits in emotional regulation (Taylor et al., 1997). As Thomson (2005) pointed out, alexithymic features and the associated anxiety sensitivity can negatively affect health through increasing physiological arousal to inaccurate perceptions of threats (Kauhanen, Kaplan, Julkunen, & Salonen, 1994).

The significant association between alexithymia and psychological distress is consistent with Thomson's (2005) model of coping with chronic skin condition and Maes et al.'s (1996) model of coping with chronic illness; according to both these models, personality characteristics such as alexithymia can influence appraisal, coping and adjustment to chronic illness. In a longitudinal study (Scharloo et al., 2000), patients with psoriasis who expressed more emotions, sought social support and engaged in more active coping had lower scores in anxiety, depression and better physical outcomes in the 1-year follow-up. However, people who have higher alexithymic traits tend to engage more in avoidance

coping (Thompson, 2005) and rumination; in contrast, they think less often of positive events and engage less in social sharing of emotions provoked by negative events (Luminet, Zech, Rime, & Wagner, 2000). It has been hypothesised that deficits in social skills linked to alexithymia may result in poorer levels of social support in chronic skin conditions (Picardi et al., 2003b, Picardi et al., 2005). This is important since social support is considered to be protective for health.

Consistent with Kirby et al.'s (2008) study, alcohol was significantly associated with anxiety. Moreover, our finding that alcohol was significantly related to anxiety and worry corroborates research evidence that supports a connection between alcohol, mood and anxiety disorders (Rodgers et al., 2000). The lack of association between alcohol difficulties and depression in the current study is not in line with findings that suggest a significant association between alcohol and depression (Hartka et al., 1991; Kirby et al., 2008; McAleer et al., 2011). This discrepancy could be partly explained by the lower rates of depression in the present study and the fact that the alcohol measures used differed. For example, alcohol difficulties were measured by the AUDIT in the present study, whereas McAleer et al. (2011) found an association between depression and alcohol problems as measured by the CAGE. The sample size of our study may have resulted in insufficient power to detect subgroup differences with the sample. It is possible that the psoriasis patients in our study who experienced depressive symptoms managed to cope without using alcohol. The lack of association between depression and alcohol in our study may be due to 'ommited variables bias'. For instance, Bilevicius et al. (2018) in a longitudinal design study found that higher levels of shame accounted for the effects of depression on problem drinking. Luninet et al. (2016) found that the association between depression and craving in alcohol dependency is moderated by gender and by alexithymia factors; for women, the link between depressive symptoms and craving was stronger for the those who had greater difficulties in describing their feelings, whereas for men the link between depressive mood and craving was weakened for those who scored higher on 'externally orientated thinking'. In our study, we did not examine the interaction between gender, alexithymia factors and depression; future research should explore these relationships in more detail.

Limitations

The findings of this study need to be interpreted with caution considering various limitations. Longitudinal studies are needed to clarify the relations between psoriasis severity, health-related quality of life, psychological distress, alcohol and alexithymia. As psychological distress was not measured by psoriasis-specific instruments, mental health difficulties observed in patients of this study may be attributed to comorbidities such as cardiovascular disease, hypertension, psoriasis arthritis, diabetes. Future research should address this issue. Participants were recruited from specialist psoriasis clinics in two hospitals in Dublin and, therefore, may not be representative for all patients with psoriasis. The convenience sample may also suffer from self-selection bias which can lead to the under-representation or over-representation of particular groups within the sample. For instance, it is possible that patients who were severely depressed and experienced significant psychosocial burden from their psoriasis chose not to participate in this study. Although valid and reliable instruments were used to assess psychological and clinical variables, the use of self-report instruments lacks objectivity. For instance, it has been argued that patients with psoriasis underreport problem drinking (Pietrzak et al., 2011). Structured interviews would also help in the identification of mood disorders and to determine to what extent psychological distress and alcohol misuse are due to psoriasis or due to other factors in a person's life. Another study limitation was that other important variables associated with patients' mental health difficulties such as the experiences of stigmatisation, coping strategies used, current clinical phase of psoriasis involving remission or recurrence and types of psoriasis treatment were not included. Another limitation was that study was cross-sectional and the impact of treatment over time was not assessed; the type of treatment and whether psoriasis was recurrent or in remission was also not assessed. A final limitation is the lack of a 'healthy' comparison group, which can affect the interpretation and generalisability of this study's results. Replication using other clinical populations is warranted.

Conclusion

This study influences our understanding of the factors associated with anxiety, depression and worry in patients with psoriasis by confirming a close association between alexithymia and psychological distress; subjective psoriasis severity was related to worry and not to depression and anxiety. It also provided evidence for a close link between alcohol and anxiety and worry in patients with psoriasis. Taken together, these findings suggest that patients' appraisals of their psoriasis need to be considered in the assessment of psoriasis severity, and psychological interventions may need to target the patients' own perceptions of psoriasis. Moreover, helping patients to identify and regulate their emotions may be necessary in order to ameliorate psychological distress. There is also a need for appropriate alcohol screening and for psychological interventions which target drinking habits and psychological distress in patients with psoriasis.

Compliance with Ethical Standards

Conflict of interest Ourania Founta, Karoline Adamzik, Anne-Marie Tobin, Brian Kirby and David Hevey declare that they have no conflict of interest.

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent Informed consent was obtained from all individual participants included in the study.

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