Stressed, depressed, and rank obsessed:

Individual differences in Compassion and Neuroticism predispose toward rank-based depressive symptomatology

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Abstract

As social creatures we monitor our relative rank and/or status with others via social comparisons. Whilst research has identified perceptions of inferiority or ‘low rank’ relative to others is a robust predictor of depressive, anxious, and stress symptomatology, to date individual differences have been ignored. Here we provide empirical evidence for how divergence across personality traits interact with social rank variables to buffer or predispose toward depressive symptomatology. Across three independent samples (N = 595) we replicated a social rank model of mental health, and with our third sample (N = 200) we sought to investigate attenuating roles for neuroticism vs compassion with multiple moderated regression models. Neuroticism predicted greater levels of rank-associated depression, and compassion failed to function as a protective factor for rank-associated depression. However, a closer inspection of the original Big-5 factor-structure positions this scale as a measure of ‘interpersonal submissiveness’ or ‘conflict appeasement’ rather than genuine compassion. Whilst it is necessary to delineate the conditions where compassion is appropriate and able to lead to positive mental-health outcomes, we argue this cannot be addressed with the Big-5 measure of trait compassion. We call for future work to consider valid and reliable measures for compassion, such as the self-compassion scale, submissive compassion scale, and fears of compassion scale, to more fully address how compassion may protect against both rank-based comparisons and severity of depression.

Introduction

Given we exist within a hierarchical, social context and seek to form and maintain meaningful social relationships (von Hippel, 2018), it is crucial to understand how our attempts to navigate the complex social world may protect or predispose toward psychopathology. As inherently social creatures, we automatically interpret cues from others which helps to co-regulate our thought, affect and behaviour (Flagan & Beer, 2013; Molenberghs, Johnson, Henry, & Mattingley, 2016). It is increasingly apparent, however, that one expression of our responses to social cues, namely our capacity for unfavourable social comparisons in relation to others, have been robustly implicated in the development of depression and anxiety (La Greca & Harrison, 2005; Santini, Koyanagi, Tyrovolas, Mason, & Haro, 2015; Teo, Choi, & Valenstein, 2013; Wetherall, Robb, & O’Connor, 2019). When an individual engages in unfavourable social comparisons, subsequent feelings of perceived inferiority,

shame, and self-critical cognitions may ensue, factors associated with increased depressive and anxious symptomatology (Wyn, Wood, Maltby, Taylor, & Tai, 2014; Zuroff, Fournier, & Moskowitz, 2007). Furthermore, perceived inferiority, in particular, has been shown to predict higher levels of submissiveness and feelings of defeat and entrapment (Price, Sloman, Gardner, Gilbert, & Rohde, 1994), processes in themselves which have been implicated in the aetiology of depressive and anxious disorders (Siddaway, Taylor, Wood, & Schulz, 2015; Wetherall et al., 2019).

The ability to form social comparisons, however, are driven in part by an implicit and often unconscious capacity for gauging self and other's relative rank and status within the social hierarchy (Goessmann & Hemelrijk, 2000; Koelkebeck et al., 2011; Sapolsky, 2005; Sapolsky, 1991). This mechanism is conserved, neurobiologically, amongst both human and non-human social creatures, highlighting it's prevalence throughout the animal kingdom (Toronchuk & Ellis, 2013). Importantly, social mentality theory (Gilbert, 2017) has recognised how these implicit mechanisms may interact with mental health and manifest within social relationships. From this perspective, 'social mentalities' guide individuals to: (1) seek to create certain types of roles with others, (2) interpret the social signals and roles others are trying to enact with the self, and (3) regulate their affective and behavioral responses (e.g., if others are friendly then approach and act in a friendly way, if others are hostile then attack or avoid) (Gilbert, 2017). Accordingly, rank-based social mentalities (e.g., to see oneself as superior or inferior) are activated in threatening or competitive contexts, highlighting how implicit rank mechanisms may be recruited quickly and often unconsciously. Importantly, however, social mentality theory recognises that multiple motivational states may be active and exert their influence at a single timepoint, and that individuals have some choice as to which 'mentality' they might choose to engage with in a given scenario (Hermanto & Zuroff, 2016).

Competing motives are especially relevant within social mentality theory, in order to describe a complex interplay between competition versus care-based, compassionate mentalities (Bartke, Bosworth, Snower, & Chierchia, 2019; Bosworth, Singer, & Snower, 2016). Critically, if individuals judge themselves through a rank mentality they are vulnerable to depressive, anxious and stress symptomatology (Gilbert, 2017; Hermanto & Zuroff, 2016; Nesse, 2019; Wetherall et al., 2019), whereas if an individual evaluates themselves through a compassionate social mentality this can foster wellbeing and promote positive mental-health benefits (Kirby, Tellegen, & Steindl, 2017; Matos, Duarte, & Pinto-gouveia, 2017). Whilst insightful, however, the present literature has failed to recognize the interplay of individual differences which may moderate the expression of depression, anxiety, or stress within a social-rank framework. One approach would be to consider the application of personality factors, as markers of individual differences in temperament.

Personality factors

Hierarchical models of personality recognise that domains of personality (e.g., the Big Five) are composed of distinct sub-components or factors (Lee & Ashton, 2004; Soto & John, 2017). For example, Trait Agreeableness is evidenced to comprise two lower-level factors, Compassion and Politeness. Through a process of factor analysis, these two related - and yet distinct - lower-level components have been shown to load onto a common, "higher-order" factor (Agreeableness). And yet, definitions of this hierarchical factor structure are retained, whereby "The two (lower-level) aspects of Agreeableness appear to distinguish between compassionate emotional affiliation with others (e.g., Warmth, Sympathy, Tenderness) and a more reasoned (or at least cognitively influenced) consideration of and respect for others' needs and desires (e.g., Cooperation, Compliance, Straightforwardness)" (DeYoung, Quilty, & Peterson, 2007), the former being compassion and the latter politeness.

The importance of examining these lower-level aspects are numerous, particularly as differences across personality domains have been associated with diverse psychological outcomes. For

example, personality traits have been shown to predict outcomes across interpersonal relationships (Mihailovic & Lojic, 2003), job and life satisfaction (Judge, Bono, Locke, Tippie, & Judge, 2000; Okwaraji, Nduanya, Okorie, & Okechukwu, 2019), and in some cases longevity of life and wellbeing (Friedman & Kern, 2014; Lachmann et al., 2017). It is important to note differences in personality are not merely ‘skin-deep’; rather, personality differences have been associated with distinct neurobiological correlates (DeYoung et al., 2010, 2007a; Dubois, Adolphs, & States, 2017).

Present research

In this paper we were specifically interested in compassion and neuroticism, as assessed from the Big-5, as potential moderators within a social-rank model of depression. Whilst trait neuroticism’s role in predicting depressive symptoms is well established (Brown & Rosellini, 2011; Roelofs, Huibers, Peeters, & Arntz, 2008), trait compassion’s potential protective effect is less well known. However, whilst not linked with the Big-5 measure directly, cultivating compassion has been associated with positive mental-health benefits and wellbeing (Hildebrandt, Mccall, & Singer, 2017; Hope, Koestner, & Milyavskaya, 2014; Neff, Rude, & Kirkpatrick, 2007). Accordingly, we suggest trait compassion as assessed from the Big-5 may function as a potential protective buffer against depressive symptomology, as assessed within a social rank framework. In contrast, however, we suggest neuroticism will be a predisposing factor for depressive symptomology within a social rank framework.

Materials and Method

Participants

A total of 595 participants took part in the present study. Sample 1 comprised 246 participants (179 female), age range 17-65 years ($M = 31.81$, $SD = 11.94$). Sample 2 comprised 141 participants (104 female), age range 17-60 years ($M = 20.57$, $SD = 5.75$). Sample 3 comprised 204 participants (115 female), age range 18-35 years ($M = 24.5$, $SD = 2.34$). A relevant research ethics governing body approved the experimental protocol. Participation was voluntary and anonymous. Subjects provided informed, written or electronic consent. First and third samples were convenience university samples who participated for course credit, and the second sample were recruited from the Amazon Mechanical Turk Platform who received \$2.00 USD for survey completion.

Materials

Mental Health.

All measures utilized sum scores of psychological scales. Depression and anxiety symptoms were measured using the shortened version of the Depression Anxiety and Stress Scale (DASS-21; Lovibond & Lovibond, 1995). The DASS-21 includes 21 items of the original 42 item scale and is comprised of three seven-item subscales measuring depression, anxiety and stress. For the subscales of depression (e.g., “I felt that I had nothing to look forward to”), anxiety (e.g., “I felt scared without any good reason”), and stress (e.g., “I found it hard to wind down”), participants were asked to rate how much each statement reflected their experienced mood over the past week. Responses were recorded on a 4-point Likert scale ranging from 0 (*did not apply to me at all*) to 3 (*applied to me very much*). Total scores were derived by the sum of each subscale, with higher totals indicating a higher severity of symptoms. The DASS-21 has good reliability amongst both student and community samples, with alphas ranging from .81-.88 (Henry & Crawford, 2005; Osman et al., 2012). The subscales also have good convergent and discriminant validity with other validated measures of depression and anxiety, such as the Hospital Anxiety and Depression Scale and the Personal Disturbance Scale (Henry & Crawford, 2005). Sample 1 had good to excellent internal reliability for depression ($\alpha = .91$), anxiety

($\alpha = .85$), and stress ($\alpha = .87$), as well as sample 2, depression ($\alpha = .95$), anxiety ($\alpha = .93$), and stress ($\alpha = .92$), and sample 3, depression ($\alpha = .89$), anxiety ($\alpha = .77$), and stress ($\alpha = .82$).

Social comparison.

The Social Comparison Scale (Allan & Gilbert, 1995) is an 11-item scale that measures an individual's perception of their social rank, attractiveness and belonging relative to others. The scale consists of a series of bipolar constructs (e.g., "inferior-superior") for which participants are asked to rate how they see themselves in comparison to others on a 10-point scale. The scale is scored as a sum of the 11 items, with higher scores indicating more favourable perceptions of social rank. It has been shown to have good reliability amongst both clinical and student populations, with alphas ranging from .88-.96 and .90-.91, respectively (Allan & Gilbert, 1995). We found the scale to have excellent internal reliability (sample 1, $\alpha = .91$; sample 2, $\alpha = .95$; sample 3, $\alpha = .90$).

Submissive behaviour.

Participants' engagement in submissive behaviour was measured using the Submissive Behaviour Scale (Allan & Gilbert, 1997). The original scale (Gilbert & Allan, 1994) was developed based on research from Buss & Craik (1989) and later refined by Allan and Gilbert (1997). The 16-item scale assesses how individuals respond in social situations (e.g., "I do what is expected of me even when I don't want to"). Responses were recorded on a 5-point Likert scale ranging from 0 (*never*) to 4 (*always*), with higher total scores indicating higher frequencies of submissive behaviour. The scale has good internal reliability ($\alpha = .89$) and good test-retest reliability amongst a student sample, $r = .84$, $p < .001$ (Gilbert, Allan, & Trent, 1995). We found the scale to have excellent internal reliability (sample 1, $\alpha = .90$; sample 2, $\alpha = .94$; sample 3, $\alpha = .85$).

Big-5 Aspects Scale.

The BFAS is a 100-item measure of the lower-level aspects that incorporate each of the "Big Five" factors of personality. One such scale that we seek to utilize in the current work is the Big Five Aspect Scales (BFAS) measure (DeYoung, Quilty, & Peterson, 2007). The Big Five Aspect Scales (DeYoung, Quilty, & Peterson, 2007), considers personality to include both *interpersonal traits*, Agreeableness (comprised of politeness and compassion) and Extraversion (comprised of enthusiasm and assertiveness), and *intrapersonal traits*, which includes Neuroticism (comprised of volatility and withdrawal), conscientiousness (industriousness and orderliness), and openness/intellect (openness and intellect).

The BFAS yields two distinct, correlated aspects per each of the "Big Five" factors (DeYoung et al., 2007). Each item is rated on a 7-point Likert scale. The BFAS has demonstrated good overall internal consistency ($\alpha = .89$), and good construct validity (DeYoung et al., 2007). We found excellent internal consistency for interpersonal traits, which encompasses neuroticism, conscientiousness, openness/intellect alongside respective subscales, at $\alpha = .85$. Additionally, we identified good internal consistency for intrapersonal traits, which encompasses both agreeableness and extraversion alongside their corresponding subscales, at $\alpha = .74$. In this study we focused on the compassion aspect of the agreeableness scale, as well the factor of trait neuroticism, which exhibited good internal consistency at $\alpha = .87$ and $\alpha = .85$, respectively.

Results

Analysis plan for tests conducted across samples

Our original data comprised three independent samples, a 1.) student population, 2.) MTurk, and another 3.) student population. Descriptive statistics for each respective sample, as well as scale coefficients and correlations between variables, are reported in appendices. We combined samples 1

and 3 into an overarching student sample, and report descriptive statistics and correlations for this aggregate dataset also in appendices.

With both our combined student and MTurk samples, we sought to explore with Linear Regressions the relationship between social rank variables and depressive symptomatology, with the hypothesis that social comparison would predict less depression symptoms whereas submissive behaviour would predict greater depression symptoms. Next, with a subset of our combined student sample ($N = 204$), we were interested in testing how individual differences such as personality may moderate the relationship between social-rank variables on depressive symptomatology. Specifically, we were interested in the potential moderating effects of two individual differences in personality, trait compassion and trait withdrawal, for social comparison on depressive symptoms. Only personality measures were collected with our student subset, hence why we needed to focus on this subset in order to address our focal hypotheses with personality variables.

A figure of proposed relationships between our variables can be found below (Figure 1), and a depiction of our analysis plan is reported in Table 1. For our student subset which comprises personality data, we have conducted multiple linear regressions to address our focal research questions. However, given we are performing multiple contrasts on the same data, it is necessary to correct for inflation of family-wise error, in order to correct for an increased chance of committing a Type 1 error (Armstrong, 2014; McDonald, 2014). Therefore, in order to control the family-wise error rate, we will utilize the Bonferroni correction method, which is a robust and conservative solution to correct for an increased Type 1 error rate at the sacrifice of increased Type 2 error (Armstrong, 2014; McDonald, 2014). A parsimonious implementation of the Bonferroni correction requires the division of the standard critical p-value (0.05) by the number of tests conducted on the same data (Armstrong, 2014; McDonald, 2014). As we are conducting two tests which draw upon our student subset data, the critical value for each series of tests will be $0.05/2$, which equals a new critical p-value of 0.025. P-values for each test are also reported in Table 4. For each regression model, variables were mean-centered prior to analysis in order to avoid potential multicollinearity with the interaction term (Aiken & West, 1991).

INSERT FIGURE 1 HERE
INSERT TABLE 1 HERE

Model 1: Combined Student Sample

Our first regression model utilized our combined student sample to examine social rank variables predicting depression symptomatology. As can be seen in Table 2, at Block 1, sex and age together accounted for a significant proportion of variance in depressive symptomatology, $R^2 = .05$, $F(2, 245) = 6.746$, $p = .001$. Independently, it was revealed age but not sex significantly predicted depressive symptomatology, whilst accounting for less than 1% of the variance, $\beta = -1.27$, $p < .001$ and $\beta = -.52$, $p = .142$, *ns*, respectively. In Block 2, entry of submissive behaviour and social comparison resulted in a marked increase in variance of depression accounted for, $\Delta R^2 = 0.37$, $\Delta F(2, 241) = 78.30$, $p < .001$, and demonstrated a large effect size, $f^2 = 0.75$.

INSERT TABLE 2 HERE

Model 2: MTurk Sample

Our second regression model utilized our MTurk sample to examine social rank variables predicting depression symptomatology. As can be seen in Table 3, at Block 1, sex and age together accounted for a significant proportion of variance in depressive symptomatology, $R^2 = .64$, $F(2, 209) = 8.69$, $p = .001$. Independently, it was revealed age but not sex significantly predicted depressive

symptomology, whilst accounting for less than 1% of the variance, $\beta = -1.50, p = .001$ and $\beta = -1.03, p = .262, ns$, respectively. In Block 2, entry of submissive behaviour and social comparison resulted in a marked increase in variance of depression accounted for, $\Delta R^2 = 0.57, \Delta F(2, 207) = 167.30, p < .001$, and demonstrated a large effect size, $f^2 = 1.90$.

INSERT TABLE 3 HERE

Model 3: Student Subset

Our third regression model investigated trait compassion as a potential moderator between social comparison and depressive symptomatology (Table 4). Variables were entered as follows: control variables age and gender at block one, social comparison at block two, trait compassion at block three, and the interaction between social comparison and trait compassion at block 4. At the first step, age and sex did not account for any significant variance in the model, $\Delta R^2 = .003, \Delta F(2, 200) = .29, \beta = .03, p = .70$. At the second and third step, a main effect of social comparison but not trait compassion were revealed ($\Delta R^2 = .22, \Delta F(1, 199) = 55.51, \beta = -.47, t(201) = -7.50, p < .001$, and $\Delta R^2 = .01, \Delta F(1, 198) = 2.88, \beta = -.11, t(201) = -1.70, p = .10$, respectively). At the fourth step, however, the interaction between social comparison and trait compassion failed to reach the corrected p -FWE of 0.0250, $\Delta R^2 = .22, \Delta F(1, 197) = 4.41, \beta = -.13, t(199) = -2.10, p = .04, ns$ (Figure 2A).

INSERT TABLE 4 HERE

INSERT FIGURE 2 HERE

Model 4: Student Subset

The fourth regression model investigated how neuroticism may moderate social-comparison associated depressive symptomatology (Table 5). Variables were entered as follows: control variables age and gender entered at block one, social comparison at block two, neuroticism at block three, and the interaction term between social comparison and neuroticism at block four. At the first step, age and sex did not account for any significant variance in the model, $\Delta R^2 = .003, \Delta F(2, 199) = .28, \beta = .03, p = .75$. At the second and third step, a main effect of social comparison and neuroticism was revealed ($\Delta R^2 = .22, \Delta F(1, 198) = 55.57, \beta = -.47, t(201) = -7.50, p < .001$, and $\Delta R^2 = .114, \Delta F(1, 197) = 33.64, \beta = .37, t(201) = 5.80, p = .001$, respectively). At the fourth step, the interaction between social comparison and neuroticism failed to reach significance, $\Delta R^2 = .01, \Delta F(1, 196) = 2.02, \beta = -.37, t(201) = -1.42, p = .16$ (Figure 2B).

INSERT TABLE 5 HERE

Discussion

Within the present research, we sought to investigate how individual differences in personality may buffer or predispose toward depression symptomatology within a social rank framework. First, we report how social rank models are expressed differentially between a combined student and mturk sample. Second, we provide empirical evidence for two key personality traits, compassion verses neuroticism, as moderators of the relationship between social comparison and depressive symptomatology.

As anticipated, higher levels of neuroticism were associated with greater depressive symptoms, across both high and low levels of social comparison. These results replicate previous literature which highlighted greater levels of trait neuroticism were associated with concurrent increases in depressive symptoms (Brown & Rosellini, 2011; Roelofs et al., 2008). Trait compassion's effect, however, was more nuanced. High (but not low) scorers on compassion who were also higher on social comparison exhibited a reduction in depressive symptomatology. However, the difference between high vs low

levels of compassion were no-longer significant for those who were low in social comparison. Given compassion did not form a protective role for those who were low in rank, it is apparent that compassion failed to protect against depressive symptoms. This is against what the broader clinical literature suggests.

First, clinical evidence of training people in compassion has established a wide range of psychological (Desbordes et al., 2012; Gorno-Tempini et al., 2004; Jazaieri et al., 2014; Weng et al., 2013) and therapeutic benefits (Ferrari et al., 2019; Hofmann, Grossman, & Hinton, 2012; Kirby et al., 2017) including for people with severe mental health difficulties (Braehler, Gumley, Harper, Wallace, Norrie, & Gilbert, 2012), such as psychotic disorders (Braehler et al., 2012), eating disorders (Kelly & Carter, 2015), personality disorders (Lucre & Corten, 2013), depression (Collins, Gilligan, & Poz, 2018; Ferrari et al., 2019), and traumatic brain injury (Ashworth, F., Gracey, F., Gilbert, 2011). Furthermore, evidence from neuroscience has identified cultivation of compassion is associated with the capacity to tolerate personal distress, and the ability to extend prosocial and/or helping behaviour to a sufferer (Ashar, Andrews-Hanna, Wager, & Dimidjian, 2016; Kim, Cunningham, & Kirby, 2020; Weng et al., 2013).

It is clear, therefore, that the wealth of evidence supporting compassion's role in promoting positive mental health benefits is not in accord with our findings of the Big-5 measure of trait compassion. Therefore, we propose that trait-compassion from the Big-5, which was originally conceptualized to measure "compassionate emotional affiliation with others (e.g., Warmth, Sympathy, Tenderness)", may in fact be a measure of 'interpersonal submissiveness', rather than a temperament of genuine compassion. This appraisal is in accordance with the original conceptualization of the Big-5 factor-structure, as compassion was originally conceptualized as a low-order aspect of trait agreeableness, along with politeness. However, we would argue that this is a misrepresentation of compassion; indeed, when acting compassionately, one might be disagreeing with the status quo or inequality in one's social hierarchy. For example, standing up for injustice might mean disagreeing with current policy or current standards imposed by regulating bodies. The key point is compassion is contextual, and there are times when compassion requires assertiveness, and thus is not to be confused with agreeableness.

To expand upon this point, recent work has established those who were agreeable and conscientious were most likely to provide a shock to a participant in a similar paradigm to Milgram's obedience studies (Bègue et al., 2014; Milgram, 1963). This evidence alongside our results suggests that the measure of agreeableness, with the lower-order aspects of politeness and compassion, is more reflective of a 'conflict avoidance and appeasement scale', as opposed to a compassion scale. Importantly, compassion is a motive, which if genuine, is focused on the courage to be sensitive and engage with suffering in self and others, with a commitment to try to work out how to alleviate and prevent it (Catarino, Gilbert, McEwan, & Baião, 2014). Thus, a compassionately oriented response in this context would be to disagree with the experimenter and not deliver the shock, whereas an agreeable, conflict avoidant person, would and did (Bègue et al., 2014).

Importantly, compassion can blend with other motives, and individuals can use compassion for many kinds of purposes, for example to be liked or to appease others. Gilbert and Allen (1994) state, "*submissive behavior is typically linked to the perception of lower social rank and functions as an appeasing strategy that can involve the inhibition of one's own hostile feelings, lack of assertiveness, denial of personal wants and needs to appease others to avoid threat from them*". While submissiveness is associated with mental health problems, genuine compassion is not. Catarino, Gilbert, McEwan, & Baião (2014) developed a measure of submissive compassion, which aimed to assess for how compassionate actions can be enacted in order to be liked by highly ranked others and to avoid rejection. This scale includes items such as, "*I try to help people as much as I can so that they appreciate me*"

and “*I worry that if I am not caring enough, people will reject me*”. In a study involving 157 students (115 women, 42 men, age-range 17-52 years, $M = 31.35$; $SD = 9.65$), the authors found that submissive compassion was significant and moderately correlated with depression and anxiety, and self-image goals. Importantly, submissive compassion was not correlated with compassion for others or compassionate goals. We think our results demonstrate, in a sample of participants who are elevated on depressive symptomatology, who view themselves as lower ranked, potentially use compassion as a strategy to minimize further possible threat from others (e.g., rejection or being alone) and to increase the likelihood of being liked.

When examining the compassion items of the BFAS, the items include, “*Like to do things for others*” and “*Inquire about others’ well-being*”. Although these items can certainly be linked to a genuine motivation for compassion, they can also tap into the motivational system of rank. For example, to show an interest in and appear helpful to others (e.g., submissive or appeasing), particularly when in low-rank, is a commonly used safety behaviour for those who believe that people wouldn’t like them and they would be rejected if they were just “being themselves” (Gilbert, Mcewan, Matos, & Ravis, 2011). Moreover, if one is compassionately motivated one may inquire about others’ well-being, however, one can also inquire about others’ well-being from a rank/competitive motive. Indeed, knowing a dominant figure (e.g., boss, parent) is not well, might mean we need to keep our distance, be submissive and appease so we are not hurt. Furthermore, although these items assess a person’s interest in others, the items do not assess for wanting to engage or alleviate suffering. Indeed, suffering is at the core of compassion, thus items not contextualized in suffering might actually be measuring near constructs such as kindness or empathy (Gilbert, Basran, & Kirby, 2019). The negatively scored items which contribute to the compassion score on the BFAS includes, “*I don’t have a soft side*”, we are unsure on how this is linked specifically to compassion, as no definition of compassion includes “soft side”. Rather compassion is linked to the courage to engage with suffering, and will include a range of different emotions that are contextually dependent. Indeed, anger might be the emotion when trying to prevent the suffering being inflicted on a minority group. An individual with agoraphobia engaging in exposure therapy is doing so in order to reduce their suffering and to live a full-life. This is clearly compassionate, trying to reduce the suffering experienced with agoraphobia, however, one would not consider this compassionate act of exposure as being ‘soft’. Indeed, the individual is moving towards the very things they are frightened of, and that takes a great deal of courage. Therefore, these aspects of the compassion subscale may be influencing the findings obtained in our study.

Limitations

Whilst it may be considered a drawback that we did not explicitly recruit individuals diagnosed with depression, the fact that our dataset revealed a sample elevated in depression is striking. First, for a sample of 200 students it highlights how regardless of scores on the moderator (i.e., mean, high, or low), participants were scoring approximately within the severe range of DASS-21 (i.e., refer to Figures 1 and 2). Given this sample comprised higher-education students, our work can also be positioned amongst the broader context that college students are disproportionately stressed (Saleh, Camart, & Romo, 2017), depressed (Habihirwe et al., 2018), anxious (Eisenberg, Gollust, Golberstein, & Hefner, 2007), and rank obsessed (Perry, Kane, Bernesser, & Spicker, 1990) relative to the general population (Evans, Bira, Gastelum, Weiss, & Vanderford, 2018). We also wish to remark upon our finding within sample 2, which failed to replicate social comparison’s ability to relate to other variables as predicted within this sample (i.e., Table 2). This finding is against what the literature predicts. Furthermore, we were able to establish the predicted role for social comparison within both sample 1 and 3. Whilst we are unsure why this occurred within sample 2, we suspect it might be due to participant’s failing to understand how to score the measure appropriately.

For future work, we propose the adoption of multiple additional scales, such as the submissive compassion scale (Catarino et al., 2014), fears of compassion scales (Gilbert et al., 2011), and the self-compassion scale (Neff, 2003). This would allow us to assess to what degree a genuine cultivation of compassion may truly buffer against rank-based depressive symptomatology, and also assess the potential moderating role for increases in fears of compassion (i.e., to the self, or expressing, or responding to other's compassion). Indeed, a recent meta-analysis has established greater fears of compassion to the self and greater fears of receiving compassion from others predicts strong associations with mental health variables such as self-criticism, shame, and anxiety (Kirby, Day, & Sagar, 2019), so we would anticipate these dual variables would play a key role in predisposing toward depressive symptoms within the social rank framework.

Furthermore, we also wish to consider a transdiagnostic approach such as outlined in Norton and Paulus (2017) in their review of Anxiety's complex underpinnings. Here, the authors identify biological and psychological vulnerabilities which can lead to the development of anxiety disorders, which are maintained by threat-related cognitive biases such as increased threat perceptions. We believe an adoption of such an integrative approach would be of benefit to future work in social rank, compassion, and depression.

Conclusions

Humans are deeply social creatures. Accordingly, we exhibit a tendency to engage in high levels of social comparison, in order to determine our social rank, which can hold deleterious outcomes for our mental health and subsequent interactions with others. Our research has identified that specific individual differences in compassion and neuroticism appear to predispose individuals toward greater depressive symptoms within a social rank framework, except for those who are also higher in compassion who also rate highly on social comparison. Whilst we require future research with additional compassion measures in order to fully examine (genuine) compassion's relationship with rank and mental health variables, our results provide clear evidence that differences in personality are able to attenuate rank-based depressive symptoms. Practically, our research suggests that individual differences in temperament may warrant consideration from clinicians, as rank-based personality interactions may undergird presentations of ruminative social-processes such as rank, shame, or self-criticism. We look forward to future research which could investigate the degree to which personality traits are 'stable' or can be shifted within this social rank model to promote greater mental health and wellbeing, as well as research which will continue to assess compassion with valid and reliable measures, to identify further the protective effects of compassion for mental-health difficulties as expressed within a social rank framework.

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Figures and Tables

Figure 1. Hypothesised relationships (i.e., correlations) between social rank variables, individual differences, and depressive symptoms. Plus signs indicate a proposed positive relationship, whereas negative signs indicate a proposed negative relationship.

Figure 2. Conditional effects of **Social Comparison (IV)** on **Depression (DV)** as a function of **a.) Trait Compassion (M)** and **b.) Trait Neuroticism (M)** at ± 1 SD. **a.** For those high in trait compassion, high but not low social comparison buffers against depressive symptoms. Furthermore, those low in trait compassion also receive a buffer against depressive symptoms if also higher on social comparison. **b.** For those high in trait neuroticism, high but not low social comparison buffers against depressive symptoms. Furthermore, those low in trait neuroticism also receive a buffer against depressive symptoms if also higher on social comparison.

Table 1. Model specification for each sample, and presence of *p*-value correction if applicable.

<i>Model Number</i>	<i>Sample</i>	<i>N</i>	<i>Method</i>	<i>Critical p-value</i>	<i>Variables in Model</i>
1	Combined Student (Full Sample)	450	Linear Regression	Standard $p < .05$	Age (control variable) Sex (control variable) Social Comparison (IV) Submissive Behaviour (IV) Depression (DV)
2	MTurk (Full Sample)	214	Linear Regression	Standard $p < .05$	Age (control variable) Sex (control variable) Social Comparison (IV) Submissive Behaviour (IV) Depression (DV)
3	Student (Personality Measure Subset)	204	Moderated Regression	Bonferroni Corrected, $p < .0250$	Age (control variable) Sex (control variable) Social Comparison (IV) Trait Neuroticism (M) Interaction (IV * M) Depression (DV)
4	Student (Personality Measure Subset)	204	Moderated Regression	Bonferroni Corrected, $p < .0250$	Age (control variable) Sex (control variable) Social Comparison (IV) Trait Compassion (M) Interaction (IV * M) Depression (DV)

Table 2. Combined Student Sample: Social Rank predicts Depression

Predictor	β	95% CI	t	sr^2	R^2	$R^2(\text{adj.})$	ΔR^2
Block 1					.44	.19	.20
Sex	-.11	[-2.22 -.44]	-2.93	-.14			
Age	-.21	[-.11 -.04]	-4.40***	-.20			
Block 2					.69	.48	.28
Social Comparison	-.29	[-.14 -.08]	-1.08***	-.33			
Submissive Behaviour	.44	[.14 .22]	18.17***	.39			

Note. DV = Depressive Symptomatology, $N = 450$, *** $p < .01$

Table 3. MTurk Sample: Social Rank predicts Depression

Predictor	β	95% CI	t	sr^2	R^2	$R^2(\text{adj.})$	ΔR^2
Block 1					.08	.07	.08
Sex	-1.02	[2.83 .74]	-1.12	0.01			
Age	-.15	[-.23 -.07]	-3.74***	0.00			
Block 2					.65	.64	.57
Social Comparison	-.04	[-.04 -.01]	-1.08	-0.04			
Submissive Behaviour	.79	[.32 .40]	18.17***	0.75			

Note. DV = Depressive Symptomatology, $N = 141$, *** $p < .001$

Table 4. Personality Sample Subset, Compassion on Social Comparison and Depression

Predictor	β	95% CI	t	sr^2	R^2	$R^2(\text{adj.})$	ΔR^2
Block 1					.003	-.007	.003
Sex	.03	[-1.23 1.81]	.38	.03			
Age	-.05	[-.17 .08]	-.64	-.05			
Block 2					.22	.21	.22
Social Comparison	-.47	[-.19 -.11]	-7.52***	-.47			
Block 3					.23	.22	.01
Compassion	-.11	[-.23 .02]	-1.70	-.12			
Block 4					.25	.23	.02
Compassion X Social Comparison Interaction	-.13	[-.02 .01]	-2.10	-.15			

Note. DV = Depressive Symptomatology, $N = 450$, *** $p < .01$. ns corrected to p -FWE.

Table 5. Personality Sample Subset, Neuroticism on Social Comparison on Depression

Predictor	β	95% CI	t	sr^2	R^2	$R^2(\text{adj.})$	ΔR^2
Block 1					.003	-.007	.003
Sex	.03	[-1.22 1.83]	.40	.03			
Age	-.04	[-.17 .09]	-.63	-.05			
Block 2					.22	.21	.22
Social Comparison	-.47	[-.19 -.11]	-7.55***	-.46			
Block 3					.34	.32	.11
Neuroticism	.37	[.09 .18]	5.80***	.38			
Block 4					.34	.33	.007
Neuroticism X Social Comparison Interaction	-.37	[-.004 .001]	-1.42	-.10			

Note. DV = Depressive Symptomatology, $N = 450$, *** $p < .01$. ns corrected to p -FWE.

Appendices

Appendix 1. Scale reliability across samples.

	Social Comparison Scale	Submissive Behaviour Scale	DASS-21: Depression Subscale	DASS-21: Anxiety Subscale	DASS-21: Stress Subscale	Trait Neuroticism	Trait Neuroticism
Sample 1	0.913	0.903	0.913	0.854	0.866	-	-
Sample 2	0.955	0.943	0.946	0.931	0.922	-	-
Sample 3	0.9	0.851	0.896	0.765	0.818	0.847	0.869

STRESSED, DEPRESSED, AND RANK OBSESSED

Appendix 2. Descriptive statistics across samples.

		Age	Sex	Social Comparison	Submissive Behaviour	Depression	Anxiety	Stress	Compassion	Neuroticism
Sample 1	Valid	246	246	246	246	246	246	246	-	-
	Missing	0	0	0	0	0	0	0	-	-
	Mean	31.809	1.744	55.866	27.919	6.337	4.764	7.671	-	-
	Std. Deviation	11.939	0.456	15.385	11.459	5.688	4.877	5.046	-	-
	Minimum	17	1	11	2	0	0	0	-	-
	Maximum	65	3	92	64	21	21	21	-	-
Sample 2	Valid	214	214	213	212	214	214	214	-	-
	Missing	0	0	1	2	0	0	0	-	-
	Mean	17.393	1.388	72.207	46.274	15.271	14.533	15.893	-	-
	Std. Deviation	11.062	0.488	21.066	14.361	6.611	6.221	6.06	-	-
	Minimum	1	1	11	16	7	7	7	-	-
	Maximum	69	2	110	80	28	28	28	-	-
Sample 3	Valid	204	204	204	202	203	203	202	203	202
	Missing	0	0	0	2	1	1	2	1	2
	Mean	20.083	1.755	61.681	46.728	11.552	12.133	14.653	39.192	60.574
	Std. Deviation	5.133	0.442	15.361	9.827	4.807	4.142	4.674	4.907	13.384
	Minimum	17	1	11	23	7	7	7	26	27
	Maximum	55	3	107	72	28	27	28	46	95
Student Sample	Valid	450	450	450	450	450	450	449	-	-
	Missing	0	0	0	0	0	0	1	-	-
	Mean	26.493	1.749	58.502	36.447	8.68	8.082	10.804	-	-
	Std. Deviation	11.128	0.449	15.628	14.27	5.906	5.851	5.992	-	-
	Minimum	17	1	11	2	0	0	0	-	-
	Maximum	65	3	107	72	28	27	28	-	-

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Appendix 3. Sample 1 Pearson Correlations

		Age	Sex	Social Comparison	Submissive Behaviour	Depression	Anxiety	Stress
Age	Pearson's r	—						
	p-value	—						
Sex	Pearson's r	0.183 **	—					
	p-value	0.007	—					
Social Comparison	Pearson's r	0.041	-0.206 **	—				
	p-value	0.552	0.002	—				
Submissive Behaviour	Pearson's r	-0.228 ***	-0.148 *	0.180 **	—			
	p-value	< .001	0.032	0.009	—			
Depression	Pearson's r	-0.270 ***	-0.124	0.090	0.798 ***	—		
	p-value	< .001	0.070	0.190	< .001	—		
Anxiety	Pearson's r	-0.222 **	-0.116	0.272 ***	0.803 ***	0.857 ***	—	
	p-value	0.001	0.090	< .001	< .001	< .001	—	
Stress	Pearson's r	-0.253 ***	-0.067	0.088	0.803 ***	0.895 ***	0.871 ***	—
	p-value	< .001	0.331	0.200	< .001	< .001	< .001	—

* p < .05, ** p < .01, *** p < .001

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15 **Appendix 4. Sample 2 Pearson Correlations**

		Age	Sex	Social Comparison	Submissive Behaviour	Depression	Anxiety	Stress
Age	Pearson's r	—						
	p-value	—						
Sex	Pearson's r	0.183 **	—					
	p-value	0.007	—					
Social Comparison	Pearson's r	0.041	-0.206 **	—				
	p-value	0.552	0.002	—				
Submissive Behaviour	Pearson's r	-0.228 ***	-0.148 *	0.180 **	—			
	p-value	< .001	0.032	0.009	—			
Depression	Pearson's r	-0.270 ***	-0.124	0.090	0.798 ***	—		
	p-value	< .001	0.070	0.190	< .001	—		
Anxiety	Pearson's r	-0.222 **	-0.116	0.272 ***	0.803 ***	0.857 ***	—	
	p-value	0.001	0.090	< .001	< .001	< .001	—	
Stress	Pearson's r	-0.253 ***	-0.067	0.088	0.803 ***	0.895 ***	0.871 ***	—
	p-value	< .001	0.331	0.200	< .001	< .001	< .001	—

* p < .05, ** p < .01, *** p < .001

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Appendix 5. Sample 3 Pearson's Correlations

		Age	Sex	SocialComparison	SubmissiveBeh	Depression	Anxiety	Stress	Agreeablenes s	Compassion	Politeness	Neuroticism	Volatility	Withdrawal
Age	Pearson's r	—												
	p-value	—												
Sex	Pearson's r	-0.029	—											
	p-value	0.684	—											
SocialComparison	Pearson's r	-0.176 *	0.066	—										
	p-value	0.012	0.352	—										
SubmissiveBeh	Pearson's r	0.014	-0.094	-0.423 ***	—									
	p-value	0.845	0.182	< .001	—									
Depression	Pearson's r	0.026	0.031	-0.462 ***	0.402 ***	—								
	p-value	0.715	0.664	< .001	< .001	—								
Anxiety	Pearson's r	0.031	0.062	-0.331 ***	0.365 ***	0.672 ***	—							
	p-value	0.658	0.376	< .001	< .001	< .001	—							
Stress	Pearson's r	-0.060	0.033	-0.263 ***	0.366 ***	0.620 ***	0.655 ***	—						
	p-value	0.394	0.640	< .001	< .001	< .001	< .001	—						
Agreeableness	Pearson's r	0.052	-0.090	-0.143 *	0.086	-0.061	-0.026	-0.011	—					
	p-value	0.462	0.204	0.042	0.223	0.386	0.716	0.874	—					
Compassion	Pearson's r	0.033	0.015	-0.032	-0.095	-0.095	-0.042	0.020	0.800 ***	—				
	p-value	0.640	0.829	0.648	0.177	0.177	0.555	0.777	< .001	—				
Politeness	Pearson's r	0.053	-0.146 *	-0.190 **	0.203 **	-0.019	-0.006	-0.033	0.886 ***	0.432 ***	—			
	p-value	0.457	0.037	0.007	0.004	0.793	0.927	0.646	< .001	< .001	—			
Neuroticism	Pearson's r	-0.012	0.032	-0.385 ***	0.385 ***	0.471 ***	0.446 ***	0.593 ***	-0.096	-0.068	-0.092	—		
	p-value	0.865	0.654	< .001	< .001	< .001	< .001	< .001	0.175	0.337	0.194	—		
Volatility	Pearson's r	-0.015	0.039	-0.181 *	0.211 **	0.349 ***	0.320 ***	0.518 ***	-0.197 **	-0.115	-0.207 **	0.887 ***	—	
	p-value	0.827	0.577	0.010	0.003	< .001	< .001	< .001	0.005	0.102	0.003	< .001	—	
Withdrawal	Pearson's r	0.005	0.003	-0.445 ***	0.398 ***	0.406 ***	0.387 ***	0.425 ***	0.014	-0.012	0.030	0.805 ***	0.513 ***	—
	p-value	0.946	0.970	< .001	< .001	< .001	< .001	< .001	0.844	0.865	0.669	< .001	< .001	—

* p < .05, ** p < .01, *** p < .001

20 **Appendix 6. Combined Student Sample Pearson's Correlations**

		Age	Sex	Social Comparison	Submissive Behaviour	Depression	Anxiety	Stress
Age	Pearson's r	—						
	p-value	—						
Sex	Pearson's r	-0.016	—					
	p-value	0.733	—					
Social Comparison	Pearson's r	-0.029	-0.134 **	—				
	p-value	0.539	0.004	—				
Submissive Behaviour	Pearson's r	-0.460 ***	0.087	-0.267 ***	—			
	p-value	< .001	0.065	< .001	—			
Depression	Pearson's r	-0.352 ***	-0.020	-0.368 ***	0.636 ***	—		
	p-value	< .001	0.668	< .001	< .001	—		
Anxiety	Pearson's r	-0.441 ***	0.060	-0.180 ***	0.708 ***	0.733 ***	—	
	p-value	< .001	0.201	< .001	< .001	< .001	—	
Stress	Pearson's r	-0.376 ***	0.052	-0.192 ***	0.688 ***	0.729 ***	0.798 ***	—
	p-value	< .001	0.271	< .001	< .001	< .001	< .001	—

* p < .05, ** p < .01, *** p < .001