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Early Nurturing Experiences, Self-Compassion, Hyperarousal and Scleroderma

The Way We Relate to Ourselves May Determine Disease Progression

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Abstract

Scleroderma is a rare, painful and complex autoimmune connective tissue disease that can lead to death. The physiology of symptom onset and progression and the psychological aspects of living with this chronic disease have been studied fairly extensively. However, there is limited knowledge about scleroderma and negative physiological arousal (hyper-arousal: linked to immune dysfunction resulting in autoimmunity in the face of stressful events) and how levels of hyper-arousal are related to stress experienced at an early age; to emotion regulation coping strategies such as self-compassion; and to when scleroderma is experienced (earlier or later onset). Knowledge about these relationships may be important information for the treatment of scleroderma and related illnesses. This study addressed these relationships for scleroderma by examining how hyper-arousal was linked to these psychosocial experiences of stress, to coping strategies, and to age of disease onset.

A within group design was utilized. A total of 122 participants were recruited from Australia (39) the United Kingdom (81) and country not specified (2) and invited to complete an online or a hard copy survey. Lower positive early life experiences, lower levels of self-compassion and an earlier onset of disease were all related to elevated levels of hyper-arousal in individuals diagnosed with scleroderma. A regression equation showed all three contributed significantly to the experienced hyper-arousal. The findings suggest that greater self-compassion may be a determining factor in how earlier emotional experiences are managed and in predicting lower hyper-arousal in terms of this disease.

Keywords: scleroderma, autoimmune, self-compassion, early-nurturing, emotion, hyper-arousal

1. Introduction

The incidence of those suffering from scleroderma is higher in countries such as the USA (276/million Chiffot, Fautrel, Sordet, Chatelus, & Sibilia, 2008) than in Australia (233/million) or in Europe e.g., France (158/million) and England (88/million) and is growing apace (Chiffot et al., 2008). With the growth it is likely there will be a corresponding rise both in terms of societal level health cost and personal and pain cost. New knowledge that might help alleviate the personal stress and the burden on families and the broader community is likely to be welcomed. Our study examined some important aspects associated with scleroderma and draws conclusions about how an individual's early emotional experiences and access to self-compassion as a way of coping may impact on the development of hyper-arousal, strongly associated with scleroderma. We indicate the importance of developing positive emotional coping strategies in people diagnosed with scleroderma.

1.1 Hyper-Arousal, the Immune System and Scleroderma

Hyper-arousal is described as physical or emotional tension produced by hormones during the fight-or-flight response and is associated with specific psychological conditions and the development of autoimmunity (Schore, 1994) (where the individual's immune system attacks its own healthy cells and tissues). The intensity of the fight and flight reaction is generally dependent on an individual's response to a stressor (e.g., Every & Lating, 2002; Selye, 1976) and ability to adapt to stress exposure (Hammad, Barsky, & Regestein, 2001). Exposure to unexpected stimuli may produce excessive arousal reactions and increased cortisol (a stress hormone) levels. Individuals with irregular cortisol arousal may be unable to distinguish between physically harmless and

threatening stimuli, frequently engaging the fight and flight response in non-threatening situations. This condition may overwhelm an individual's resources to accurately process information, decreasing selective attention abilities, resulting in ambiguous meaning and difficulty discriminating between meaningful and insignificant stimuli (Hammad et al., 2001).

1.2 Background to Scleroderma and Its Impacts

The pathogenesis of scleroderma is very complex; genetic variables influence collagen, vascular and immune function and are further complicated by environmental factors (Smith & Kalhaleh, 2008; Steen, 2008). Antibodies explain differences between presenting symptoms for different scleroderma subsets such as diffuse and limited sclerosis; however, what initiates and perpetuates this disease is still unclear (Smith & Kalhaleh, 2008). Much is known about scleroderma and the relationship with psychological aspects such as coping, depression and anxiety (e.g., Angelopoulos, Drososet, & Moutsopoulos, 2001; Richards, Herrick, Griffin, Gwilliam, & Fortune, 2004; Roca, Wigley, & White, 1996). However, the relationship of personal experiences of stress and levels of physiological arousal related to disease onset have received less attention. A study conducted in 1983 by Freedman and Ianni, identified differences in stress reactions between individuals diagnosed with scleroderma and those without scleroderma. Those with scleroderma had a heightened stress response. Research has also explored stress experienced by individuals diagnosed with scleroderma. A few studies found that stress events, emotional stress and recurrent infections were reported before or during onset of scleroderma (Hui, Johnston, Brodsky, Tafur, & Kim Ho, 2007). Stress events were also reported by individuals in the year before onset of scleroderma, with scleroderma patients reporting significantly greater scores on measures of stress experiences, than non-scleroderma participants (Chen, Huang, Qiang, Wang, & Han, 2008).

Research suggests that arousal is influenced by genetic factors and is higher in individuals who are more physiologically and emotionally reactive (Pfaff, 2005). Virtually any stressor whether physical or psychological will result in a rapid increase in the **hormone adrenocorticotropic** (Rice, 1999). The adrenals respond to stress by secreting a number of hormones including epinephrine (adrenaline), norepinephrine (noradrenaline) and glucocorticoids that include the hormone cortisol (Rice, 1999). High levels of the stress hormone cortisol can have negative effects on the immune system, while epinephrine and norepinephrine affect the sympathetic nervous system (SNS; Rice, 1999). Research suggests hyper-arousal is associated with a number of biopsychosocial stress related factors. It forms part of the fight and flight response that functions to protect an individual from threat, however over-reactive protection defences that create excessive arousal reactions are a risk factor in the development of autoimmunity (e.g., Schore, 1994). It has been suggested that individuals diagnosed with scleroderma have a heightened stress response, when compared to individuals without scleroderma (Freedman & Ianni, 1983). Hyper-arousal is involved in the stress response and autoimmunity (e.g., Every & Lating, 2002) and is higher in individuals who are more physiologically and emotionally reactive (Pfaff, 2005).

The factors that may contribute to heightened levels of physiological arousal in individuals diagnosed with scleroderma require investigation. The factors studied in the current study were early life experiences of stress or lack of warmth in early relationships, inadequate emotion regulation strategies, and the relationship to age of disease onset.

1.3 Early Memories of Warmth and Safeness

Research suggests negative early childhood experiences can have detrimental effects on the social functioning, psychological and physical health of individuals. Gilbert (2007) suggests early life experiences influence gene expression and the biological and psychological functioning of the brain. These early life experiences are expressed as different types of emotion regulation and social communications that reflect cognitive and behavioural patterns of threat and safety. Positive early experiences that engender warmth and safety have been associated with well-being (Schore, 1994), while negative experiences with low self-kindness and/or the development of self-criticism (Brewin, Firth, Cozens, Furnham, & McManus, 1992; Neff, Kilpatrick, & Rude, 2007), are associated with poorer psychological outcomes (Irons, Gilbert, Baldwin, Baccus, & Palmer, 2006). Gilbert and colleagues (2008) suggested that feeling safe and content is a determinant of psychopathology, attachment style and self-evaluation.

Positive nurturing experiences that foster feelings of warmth (such as tenderness, kindness and concern) and safeness (feeling safe rather than safety seeking) are associated with a lower risk of developing psychopathology (Mikulincer & Shaver, 2007). Negative rearing environments where perceptions of parents as being non-caring (Finzi-Dottan & Karu, 2006) are seen as being associated with an increase in negative affect and a vulnerability to psychopathology (Heit, Graham, & Nemeroff, 1999; Schore, 1994). Gilbert et al. (2008) proposed that when early environments are experienced as threatening and fail to provide feelings of safety and warmth, a lack of

stimulation of the positive affect and warmth systems and an over-activation of the threat/defence/protective systems may occur. Psychosocial stress, particularly early threat experiences have the potential to impact on immune and psychological functioning. These suggestions provide support for exploring these aspects in relation to scleroderma onset.

Gilbert and colleagues developed the Early Memories of Warmth and Safeness scale (EMWS) to measure negative childhood experiences. The EMWS scale was selected for this study as it was designed to measure the recall of feelings associated with warmth and safety as a child and may be a better indicator of early negative life experiences than recalling specific negative event(s) in childhood (Richter, Gilbert, & McEwan, 2009). Richter and colleagues suggest that how an individual responds to an event (both physiologically and emotionally) may be a better indicator of threat than recalling the stressful event itself, as some individuals may recall parents as kind and available but still feel fearful and lack a sense of belonging. Others may have experienced negative events but felt they managed and coped well (Richter et al., 2009). The recall of positive or negative feelings associated with early rearing experiences generally relies on the recollection of an individual's own inner experiences, rather than recalling events related to other's behaviour, as an indicator of stress experienced. Recall of affect in relation to childhood memories may therefore explain feelings of threat not accounted for by the recall of any particular stressful event. [This view of exploring an individual's experience of threat was utilised in this study to measure scleroderma participant's reporting of early life exposure to warmth and safety-using the scale by Richter, Gilbert, and McEwan (2009), as an individual's capacity to regulate arousal early in life influences immune responses and future immune functioning]. Early adverse experiences may influence vulnerability in numerous areas of functioning involving threat/arousal, including regulating emotions and arousal or hyper-arousal-accentuating the experience of stress (Schoore, 1994).

1.4 Self-Compassion: Biopsychosocial Implications

Self-compassion is an emotion regulation strategy (Neff, 2003a) that involves not avoiding or suppressing negative experiences. This process may engage chemicals such as cortisol, implicated in the fight and flight/threat system (Gilbert, 2002). Self-compassion involves kindness and understanding toward the self (Neff, 2003a; Neff et al., 2007), through an awareness of the distressing feelings but also through treating oneself with kindness and understanding rather than engaging in self-judgement. Self-compassion involves recognising that suffering and disappointment are part of being human and that people including self are worthy of kindness and compassionate care (Neff, 2003a). When compassion is applied to the self, it requires a kind openness to one's own suffering and pain, allowing an accepting kindness toward less favourable attributes and inadequacies, when not managing a situation as well as expected. Experiencing failure as part of a shared human condition helps reduce feelings of isolation and the likelihood of becoming immersed in the negative emotional experience associated with the situation (that is, in rumination; Gilbert, 2007). Self-compassion allows an individual to view the experience from an outside perspective, disengaging from the exaggerated experience of over identifying with the subjective content and providing kindness to the self from the self (that is, a mindful and more balanced view: Neff, 2003a). Self-compassion involves developing the ability to become mindfully aware of these experiences, rather than over-identifying with them, lessening the impact of the negative experience and enabling opportunities to develop a more holistic view of one's situation (Neff, 2003a). Gilbert (2007) saw this mindful self-kindness as reducing rumination and lessening the impact of negative affective experiences, by providing opportunities to reduce heightened threat responses resulting from a threat processing deficit. Self-compassion has not been examined in any other studies to the authors' knowledge, in relation to scleroderma and its onset. This factor was explored as it was hypothesised that self-compassion may act as a protective factor for immune functioning (reducing hyper-arousal trends) and therefore would provide more positive health outcomes for individuals who engage in this emotion regulation strategy.

Neff developed the self-compassion scale (2003b), that has been widely used to measure this construct. This scale utilized in the current study, constitutes the three major aspects of self-compassion discussed above: self-kindness, common humanity and mindfulness. Self-kindness refers to treating oneself with warmth and care without engaging in self-judgment. Common humanity indicates an ability to understand one's suffering or inadequacies as part of shared human experiences, rather than feeling alone or isolated. Mindfulness describes a capacity to employ a balanced view rather than over-identifying with the experiences and is a protective behaviour for experiences of anxiety (Neff, 2003b).

Research has demonstrated a link between the benefits of self-compassion and psychosocial aspects; however, only a few studies have investigated self-compassion and physiological factors (e.g., Pace et al., 2009; Wren et al., 2011). Compassion has been investigated in relation to psychosocial stress and physiological reactions of the neuro-endocrine and innate immune systems. Pace and colleagues (2009) found that people who engaged in more

compassion focused meditation and reflection when compared to people with less engagement, scored lower on physiological responses (such as cortisol levels) and psychological measures (such as of distress and anxiety); suggesting that stress induced immune and behavioural responses (arousal) may be moderated by compassion focused meditation (Pace et al., 2009). Therefore strategies high in self-compassion are likely to produce positive physical and psychological health outcomes (Neff, 2003a; Pace et al., 2009). We sought to examine this relationship in regard to hyper-arousal in scleroderma. Self-compassion provides a solution for threat processing difficulties, and is negatively associated with depression, anxiety, self-criticism and thought suppression and positively associated with life satisfaction (e.g., Gilbert, 2007; Neff, 2003a; Neff et al., 2007), stress reduction (Sharpiro, Astin, Bishop, & Cordova, 2005) and lower cortisol levels (Pace et al., 2009). Self-compassion is significantly related to adaptive functioning and positive health outcomes (Neff et al., 2007). As self-compassion is associated with wellbeing (e.g., Neff, 2003a), the development of inner (self) compassion may therefore provide physiological and psychological health benefits (Gilbert, 2002) to individuals with compromised psychological and immune functioning. Self-compassion strategies are theorised to act as a protective factor (Neff, 2003a), with greater experience of self-compassion likely to be associated with lower physiological arousal and a later onset of scleroderma symptoms.

Risk factors in the development of autoimmunity have been explored in the literature; however, factors that may protect an individual from elevated (threat-related) arousal and the onset and/or development of disease have not previously been explored in relation to scleroderma. Self-compassion is one emotion regulation strategy that may be a protective factor as it provides an individual with the capacity to self-soothe and calm the ensuing physiological reactions. Neff (2003a; 2003b) suggested that self-compassion increases the capacity for self-care: it reduces feelings of isolation by increasing feelings of connectedness to the suffering of other human beings. Self-compassion reflects an ability to positively regulate emotions that lead to increased feelings of autonomy and the capacity to provide care and compassion for both self and others that are associated with positive health outcomes (Reyes, 2011). Individuals diagnosed with scleroderma tend to have a heightened stress response (Freedman & Ianni, 1983), when compared with individuals without scleroderma. This response is likely to be linked to feelings associated with fear or threat and the ability to self-soothe; and may reflect an inability to regulate emotions through insufficient self-compassion. Low self-compassion may invoke a stress response (hyper-arousal); but we found no previous studies that linked self-compassion with scleroderma and its alleviation. We have added *experiences of stress before diagnosis of scleroderma* as a factor of interest, as such experiences have been identified as relevant but scarcely investigated in other studies. The current study explored whether hyper-arousal is associated with childhood experiences of warmth and safety, levels of self-compassion and how the disease is experienced, i.e., earlier or later onset.

1.5 Hypothesis

Stress experiences can occur at any age and may influence how emotions are regulated and whether physiological arousal responses occur that can affect immune system functioning. Early *nurturing* experiences whether positive or negative may influence how individuals experience and manage stress. Strategies such as self-compassion that provide an individual with the capacity to reduce arousal may therefore reduce this impact on the immune system by delaying the onset of disease. This study therefore hypothesised that greater levels of negative physiological arousal would be predicted from lower experiences of warmth and safety as a child, lower levels of self-compassion, and an earlier diagnosis of scleroderma. The regression equation used physiological (hyper-) arousal as the DV; and EMWS (early memories of warmth and safety), self-compassion, and early vs late onset of disease as IVs.

2. Method

2.1 Procedure

Several scleroderma organisations internationally were involved in promoting this study to members diagnosed with scleroderma. These organisations included the Queensland and the Australian Scleroderma Associations and the United Kingdom Scleroderma Society. These non-profit organisations work to provide education and support for members with scleroderma and their families. Approval was received from the various associations' committees responsible for scleroderma research once the survey and explanatory letter had been sighted and discussed. Participants in Australia were recruited through newsletters published by the Australian, and Australian State Scleroderma Associations, such as Queensland and Victoria and by the primary researcher within South East Queensland (Sunshine Coast, Brisbane and Gold Coast) at scleroderma meetings to complete an online or hardcopy version of the survey. Australian participants who had no online access received a hardcopy version of the questionnaire. These participants were recruited from phone enquires and emails as a result of advertisements

in scleroderma newsletters and magazines or at scleroderma meetings. A questionnaire with a stamped addressed envelope (to the supervisor of this project in Australia) was forwarded to interested participants by mail or handed to participants at meetings. A written explanatory letter containing information about the purpose, procedure, where questions/complaints could be directed, risks and benefits of the research project and confidentiality of participants was attached as a cover page to the online and hardcopy versions. Completion of the survey required approximately 50-60 minutes of the participants time.

In the United Kingdom information about the study and the survey including a written explanatory letter from both the researcher and the United Kingdom Scleroderma Society itself was forwarded by the trustee of the Society to 231 of their members who had been diagnosed with Scleroderma. The project was approved by the University's Human Research Ethics Committee and received approval from the Scleroderma Society Ethics Committee in the United Kingdom and the Queensland and Australian Scleroderma Associations.

2.2 Participants

Male and female adults aged 18 years and over diagnosed with scleroderma were invited to participate in this research project. Participants were asked a number of demographic and health questions, such as the country resided in, gender, current age and age diagnosed with scleroderma. Males were recruited with regard to the scleroderma prevalence rates for females and males. Similar to other connective tissue diseases, scleroderma has a greater incidence in females with predominance of 3-5:1, and up to 14:1 in some female populations (Chiffot et al., 2008). A similar proportion of males were recruited for this project. Approximately 6:1 (Females 105, Males 17).

2.3 Measures

2.3.1 Psychosocial Stress: Warmth and Safeness

Early Memories of Warmth and Safeness Scale. The EMWS scale is a 21 item self-report, 5 point Likert scale (e.g., 0 = no, never, 2 = yes sometimes and 4 = yes most of the time). Items include, "I felt safe and secure". "I felt a sense of belonging", "I felt cared for". This scale assesses emotional memories of an individual's childhood as a measure of preverbal or nonverbal experiences of stress. The EMWS scale focuses on recall of one's own emotional experiences while most other measures focus on recall of others behaviours; recall of positive emotions (or deficits) was found to be a better predictor of psychopathology and styles of self-criticism than recall of parental behaviour. The EMWS scale has good psychometric properties (high Cronbach's alpha, retest reliability, divergent and predictive validity). "Recall of parental behaviour and recall of positive emotional memories were highly related, but recall of positive emotional memories was a better predictor of psychopathology, styles of self-criticism/self-reassurance and disposition to experience positive affect, than recall of parental behaviour" (Richter et al., 2009).

2.3.2 Self-Compassion: Self-Compassion Scale

The Self Compassion Scale (Neff, 2003b) is a 26 item, self-report, emotion regulation measure that employs a 5 point Likert scale (e.g., 1 = almost never to 5 = almost always) that contains three components. Self-kindness/Self-judgment (being kind and understanding toward oneself rather than judgmental or critical); Common humanity/Isolation (viewing one's negative experiences as a normal part of the human condition rather than experiencing suffering in isolation); and Mindful acceptance/Over-identifying (being open to and accepting of one's situation rather than over-identifying with painful thoughts and feelings). Examples of items include, "When things are going badly for me, I see the difficulties as part of life that everyone goes through". "When I think about my inadequacies, it tends to make me feel more separate and cut off from the rest of the world". "I try to be loving towards myself, when I'm feeling emotional pain". "When I fail at something important to me, I become consumed by feelings of inadequacy". "When I feel inadequate in some way, I try to remind myself that feelings of inadequacy are shared by most people". This scale has good psychometric properties (construct, content, convergent and discriminant validity; test-retest reliability) and is a valid theoretical measure of self-compassion (Neff, 2003b). Self-compassion is thought to be an adaptive process that increases psychological resilience and well-being (Neff, 2003a).

2.3.3 Arousal: Hyper-Arousal Scale

The Hyper-arousal Scale (Hammond, Barsky, & Regestein, 2001) is a 26 item self-report 5 point likert scale that measures tendencies to introspect or think about feelings by responding intensely to unexpected stimuli and other behaviours that involve cortisol arousal. The scale contains items such as "Bright lights, crowds, noise or traffic bother me.", "I think a lot about feelings.", "My mind is always going.", "I take things personally.", "I am overly conscientious.". This scale has good psychometric properties (predictive and construct: Hammond et al., 2001). Participants recorded responses to 26 questions related to how they would respond in certain situations (e.g., 0 =

not at all true to 5 = completely true). Hyper-arousal scale scores correlate with several EEG measures of arousal including frequency spectral and evoked potential measures (Hammond et al., 2001). Hyper-arousal scores signify increased general cerebral responsiveness but decreased selective attention, indicating openness to stimuli and difficulty distinguishing between physiologically harmless and threatening sensations. This situation may create an information overload and result in difficulty adapting to recurring stimuli. A decrease in selective attention may create ambiguity as to the meaning attributed to the perceived experience resulting in the development of an adversity management system (Hammond et al., 2001).

2.3.4 Age of Onset

Participants were asked to indicate the age at which the onset of scleroderma was diagnosed. The question asked was at what age (indicating years and months) were you diagnosed with scleroderma.

3. Results

3.1 Overview of Analysis

Analysis was performed using SPSS version 20. Descriptive statistics for each of the continuous variables were obtained (please see Table 1 for Ms and SDs for the main variables in the study). Pearson's product-moment correlation coefficients were calculated for the scales (please see Table 1 for details), to establish the relationships between the dependent variable (hyper-arousal) and the independent variables [Early Memories of Warmth and Safeness (EMWS), Self-Compassion (SC) and age of scleroderma onset]. Multiple regression assumptions were explored as these analyses were considered appropriate to meet the initial hypotheses.

3.2 Statistical Analysis

Pearson's bivariate correlation coefficients demonstrated significant relationships between Hyper-arousal and Self-compassion ($r = -.43, p = .000$), Age diagnosed with scleroderma ($r = -.35, p = .002$) and EMWS ($r = -.31, p = .006$).

Table 1. Significant bivariate correlations and means and standard deviations for hyper-arousal and self-compassion age diagnosed with scleroderma and EMWS

	1	2	3	4	M	SD
1	1				73.64	15.93
2	-.43***	1			83.15	17.95
3	-.35**	.16	1		46.90	11.60
4	-.31**	.34**	-.02	1	70.03	23.94

* $p < .05$ ** $p \leq .01$ *** $p \leq .001$. 1 = Hyper-arousal, 2 = Self-Compassion, 3 = Age diagnosed 4 = EMWS

Multiple regression analysis demonstrated the variables significantly accounted for 54.9% (Adjusted $R^2 = 27.1\%$) of the variance, $F(3, 70) = 10.04, p = .000$, in Hyper-arousal. The regression coefficients demonstrated that Hyper-arousal was significantly predicted by Self-compassion ($\beta = -.30, p = .007, sr^2 = .09\%$), EMWS ($\beta = -.22, p = .046, sr^2 = .05\%$) and Age diagnosed with scleroderma ($\beta = -.30, p = .004, sr^2 = .09\%$).

Table 2. Summary of the multiple regression analysis for hyper-arousal—predictor variables self-compassion age diagnosed with scleroderma and EMWS

Variable	B	SEB	β
Hyper-arousal			
Age Diagnosed Scleroderma	-.42	.14	-.30**
Self-Compassion	-.27	.10	-.30**
EMWS	-.14	.07	-.22*
Total R2		.27***	

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

Results demonstrated that early life experiences low in warmth and safety and low Self-compassion contributed to elevated levels of Hyper-arousal. Receiving a diagnosis of scleroderma at a younger age was also related to elevated levels of Hyper-arousal. Results indicated that those Scleroderma participants who report fewer experiences of warmth and safety, fewer experiences of Self-compassion and an earlier onset of Scleroderma, experienced greater levels of Hyper-arousal than those with the opposite trends. Therefore greater Self-compassion predicted lower experiences of negative arousal. Results also demonstrated that individuals diagnosed with Scleroderma who reported greater experiences of EMWS also reported lower levels of arousal; and lower negative arousal was also related to a later diagnosis of Scleroderma.

Multiple regression analysis also demonstrated a link between self-compassion and early life experiences of nurturing and hyper-arousal. The variables significantly accounted for 47.8% (Adjusted $R^2 = 20.7\%$) of the variance, $F(2, 73) = 10.80, p = .000$, in Self-Compassion. The regression coefficients demonstrated that Self-Compassion was significantly predicted by Hyper-arousal ($\beta = -.35, p = .002, sr^2 = .12\%$), and EMWS ($\beta = -.23, p = .037, sr^2 = .05\%$).

Table 3. Summary of the multiple regression analysis for self-compassion—predictor variables EMWS and hyperarousal

Variable	<i>B</i>	<i>SEB</i>	β
Self-Compassion			
Hyper-arousal	-.40	.12	-.35**
EMWS	.17	.08	.23*
Total R2	.23***		

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

The results demonstrated that greater self-compassion is related to greater nurturing experiences in early life and lower hyper-arousal in individuals with scleroderma.

4. Discussion and Conclusions

The results show that negative early life experiences and the development of certain cognitions and emotions low in self-compassion are associated with increased arousal levels. Such levels impact on the immune system; and may partially contribute to the development or earlier onset of scleroderma. Results also demonstrated that negative early nurturing experience and elevated levels of negative arousal predicted lower self-compassion. Early life experiences that provide limited experiences of warmth and feelings associated with safety, may impact on an individual's subjective evaluation of stress/threat experiences, and the capacity to self-soothe and reduce negative arousal. These experiences may reflect a reliance on inadequate emotion regulation resources low in self-compassion that may impact on the level and duration of negative arousal or hyper-arousal, an individual may experience.

Hyper-arousal in the current study was related to the commencement of scleroderma and to lower self-compassion and may be a consequence of negative early rearing experiences lacking in adequate opportunities to feel safe and calm. Negative rearing experiences may impact on the development of self-compassionate emotion regulation strategies, reducing the capacity to be kind to oneself and therefore the capacity to self-soothe. This way of engaging with the self is likely to elevate negative physiological arousal and may, as a consequence, influence when scleroderma develops.

These findings for scleroderma development are consistent with related findings from other immune related physical and psychological health studies. For example in 2009, Pace and colleagues found that stress/arousal induced immune and behavioural responses may be moderated by compassion focused meditation (Pace et al., 2009). In 2013, Przewdziceki and colleagues found self-compassion to be a protective factor for psychological distress in women experiencing body changes resulting from breast cancer treatment (Przewdziceki et al., 2013). Positive outcomes have been found for individuals who engage in self-compassion in relation to stress/arousal and health. The findings in this study on scleroderma suggest that self-compassion may be an effective strategy for individuals with scleroderma as this group may generally be prone to elevated arousal (Freeman & Ianni, 1983) whatever the cause of this arousal. The utilization of self-compassion as a strategy to manage emotions and reduce the threat experience may help decrease arousal and return the individual's body to a state of equilibrium.

In conclusion, the absence of compassionate soothing and nurturing experiences and the presence of internalisation of early external threat (early life experiences low in warmth and safety) appear likely to impede the development of effective coping strategies. The development and utilization of self-compassion strategies could promote emotional and subsequently physiological calming responses that would be beneficial to individuals with scleroderma. The implications for clinical and counselling professionals are strong: helping clients or patients including children develop self-compassion strategies should assist them to manage more effectively their emotional and stress responses and may delay disease onset and development.

4.1 Health and Family and Financial Implications

Engaging in effective emotion regulation strategies such as self-compassion may not only provide personal benefits to the individual but also financial benefits to the health system. A delay in onset may also lessen the burden on families as children would be older and therefore the disease would be less likely to impact on the responsibilities associated with caring for a young family, managing a career and general life activities associated with these factors. Individuals predisposed to immune related diseases may have a better quality of life for a longer period of time (having the disease later in life) and would most likely require fewer visits for medical treatment, than if diagnosed with the disease at a younger age. The benefits of engaging in self-compassionate emotion regulation strategies would therefore provide advantages not only for the individual afflicted by the disease and their family but would also reduce the financial cost to the health system and the general community.

Improving understanding that some coping styles are not helpful in reducing physiological and psychologically stress and providing individuals with opportunities to become mindfully aware of difficult thoughts and memories without using over-identification techniques; while managing these experiences with mindful self-kindness, rather than self-judgment would almost certainly assist many individuals with scleroderma to live more relaxed, happier and healthier lives. Improving how we relate to ourselves, with self-compassion or self-criticism, can influence our own disease experience and our health and wellbeing.

4.2 Limitations

Reporting of early childhood experiences in the current study required the recollection of past events. Recounting these events may be impeded by individuals' ability to accurately remember how they felt at a very early time in their life.

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