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Short title: Concerns about appearance and their impact on mood in rheumatoid arthritis

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Author: Hayley McBain[1], Michael Shipley[2], Stanton Newman[1] and Members of the Appearance Research Collaboration (ARC)[3]

[1] School of Health Sciences, City University, London, UK

[2] Centre for Rheumatology, University College London Hospital, London, UK

[3] See Acknowledgements for full list of ARC members

Address for Correspondence:

Professor Stanton Newman

School of Health Sciences

City University

20 Bartholomew Close

London

EC1A 7QN

Email: stanton.newman.1@city.ac.uk

Phone: +44 (0)207 040 5829

Fax: +44 (0)207 040 0875

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Abstract

Objectives: Increased levels of anxiety and depression are commonly reported by patients with Rheumatoid Arthritis (RA) in comparison to the general population. Rather than the clinical features of the disease this difference has been attributed to psychosocial factors. Patients with RA can develop joint swelling and disfigurement as a direct result of the disease and experience concerns about their altered appearance. This study aims to identify if appearance-specific issues contribute to our understanding of mood in RA, over and above demographic, functional and generalised psychosocial measures.

Methods: A total of 89 patients with RA completed a series of psychosocial questionnaires measuring demographics, physical function, general cognitive processes and a number of appearance-specific concepts to determine the contribution of appearance concerns to mood.

Results: Hierarchical linear regression suggested that living status, optimism, social support and appearance-related social anxiety and avoidance are associated with levels of depression. The relationship between social support and depression was found to be mediated by appearance-related social anxiety and avoidance. Optimism remained the only variable significantly associated with anxiety.

Conclusion: These findings confirm the role of optimistic cognitions and a supportive environment in mood for patients with RA and also establishes a possible link between depression and appearance concerns in this population. Interventions targeting social support, optimism and social anxiety and avoidance in relation to appearance are key in the improvement of depression in this patient group.

Introduction

RA affects approximately 1.16% of the female 0.44% of the male UK population, which is between 350,000 and 400,000 people (Symmons et al., 2002). Treatment aims to reduce the impact of the disease by limiting symptoms, reducing inflammation and disability, and improving quality of life (Pollard, Choy, & Scott, 2005). Intensive treatment early in the disease course aims to prevent disfigurement. However, there are a significant number of individuals with irreversible damage. Disfigurement of the hands and feet affects approximately 80-90% of patients with RA (Bal, Aydog, Aydog, & Cakci, 2006). These changes are not reversible medically but may be amenable to surgical correction.

The psychosocial implications of RA are clear, with self-reported levels of clinical depression far greater than that of the general population (Dickens, McGowan, Clark-Carter, & Creed, 2002). A number of studies have been conducted to identify the psychosocial variables which may exacerbate depression and anxiety in inflammatory arthritis with constructs such as optimism and social support (Fournier, de Ridder, & Bensing, 2002; Zyrianova et al., 2006; Treharne, Lyons, Booth, & Kitas, 2007) at the forefront of the literature. By identifying which factors impair psychological distress, targeted interventions can be developed to minimize the psychological impact of the disease.

Despite the potentially disfiguring nature of RA, research is limited in its investigation of how appearance concerns may impact upon anxiety and depression in this group. Early research on body image and attractiveness suggests that RA patients are less likely to describe themselves as attractive than healthy controls (Skevington, Blackwell, & Britton, 1987), with concerns about body-image focused on body parts and characteristics associated with disability (Cornwell & Schmitt, 1990). Evidence suggests that body image concerns are not only worse in people with RA when compared to individuals without the condition and but are also associated with poorer quality of life (Jorge, Brumini, Jones, & Natour, 2010). Approximately 30% of patients with arthritis report that their disease makes them feel unattractive and these feelings have been associated with high levels of depression (Monaghan et al., 2007).

In fact negative feelings about the appearance of hands was significantly associated with a desire for surgery in patients with RA, even when duration of arthritis, age, grip strength and objectively rated hand attractiveness were controlled for (MacSween, Brydson, & Fox, 2004; Vamos, 1990). Those experiencing higher levels of distress also report embarrassment, self-consciousness and distress specific to their appearance, and use avoiding and concealing behaviours to reduce noticeability (Rumsey, Clarke, & Musa, 2002).

There is consensus in the disfigurement literature that the severity of a disfiguring condition is not associated with psychological adjustment (Moss, 2005). Previous research has identified a number of key constructs including cognitions related to social interactions, perceptions of social support and the perceived visibility of the difference to others (Thompson & Kent, 2001). However, the evidence to date has not provided a clear conclusion about which factors exacerbate distress and therefore has not provided the evidence base for the design of interventions to reduce this problem for patients.

More recent research in the area of disfigurement has begun to focus on how appearance concerns impact on social anxiety and the use of socially avoidant coping strategies. A majority of patients with RA report feelings of social isolation and although this has been found to significantly correlate with physical impairment, no relationship with radiographic damage or disease severity has been found (Bugajska et al., 2010). Feelings of social isolation may be exacerbated further by a patient's concern about their changing appearance. Although patients with RA experience less social anxiety and use less social avoidance strategies than a majority of other potentially disfiguring conditions (Rumsey, Clarke, White, Wyn-Williams, & Garlick, 2004), they are more affected by these issues than the general population (Carr, Moss, & Harris, 2005).

The goal of the current study was to examine what patients with RA think about their appearance and how they behave as a result. Looking specifically at how these concerns impact upon depression and anxiety over and above demographic, functional and general psychosocial factors. In particular this study set out to examine the potential contribution of appearance related social anxiety and social avoidance to the relationship between social support and mood, as a result of this established relationship in RA (Revenson, Schiaffino, Deborah Majerovitz, & Gibofsky, 1991; Evers, Kraaimaat, Geenen, & Bijlsma, 1997; Fitzpatrick, Newman, Archer, & Shipley, 1991). By utilizing psychosocial

variables which are potentially amendable to change, it is hoped that this study may make suggestions about the screening of patients in clinic and the development of psychosocial interventions designed to promote positive adjustment.

Methods

Subjects

Outpatients seeing a Clinical Nurse Specialist at University College Hospital, London were invited to take part. Inclusion criteria were clinical diagnosis of RA, aged 18 years plus, the ability to read and write in English and no diagnosed psychiatric illness or significant co-morbidity, defined as primary treatment for another condition. A consecutive sample of patients was recruited between August 2007 and March 2008.

Procedures

Patients meeting the inclusion criteria were invited to take part in the study prior to their appointment, when further explanation and clarification was offered. Once informed consent was obtained, participants completed the questionnaire booklet either in the clinic or at home.

Study Instruments

Demographics

All participants provided data on age, gender, living status and ethnicity.

Primary outcome measure

Depression and Anxiety: The Hospital Anxiety & Depression Scale (Zigmond & Snaith, 1983) (HADS) is a 14 item questionnaire measuring depression and anxiety in patients with physical health problems. Total sum scores range from 0-21, with higher scores indicating greater levels of anxiety or depression. A score of 0–7 on either subscale is classified as 'normal', 8–10 is suggestive of the presence of moderate levels of anxiety or depression, and a score of >11 indicates 'caseness', a high likelihood that a

person would be diagnosed to be suffering from clinical anxiety or depression. The authors of the scale report Cronbach's alpha between 0.78 and 0.93 for anxiety and 0.82 to 0.90 for depression and has been validated for use with people with visible difference (Martin & Newell, 2004). It possesses high test-retest reliability (r > 0.80) after 2 weeks (Herrmann, 1997). Compared to commonly used depression and anxiety measures correlations range between 0.60 (good) and 0.80 (very good) and the scales have good discriminant validity when correlated with each other (mean=0.56; range 0.49–0.74) (Bjelland, Dahl, Haug, & Neckelmann, 2002).

Functional measures

The cumulative impact of RA was assessed using the Stanford Health Assessment Questionnaire-II (Wolfe, Michaud, & Pincus, 2004) (HAQ-II) a valid and reliable measure of functional disability. The questionnaire asks how arthritis has affected the participant's ability to function in daily life, specifically referring to, for example, their ability to get on and off the toilet or go up two or more flights of stairs. Responses are on a four point scale ranging from without any difficulty to unable to do. The scores for this 10-item questionnaire range from 0-3 with higher scores representing greater levels of disability. Authors of the scale report satisfactory reliability, good construct validity with measures of function, discriminant validity and predictive validity in terms of mortality rates.

Generalised psychosocial cognitions

Optimism. A shortened four item version of the Life Orientation Test Revised (Scheier & Carver, 1987) (LOT-R) was utilized. The total scale score ranges from 4 to 20 with higher scores indicating a more optimistic outlook. The authors demonstrate adequate internal consistency (alpha=0.78) and test-retest reliability (r=0.68 at 4 months, r=0.60 at 12 months, r=0.56 at 24 months, r=0.79 at 28 months) (Scheier, Carver, & Bridges, 1994).

Social acceptance. Two items assessed the extent to which the respondent felt accepted by their social group and society in general. These were designed by the Appearance Research Collaboration (ARC) and are yet to be tested for validity. The questions reflect acceptance from society in general and the

person's social group. Total scores range from 2-14, with higher scores indicating higher levels of acceptance.

Social support. A four item version of the Short Form Social Support Questionnaire (Sarason, Levine, Basham, & Sarason, 1983) (SSQ) was used. Ratings of the quality of social support ranged from 4 to 24, with higher scores representing greater satisfaction with their social network. The measure has been shown to possess good test-retest reliability (r=0.83 at 4 weeks) and good internal reliability (alpha coefficient=0.97).

Fear of negative evaluation (FNE). The Brief FNE scale (Leary, 1983) examines whether an individual is concerned about the opinions of others. Scores range from 12-60 with higher scores indicating greater fear of negative evaluation. The authors have demonstrated high levels of internal consistency (alpha=0.90), good test retest reliability (r=0.75 at 4 weeks) and acceptable levels of construct validity.

Appearance-related cognitions

Social anxiety & avoidance. The Derriford Appearance Scale (DAS24) (Moss, 2004) is a 24 item scale measuring the impact of appearance-related distress on social anxiety and avoidance. It has been widely used in research related to disfigurement. Total scores range from 11-96 with higher scores representing greater levels of distress. The scale also includes a question asking if the participant is concerned about any aspect of their appearance, however small (yes or no), this information was extracted and analysed as an additional variable. The author of the measure have demonstrated adequate internal consistency (alpha=0.92), test retest reliability (r=0.82), concurrent validity with the DAS59 (r=0.88) and convergent validity with other relevant psychosocial measures (r<0.45).

Area and cause. Participants were asked to indicate any areas of the body which they were sensitive about and to indicate the cause of the area they were sensitive about the appearance of. The cause responses were then grouped into RA-related, non-RA related and no concern.

Visibility when clothed. Participants rated how visible their area of concern was when fully clothed, on a seven point scale from 1 (not at all visible) to 7 (extremely visible). This item was designed by the ARC and is yet to be tested for validity.

Disguisability. Participants rated how difficult it was to hide or disguise any aspects of their appearance about which they were concerned, on a seven point scale from 1 (extremely easy) to 7 (impossible). This item was designed by the ARC and is yet to be tested for validity.

Social comparison. Measured by a brief version of the Iowa-Netherlands Social Comparison measure (Gibbons & Buunk, 1999) (INCOMM). This scale measures the frequency with which someone compares their appearance to that of others, with higher total scores indicating a tendency to compare more often. Potential scores range from 11-55. The scale possess good internal consistency (alpha=0.83), concurrent validity (r=0.88) and adequate test retest reliability at four weeks (r=0.71) and one year (r=0.60).

Physical appearance discrepancy. Measured by the Physical Appearance Discrepancy Questionnaire (Altabe & Thompson, 1996) (PADQ), this scale looks at the discrepancy between a person's perception of how they look and how they or their significant others would ideally like them to look. Total scores range from 8-56, with higher scores indicating a greater discrepancy. The measure has been shown to possess good construct validity with measures such as mood.

Centre for Appearance Research Valance and Salience scales (Moss, Hobbs, & Rosser, 2008) (CARVAL, CARSAL). The CARVAL is a 6 item valance questionnaire which measures how positively someone evaluates their own appearance. The CARSAL is a 6 item salience questionnaire measuring how much a person values appearance as an important attribute. Total scores on both scales range from 6 to 36, with higher total scores indicating a more positive evaluation of appearance and a greater value placed on the importance of appearance. Both measures have demonstrated good internal consistency (alpha=0.85-0.89) and very good test-retest reliability (r= .089-.95 at 3 months).

Data analysis

Missing data was managed using multiple imputation methods in SPSS version 18. Constraints and rounding were used to ensure that the imputed scale level data was meaningful and corresponded to possible values. The model used to generate the imputed values corresponded with model used for the analysis. Five scale level imputation iterations were used to eliminate bias, it has been suggested that

between 3 and 10 imputations are sufficient, particularly for datasets with minimal missing data (Rubin, 1987). All analysis was performed on each of these 5 datasets and then pooled to give a final result. Those participants with more than 30% missing data were removed from the analysis, this cut-off was decided a priori.

Hierarchical linear regression was performed to determine the additional contribution of appearance-specific variables over and above other generic psychosocial variables to anxiety and depression. The demographic block was entered first (age, gender, marital status) with marital status entered as dummy variables (3 groups; living alone, with a partner, living with relatives or friends), followed by functional disability (HAQII), then the general psychosocial measures (optimism, social support, social acceptance and fear of negative evaluation) and the appearance-specific measures in the final block (social comparison, salience, valance, self discrepancy, visibility when clothed, disguisability, cause of area of appearance concern as a dummy variable (3 groups; no concern, non-related RA cause, RA-related cause), DAS24). The variance explained by each of the blocks is reported as R^2. Unstandardized coefficients (β) are reported to indicate which of the variables has a greater statistical association with mood, with larger beta values indicating a great association. Positive betas suggest positive associations and negative betas negative associations.

The data was examined to ensure that the assumptions of normality, linearity, homoscedasticity and non-multicolinearity for the regression models were met. There was no evidence of multicolinearity when looking at the variance inflation factor (VIF) and tolerance values for the each of the predictor variables. All *p*-values were based on two-sided tests of statistical significance, set at <0.05.

In order to test for mediation analysis the bootstrapping procedures described by (Preacher & Hayes, 2008) were implemented. These are particularly suited for mediation analyses with small samples (Preacher & Hayes, 2004; Shrout & Bolger, 2002) and provide a confidence interval around the indirect effect (i.e., the path through the mediator). If zero falls outside this interval, mediation is said to be present. The SPSS macros for bootstrapping (Preacher & Hayes, 2008) using a resample procedure of 5,000 bootstrap samples (bias corrected and accelerated estimates and 95% CI) was used.

Ethical approval

Ethical approval for the study was granted by the UCL/UCLH Joint Research Ethics Committee.

Results

Study population

Of the 177 questionnaires distributed, 87 (49%) were not returned and 1 (0.5%) was missing more than 30% of the responses and therefore excluded from the analysis. Of the 89 respondents, a majority were female (83%), living with a partner (63%) and white (81%). The average age was 58.3 years (SD, 14.8). Over eighty per cent were concerned about some aspect of their appearance, with approximately 51% concerned about their hands, 25% their knees and 44% their feet (Table 1).

Missing data

The amount of missing data for those who completed a questionnaire was minimal at 1.85% and was judged to be missing at random. Of the 89 returned questionnaires 16 had varying degrees of data missing, ranging from 5.9 to 32%, the one participant with more than 30% missing data was removed from the analysis. The item relating to disguisability had the most responses missing (11.2%).

Overall levels of anxiety and depression

Mean levels of anxiety (7.58, SD 3.85) and depression (8.48, SD 3.31) indicate scores which are on average within the normal to moderate range. A majority of participants experienced normal levels of anxiety and depression (49% and 50% respectively). However, there were also a large number who reported severe symptoms, with 19% of the sample clinically anxious and 26% clinical depressed. Overall, 10 participants (11%) were both clinically depressed and anxious, 7 (8%) clinically anxious only and 13 (15%) clinically depressed. A majority (66%) were either within the normal or moderate range for both.

Relationships with mood

Variables were introduced sequentially as blocks into the hierarchical regression and are presented in Tables 2 and 3.

Anxiety

The demographic block was introduced first and accounted for 10% of the variance ($p < 0.05$). An additional 3% ($p < 0.001$) of the variance was explained after adding functional disability. The introduction of the psychosocial variables explained an additional 28% ($p < 0.001$) and when the appearance-specific cognitions were added this increased the explained variance by 4% ($p < 0.001$).

Being male was associated with lower levels of anxiety (β = -2.85; $p = 0.01$) this inverse relation remained until inclusion of the appearance-specific variables were added to the model, at which point the gender-anxiety association became non-significant. Similarly functional disability (β = 1.41; $p = 0.03$) when added to the model was significantly associated with anxiety with greater disability associated with more anxiety. However, after inclusion of the psychosocial and then appearance-specific variables it became non-significant. Optimism (β = -0.51; $p < 0.001$) was inversely associated with anxiety and remained so after inclusion of the appearance-specific measures were added to the model. The addition of the appearance-specific measures added very little to the overall model and none of these variables were associated significantly to anxiety.

Depression

The demographic block was introduced first and accounted for 3% of the variance, although this was not significant (p = 0.15). An additional 14% ($p = 0.001$) of the variance was explained after adding functional disability. The introduction of the psychosocial variables explained an additional 28% ($p < 0.001$) and when the appearance-specific cognitions were added this increased the explained variance by 7% ($p < 0.001$).

After inclusion of all blocks when comparing those who live with a partner those living with relatives or friends experienced higher levels of depression (β = 2.50; p = 0.03). Similar to anxiety, functional disability (β = 2.08; p < 0.001) when added to the model was significantly associated with depression with greater disability associated with a more depressed mood. However, after inclusion of the appearance-specific variables it became non-significant. In addition, optimism (β = -0.35; $p < 0.001$) was inversely associated with depression as was social support (β = -0.19; $p = 0.01$) and these variables

remained significant after inclusion of the appearance-specific measures. The addition of the final block again added little to the overall variance, although this step was significant. The DAS28 a measure of social anxiety and social avoidance in relation to appearance did contribute significantly to the overall model for depression and was positively associated (β = 0.09; p = 0.02). The remaining variables failed to correlate significantly with depression.

Social support, social anxiety & avoidance and mood: Mediation analysis

We specifically set out to examine the relationship between social support and mood and the mediating role of appearance-related social anxiety and avoidance. We hypothesised that social anxiety and avoidance in relation to appearance would mediate the relationship between satisfaction with social support and mood, see figure 1 for a diagrammatic representation. However, as the DAS24 was not significantly associated with anxiety in the regression analysis the mediating relationship between social support and anxiety through the DAS24 was not explored. Table 4 summarizes the results for the mediation analyses relating to depression. As the confidence interval does not contain zero, it can be concluded that there is a significant mediating effect of social support on depression through social anxiety and avoidance. An adjusted R^2 of 0.43 is observed for this significant indirect effect, indicating that approximately 43% of the total effect of social support on depression is explained by appearance-related social anxiety and social avoidance.

Discussion

Previous research has highlighted the distress patients with RA have regarding their appearance. This study found that a majority of the participants report concerns about some aspect of their body and this proportion was significantly higher than that of the general population (Carr, Harris, & James, 2000). The hands, feet and knees were the most frequently reported areas of sensitivity, reflecting the potentially disfiguring nature of RA.

Although a majority of participants had adjusted well, others had levels of anxiety and in particular depression that were significantly higher than that of a non-clinical sample. This was reflected

in the number of participants meeting the criteria for clinical anxiety and depression (Crawford et al. 2001) and mean levels of depression twice that of the general population (Crawford, Henry, Crombie, & Taylor, 2001; Dickens et al., 2002). Being at increased risk for depression is particularly concerning in RA given that depression has been found to increase the risk of mortality (Ang, Choi, Kroenke, & Wolfe, 2005).

The analysis of factors associated with levels of anxiety demonstrated a link with optimism but no relationship to any appearance-specific cognitions, this reflect the previous research (Monaghan et al., 2007). It may be surprising that appearance-related social anxiety and avoidance failed to add any significant variance to generalized anxiety whilst contributing to depression. Worry regarding social situations has been associated in the literature with depression, more strongly than generalized anxiety, with levels similar to that of people with social phobia (Wells & Carter, 2001). It may therefore be that depression in part reflects how a person sees them self in the social world, but this relationship requires further exploration. Other factors significantly associated with levels of depressed mood were social support and optimism.

This study highlights the importance of optimism in mood and is consistent with other studies in RA which suggest those who are more optimistic report less anxiety and depression (Treharne, Kitas, Lyons, & Booth, 2005). Whilst there are many findings indicating that optimism is adaptive in the face of adversity, research on optimism in the context of appearance has been lacking. This is particularly relevant in the context of interventions, as there is some evidence to suggest that optimism can be taught (Segerstrom, 2006).

The association between depression and appearance-related social anxiety and avoidance builds on previous work (Monaghan et al., 2007) but by using a valid and reliable measure of appearance concern and its impact on social behaviour this study makes for more robust findings. Greater satisfaction with social support in this sample was associated with lower levels of depression. Positive support from others is widely acknowledged as a buffer to the consequences of stress and has been highlighted as an important factor in the explanation of mood (Revenson et al., 1991; Fitzpatrick et al., 1991). In fact greater satisfaction with emotional support and social companionship are related to less distress in patients with RA (Strating, Suurmeijer, & Van Schuur, 2006). In a recent review of

supportive interventions in RA, cognitive-behavioural interventions which included family or friends yielded better outcomes in both disease status and mood. The supportive role of a friend or family member as part of cognitive-behavioural strategies may provide more encouragement than someone who is less informed (Lanza & Revenson, 1993).

It has been suggested that factors such as social stress and isolation may be required for depression to develop in RA, with depressed patients more likely to experience social difficulties, both related to and independent of their arthritis (Dickens, Jackson, Tomenson, & Creed, 2003). Becoming anxious about interacting in social situations and hence avoiding them may therefore be a consequence of how a person with RA feels about their appearance. The significant relationship between social support and appearance-related social anxiety and avoidance suggests that having people around you who are supportive and positive may decrease social anxiety and encourage interaction with others. In fact, this study indicates that the relationship between satisfaction with social support and depression is mediated by social avoidance and anxiety. Suggesting either a possible direct or indirect effect of social support on depression or that other factors in addition to social anxiety and avoidance mediate this relationship. These interactions require larger longitudinal designs to tease out the causal relationships between variables, including other possible explanations.

It is important however that as with optimism these factors are potentially modifiable. The way in which people think about their social interactions and interpret social situations has been the focus of social skills training. Such interventions aim to teach people how to communicate effectively and deal with the reactions of others and have been found to be beneficial for psychosocial well being (Robinson, Ramsey, & Partridge, 1996). (Moss, 1997) has suggested that the social context of this type of intervention and the opportunity it presents to meet similarly affected individuals is as beneficial as the strategies being taught. Highlighting again the possible benefits of support from others.

This study has a number of limitations. As only 50% of eligible patients completed questionnaires it is possible that those for whom appearance is a greater concern or those more depressed or anxious chose not to participate. Data from clinical records were not collected and therefore we are unable to compare responders with non-responders. As a result of this, generalization of these findings to the RA population is limited by the small sample size. As the study was cross-

sectional it is not possible to draw conclusions about the direction of causality. Further comprehensive longitudinal studies with adequate power and therefore greater sample sizes are required to understand these relationships further. Multiple regression requires a large sample size, the number of participants should substantially exceeding the number of predictor variables included in the regression. The absolute minimum is five times as many participants as predictor variables which is achieved in this study, but a more acceptable ratio would have been 10 participants to every independent variable (Brace, Kemp, & Snelgar, 2003). The lack of an objective measure of disfigurement may be seen as a limitation of this study, however, as highlighted previously research has so far failed to find a link between objective measures of disfigurement and psychological adjustment.

Conclusion

In common with the literature this study demonstrates the important role of optimism and social support in relation to anxiety and depression in patients with RA. To further add to the evidence these findings suggest that the relationship between social support and depression may be mediated by appearance-related social anxiety and the use of socially avoidant coping strategies. This emphasises the importance of a positive supportive environment and engagement in quality social interactions to aid in the psychological adjustment of people with RA. Poor social support may lead to the avoidance of social situations and social anxiety and thereby increasing levels of depression. But these increased feelings of depression may also result in a desire for social isolation, high levels of social anxiety and hence fewer sources of social support. This bidirectional relationship needs further exploration. The variables that appear to be driving mood in RA patients are however potentially amenable to change and these findings emphasise the importance of developing psychosocial interventions aimed at improving mood in patients with RA.

Keywords: rheumatoid arthritis, disfigurement, appearance concerns, anxiety, depression

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Members of the Appearance Research Collaboration:

Professor Nicola Rumsey, Centre of Appearance Research, University of the West of England, UK

Professor Stanton Newman, School of Health Sciences, City University London, UK

Professor Rob Newell, Department of Nursing, University of Bradford, UK

Dr Andrew Thompson, Clinical Psychology Unit, University of Sheffield, UK

Dr Roger Charlton, Warwick Medical School, University of Warwick, UK

Dr Diana Harcourt, Centre of Appearance Research, University of the West of England, UK

Dr Tim Moss, Department of Psychology, University of the West of England, UK

Dr Alex Clarke, Department of Plastic and Reconstructive Surgery, Royal Free Hampstead NHS Trust, UK

Ms Hayley McBain, School of Health Sciences, City University London, UK

Dr Sally-Anne Clarke, Clinical Psychology Unit, University of Sheffield, UK

Dr James Byron-Daniel, School of Health and Social Care, University of the West of England, UK

Dr Elizabeth Jenkinson, Centre of Appearance Research, University of the West of England, UK

Mrs Krysia Saul, Warwick Medical School, University of Warwick, UK

TABLE 1. Participant characteristics	
Characteristics	Study population (n=89)
Demographics	
Women, n (%)	74 (83.10)
Age (mean, SD) years	58.26 (14.79)
Marital status, n (%)	
Living with a partner	58 (65.17)
Living alone	20 (22.47)
Living with friends or family	11 (12.36)
Primary outcome measure	
Anxiety, mean (SD)	7.58 (3.84)
Depression, mean (SD)	8.48 (3.31)
Function	
Functional disability, mean (SD)	0.58 (0.60)
Generalised psychosocial cognitions	
Optimism, mean (SD)	14.54 (3.05)
Social acceptance, mean (SD)	11.78 (3.03)
Social Support, mean (SD)	20.57 (4.56)
Fear of negative evaluation, mean (SD)	33.77 (8.62)
Appearance-specific cognitions	
Social anxiety & avoidance, mean (SD)	33.71 (13.08)
Any aspect that concerns you, n (%)	
Yes	72 (80.90)
No	17 (19.10)
Area of body, n (%)*	
Hands	45 (50.56)
Feet	39 (43.82)
Knees	22 (24.72)
Abdomen	16 (18.0)

Upper Arms	14 (15.73)
Thighs	11 (12.40)
Lower legs	10 (11.24)
Hips	10 (11.24)
Neck	9 (10.11)
Cause of the disfigurement, n (%)	
No concern	6(6.74)
RA related	60 (67.42)
Non-RA related	23 (25.84)
Visibility when clothed, mean (SD)	4.01 (2.20)
Disguisability, mean (SD)	4.31 (1.80)
Social comparison, mean (SD)	33.79 (7.62)
Self discrepancy, mean (SD)	26.26 (12.29)
Valance, mean (SD)	18.37 (7.46)
Salience, mean (SD)	29.12 (8.06)

***areas of concern with >10% response**

Table 2. Hierarchical multivariable linear regression model for anxiety [unstandardized coefficients (β), standard error and *p*-value]

	Demographic block, Model 1			Demographic & disability block, Model 2			Demographic, disability & psychosocial block, Model 3			Demographic, disability, psychosocial & appearance block, Model 4		
	β	**Std. Error**	***p***	**β**	**Std. Error**	***p***	**β**	**Std. Error**	***p***	**β**	**Std. Error**	***p***
Demographic Block												
(Constant)	11.06	1.88	0.00	10.29	1.87	0.00	18.00	3.73	0.00	13.80	4.30	0.00
Age	0.00	0.03	0.95	0.00	0.03	0.91	0.00	0.03	0.87	0.02	0.03	0.48
Gender												
Female (constant)												
Male	**-2.85**	**1.11**	**0.01**	**-2.72**	**1.09**	**0.01**	**-2.08**	**0.94**	**0.03**	-0.85	1.02	0.40
Living status												
Living with a partner (constant)												
Living alone	-1.32	0.99	0.18	-1.59	0.97	0.10	-1.49	0.83	0.07	-1.61	0.85	0.06
Living with family or friends	2.12	1.26	0.09	1.88	1.24	0.13	1.70	1.05	0.11	1.27	1.08	0.24
Disability Block												

Functional disability	**1.41**	**0.64**	**0.03**	0.57	0.56	0.31	-0.11	0.65	0.86
Psychosocial Block									
Optimism				**-0.51**	**0.13**	**0.00**	**-0.51**	**0.15**	**0.00**
Social acceptance				0.00	0.13	0.99	0.14	0.15	0.35
Social support				-0.13	0.09	0.14	-0.17	0.09	0.07
Fear of negative evaluation				0.05	0.04	0.26	0.04	0.06	0.52
Appearance Block									
Social anxiety & avoidance							0.04	0.05	0.44
Concern about appearance									
No (constant)									
Yes							1.14	1.21	0.34
Cause									
No concern (constant)									
RA related cause							1.30	1.78	0.47
Not RA related cause							1.67	1.77	0.34
Visibility							0.09	0.22	0.67

Disguisability				-0.35	0.31	0.26
Social comparison				-0.04	0.05	0.46
Self-discrepancy				0.08	0.04	0.05
Valence				-0.02	0.07	0.76
Salience				-0.03	0.05	0.55
R^2	0.14(p=0.01)	0.19(p=0.003)	0.47(p<0.001)	0.57(p<0.001)		
Adjusted R^2	0.1	0.13	0.41	0.45		

Table 3. Hierarchical multivariable linear regression model for depression [unstandardized coefficients (β), standard error and *p*-value]

	Demographic block, Model 1			Demographic & disability block, Model 2			Demographic, disability & psychosocial block, Model 3			Demographic, disability, psychosocial & appearance block, Model 4		
	β	**Std. Error**	***p***	**β**	**Std. Error**	***p***	**β**	**Std. Error**	***p***	**β**	**Std. Error**	***p***
Demographic Block												
(Constant)	7.74	1.68	0.00	6.61	1.58	0.00	17.53	3.07	0.00	13.30	3.42	0.00
Age	0.03	0.03	0.21	0.03	0.03	0.21	0.03	0.02	0.16	0.04	0.02	0.07
Gender												
Female (constant)												
Male	-1.18	0.99	0.23	-0.99	0.92	0.28	-0.55	0.78	0.48	0.56	0.81	0.49
Living status												
Living with a partner (constant)												
Living alone	-0.86	0.89	0.33	-1.26	0.82	0.13	-1.33	0.69	0.05	-1.16	0.69	0.09
Living with family or friends	**2.50**	**1.13**	**0.03**	**2.15**	**1.05**	**0.04**	**1.80**	**0.87**	**0.04**	**1.79**	**0.86**	**0.04**
Disability Block												
Functional disability				**2.08**	**0.54**	**0.00**	**1.29**	**0.47**	**0.01**	0.33	0.53	0.53

Psychosocial Block						
Optimism	**-0.35**	**0.11**	**0.00**	**-0.32**	**0.12**	**0.01**
Social acceptance	-0.11	0.11	0.30	-0.01	0.12	0.91
Social support	**-0.19**	**0.07**	**0.01**	**-0.21**	**0.08**	**0.00**
Fear of negative evaluation	-0.01	0.04	0.74	-0.06	0.04	0.15
Appearance Block						
Social anxiety & avoidance				**0.09**	**0.04**	**0.02**
Concern about appearance						
No (constant)						
Yes				-0.51	0.97	0.60
Cause						
No concern (constant)						
RA related cause				1.89	1.43	0.19
Not RA related cause				1.66	1.41	0.24
Visibility				0.08	0.18	0.64
Disguisability				-0.10	0.24	0.69

Social comparison				-0.06	0.04	0.18
Self-discrepancy				0.03	0.03	0.29
Valence				0.01	0.05	0.86
Salience				0.00	0.04	0.92
R^2	0.08(p=0.15)	0.22(p=0.001)	0.51(p<0.001)	0.63(p<0.001)		
Adjusted R^2	0.03	0.17	0.45	0.52		

Table 4. Mediation model				
	Coefficients	s.e	Normal theory *P*	Bootstrap 95% CI
Total effect (c)	-0.380	0.066	<0.001	-
Direct effect (c')	-0.273	0.063	<0.001	-
Indirect effect (via DAS24)	-0.108	0.04	<0.001	(-0.192; -0.024)
Model R^2 (p)		0.44 (<0.001)		
Adj. R^2		0.43		

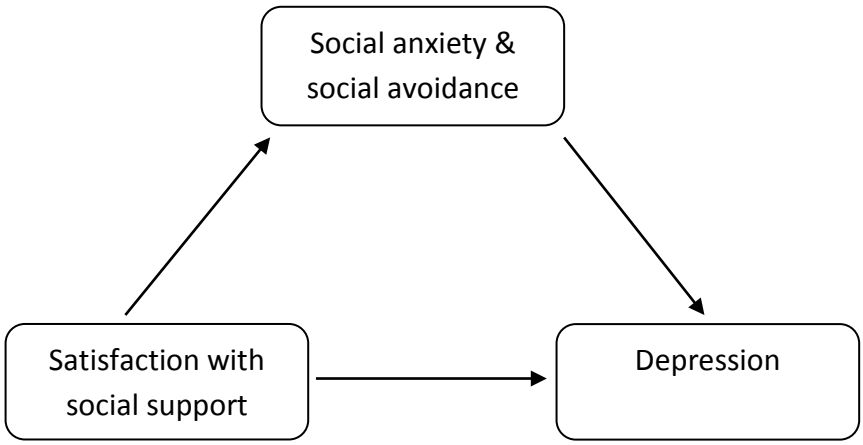

Figure 1: Potential mediation model for social support and depression.

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