the british psychological society
promoting excellence in psychology

Psychology and Psychotherapy: Theory, Research and Practice (2021), 94, 188–211

www.wileyonlinelibrary.com

Stressed, depressed, and rank obsessed: Individual differences in compassion and neuroticism predispose towards rank-based depressive symptomatology

Jeffrey J. Kim[1,2]*, Ruby Gerrish[1,2], Paul Gilbert[1,2,3] and James N. Kirby[1,2]

[1]School of Psychology, The University of Queensland, Brisbane, Queensland, Australia
[2]Compassionate Mind Research Group, The University of Queensland, Brisbane, Queensland, Australia
[3]Centre for Compassion Research and Training, College of Health and Social Care Research Centre, University of Derby, UK

Objectives. 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 symptomology, to date individual differences have been ignored. We wish to provide empirical evidence to outline how differences across personality traits may interact with social rank variables to buffer or predispose towards depressive symptomology.

Methods. 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 versus compassion with multiple moderated regression models.

Results. 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.

Conclusions. 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.

*Correspondence should be addressed to Jeffrey J. Kim, School of Psychology, The University of Queensland, Level 3 Building 24a, St Lucia, 4072, Brisbane, QLD, Australia (email: Jeffrey.kim@uqconnect.edu.au).

DOI:10.1111/papt.12270

Practitioner Points

- Social rank mechanisms are robustly implicated in depression, anxiety, and stress.
- Clients who present as higher in neuroticism, inferiority, or submissiveness may be more prone towards rank-associated depression symptoms.
- Preliminary evidence suggests cultivation of genuine compassion can shift clients from a rank-focussed to a compassionate-focussed mentality, which aids mental health and fosters well-being.

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 towards 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 *social comparisons* in relation to others, has 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 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, 1991, 2005). This mechanism is conserved, neurobiologically, amongst both human and non-human social creatures, highlighting its 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 behavioural 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 recognizes that multiple motivational states may be active and exert their influence on individuals at a single time point and that individuals have some choice as to which 'mentality' they might choose to engage within 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 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 well-being 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 recognize that domains of personality (e.g., the Big-5) 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 well-being (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, 2007; Dubois & Adolphs, 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 well-being (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 four-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 to .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 (α = .91), anxiety (α = .85), and stress (α = .87), as well as sample 2, depression (α = .95), anxiety (α = .93), and stress (α = .92), and sample 3, depression (α = .89), anxiety (α = .77), and stress (α = .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 with 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 to .96 and .90–.91, respectively (Allan & Gilbert, 1995). We found the scale to have excellent internal reliability (sample 1, α = .91; sample 2, α = .95; sample 3, α = .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 and 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, $\alpha = .94$; and 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-5' factors of personality.

One such scale that we seek to utilize in the current work is the Big-5 Aspect Scales (BFAS) measure (Deyoung *et al*., 2007). The BFAS (DeYoung *et al*., 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-5' factors (DeYoung *et al.*, 2007). Each item is rated on a seven-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 A–F. We combined samples 1 and 3 into an overarching student sample and report descriptive statistics and correlations for this aggregate data set also in Appendices A–F.

With both our combined student and MTurk samples, we sought to explore with linear regressions the relationship between social rank variables and depressive symptomatology (DV), 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 DV. 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, analyzed and reported with our student subset.

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 (.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 .05/2, which equals a new critical p-value of .0250. p-values for each test are also reported in Table 4. For each regression model, variables were mean-centred prior to analysis in order to avoid potential multicollinearity with the interaction term (Aiken & West, 1991).

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 symptomology, $R^2 = .05, F(2, 245) = 6.746, p = .001$. Independently, it was revealed age but not sex significantly predicted depressive symptomology, whilst accounting for less than 1% of the variance, $\beta = -1.27, p < .001$ and $\beta = -.52, p = .142, ns$, respectively. In Block 2, entry of submissive behaviour and social comparison resulted in a marked

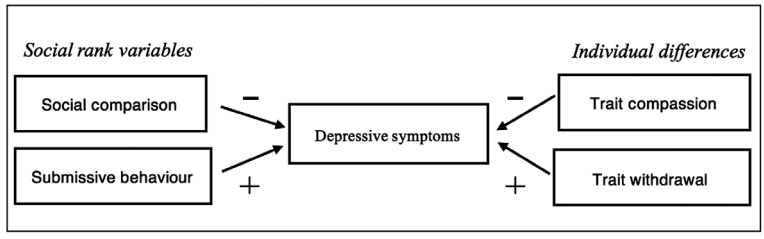

Figure 1. Hypothesized relationships (i.e., correlations) between social rank variables, individual differences, and depressive symptoms. Plus signs indicate a proposed positive relationship, whereas negative signs indicate a proposed negative relationship.

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

Model number	Sample	*N*	Method	Critical *p*-value	Variables in model
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)

DV = depressive symptomatology, IV = Independent Variable, M = Moderator.

Table 2. Combined student sample: social rank predicts depression

Predictor	β	95% CI	*t*	sr^2	R^2	R^2(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. $N = 450$. ***$p < .01$.

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, $f^2 = 0.75$.

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 symptomology,

Table 3. MTurk sample: social rank predicts depression

Predictor	β	95% CI	*t*	sr^2	R^2	R^2(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. $N = 141$. ***$p < .001$.

$R^2 = .64$, $F(2, 209) = 8.69$, $p = .001$. 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, $f^2 = 1.90$.

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 .0250, $\Delta R^2 = .22$, $\Delta F(1, 197) = 4.41$, $\beta = -.13$, $t(199) = -2.10$, $p = .04$, *ns* (Figure 2a).

Table 4. Personality sample subset, compassion on social comparison and depression

Predictor	β	95% CI	*t*	sr^2	R^2	R^2(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 × social comparison interaction	−.13	[−.02 .01]	−2.10	−.15			

Note. $N = 450$. *ns* corrected to *p*-FWE. ***$p < .01$.

Table 5. Personality sample subset, neuroticism on social comparison on depression

Predictor	β	95% CI	*t*	sr^2	R^2	R^2(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 × social comparison interaction	−.37	[−.004 .001]	−1.42	−.10			

Note. $N = 450$. *ns* corrected to *p*-FWE. ***$p < .01$.

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 $\Delta R^2 = .114$, $\Delta F(1,$

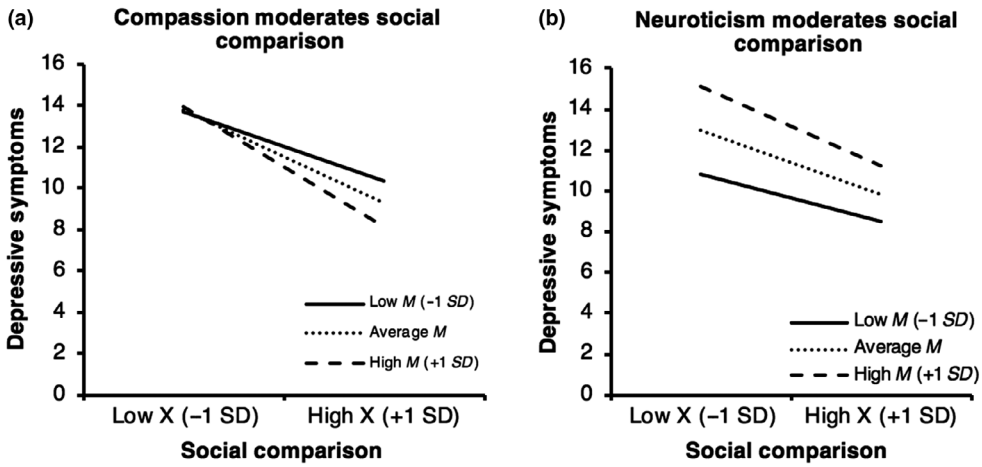

Figure 2. Conditional effects of Social Comparison (IV) on Depression (DV) as a function of (a) trait compassion (M) and (b) trait neuroticism (M) at ±1 *SD*. (a) For those high in trait compassion, high but not low social comparison buffers against depressive symptoms. Furthermore, those low in trait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

197) = 33.64, β = .37, $t(201) = 5.80$, $p = .001$, respectively). At the fourth step, the interaction between social comparison and neuroticism failed to reach significance, $\Delta R^2 = .01$, $\Delta F(1, 196) = 2.02$, β = −.37, $t(201) = -1.42$, $p = .16$ (Figure 2b).

Discussion

Within the present research, we sought to investigate how individual differences in personality may buffer or predispose towards depression symptomatology within a social rank model. 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 versus low levels of compassion was 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 those who were low in rank, it is apparent that, 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, Gracey, & 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, Cunnington, & 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 in compassion is contextual, and there are times when compassion

requires assertiveness and thus is not to be confused with agreeableness. It is perhaps humorous to ponder that a better measurement for compassion within the present study would have been to measure the BFAS aspect of assertiveness, under the extraversion factor!

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 Allan (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'. Whilst submissiveness is associated with mental health problems, genuine compassion is not. Catarino *et al*. (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, 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 perceived favourably.

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. Showing an interest in others and appearing helpful to others (e.g., submissive or appeasing), particularly when in low rank, are commonly used safety behaviours for those who believe that people would not like them and they would be rejected if they were just being themselves (Gilbert, Mcewan, Matos, & Rivis, 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 and 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, MacArthur, & Kirby, 2019). The negatively

scored items which contribute to the compassion score on the BFAS include 'I don't have a soft side', and 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

Furthermore, whilst it may be considered a drawback that we did not explicitly recruit individuals diagnosed with depression, the fact that our data set 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 remark upon our finding within sample 2, which failed to replicate social comparison's ability to relate to all other variables 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 samples 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 towards 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.

Another factor relevant to future compassion research is a call to delineate the boundary conditions within contemplative science and meditative traditions, with the explicit goal to map the potential for positive versus negative experience and outcomes from engaging and/or training in certain practices (Lindahl, Fisher, Cooper, Rosen, & Britton, 2017; Dam *et al.*, 2018a; Dam, *et al.*, 2018b). To position our current work within this debate, whilst our research investigating Big-5 compassion seemed to identify no negative outcomes for higher scorers on this trait, we did observe evidence that trait compassion fails to function how it is typically evidenced to in accord with the broader clinical literature. Whilst we argue this is due to conflating the measurement of compassion with submissiveness, future work would also need to be conducted in order to fully address such possibilities.

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 towards 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 well-being, 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.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Conflicts of interest

The authors have no competing interests to declare.

Author contribution

Jeffrey J. Kim, BPsySci(Hons): Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Validation, Visualization, Writing – original draft, Writing – review & editing; Ruby Gerrish: Conceptualization, Data curation, Formal analysis, Methodology, Project administration, Validation, Writing – original draft, Writing – review & editing; Paul Gilbert: Writing – review & editing; James N. Kirby: Conceptualization,

Investigation, Methodology, Supervision, Validation, Writing – original draft, Writing – review & editing.

Data availability statement

Data will be made available upon request.

References

Aiken, L. S., & West, S. G. (1991). *Multiple regression: Testing and interpreting interactions*. Thousand Oaks, CA: Sage Publications Inc.

Allan, S., & Gilbert, P. (1995). A social comparison scale: Psychometric properties and relationship to psychopathology. *Personality and Individual Differences*, *19*, 293–299. https://doi.org/10.1017/CBO9781107415324.004

Allan, S., & Gilbert, P. (1997). Submissive behaviour and psychopathology. *British Journal of Clinical Psychology*, *36*, 467–488. https://doi.org/10.1111/j.2044-8260.1997.tb01255.x

Armstrong, R. A. (2014). When to use the Bonferroni correction. *Ophthalmic & Physiological Optics: The Journal of the British College of Ophthalmic Opticians (Optometrists)*, *34*, 502–508. https://doi.org/10.1111/opo.12131

Ashar, Y. K., Andrews-Hanna, J., Wager, T. D., & Dimidjian, S. (2016). Towards a neurosciences of compassion: A brain systems-based model and research agenda. In M. E. P. S. Joshua, D. Greene, & India Morrison (Eds.), *Positive neuroscience* (1st ed., pp. 1–256). New York, NY: Oxford University Press.

Ashworth, F., Gracey, F., & Gilbert, P. (2011). Compassion focused therapy after traumatic brain injury: Theoretical foundations and a case illustration. *Brain Impairment*, *12*, 128–139. https://doi.org/10.1375/brim.12.2.128

Bartke, S., Bosworth, S. J., Snower, D. J., & Chierchia, G. (2019). Motives and comprehension in a public goods game with induced emotions. *Theory and Decision*, *86*, 205–238. https://doi.org/10.1007/s11238-018-9677-5

Bègue, L., Beauvois, J., Courbet, D., Oberlé, D., Lepage, J., & Duke, A. A. (2014). Personality predicts obedience in a Milgram paradigm. *Journal of Personality*, *83*, 299–306. https://doi.org/10.1111/jopy.12104

Bosworth, S. J., Singer, T., & Snower, D. J. (2016). Cooperation, motivation and social balance. *Journal of Economic Behavior and Organization*, *126*, 72–94. https://doi.org/10.1016/j.jebo.2015.12.005

Braehler, C., Gumley, A., Harper, J., Wallace, S., Norrie, J., & Gilbert, P. (2012). Exploring change processes in compassion focused therapy in psychosis: Results of a feasibility randomized controlled trial. *British Journal of Clinical Psychology*, *52*, 199–214. https://doi.org/10.1111/bjc.12009

Brown, T. A., & Rosellini, A. J. (2011). The direct and interactive effects of neuroticism and life stress on the severity and longitudinal course of depressive. *Journal of Abnormal Psychology*, *120*, 844–856. https://doi.org/10.1037/a0023035

Buss, D. M., & Craik, K. H. (1989). On the cross-cultural examination of acts and dispositions. *European Journal of Personality*, *3*(1), 19–30. https://doi.org/10.1002/per.2410030104

Catarino, F., Gilbert, P., McEwan, K., & Baião, R. (2014). Compassion motivations: Distinguishing submissive compassion from genuine compassion and its association with shame, submissive behavior, depression, anxiety and stress. *Journal of Social and Clinical Psychology*, *33*, 399–412. https://doi.org/10.1521/jscp.2014.33.5.399

Collins, R. N., Gilligan, L. J., & Poz, R. (2018). The evaluation of a compassion-focused therapy group for couples experiencing a dementia diagnosis. *Clinical Gerontologist*, *41*, 474–486. https://doi.org/10.1080/07317115.2017.1397830

Desbordes, G., Negi, L. T., Pace, T. W. W., Wallace, B. A., Raison, C. L., & Schwartz, E. L. (2012). Effects of mindful-attention and compassion meditation training on amygdala response to emotional stimuli in an ordinary, non-meditative state. *Frontiers in Human Neuroscience*, *6*, 1–15. https://doi.org/10.3389/fnhum.2012.00292

Deyoung, C. G., Hirsh, J. B., Shane, M. S., Papademetris, X., Rajeevan, N., & Jeremy, R. (2010). Testing predictions from personality neuroscience. Brain structure and the big five. *Psychological Science*, *21*, 820–8. https://doi.org/10.1177/0956797610370159

Deyoung, C. G., Quilty, L. C., & Peterson, J. B. (2007). Between facets and domains: 10 Aspects of the big five. *Journal of Personality and Social Psychology*, *93*, 880–896. https://doi.org/10.1037/0022-3514.93.5.880

Dubois, J., & Adolphs, R. (2017). Building a science of individual differences from fMRI. *Trends in Cognitive Sciences*, *20*, 425–443. https://doi.org/10.1016/j.tics.2016.03.014

Eisenberg, D., Gollust, S. E., Golberstein, E., & Hefner, J. L. (2007). Prevalence and correlates of depression. *American Journal of Orthopsychiatry*, *77*, 534–542. https://doi.org/10.1037/0002-9432.77.4.534

Evans, T. M., Bira, L., Gastelum, J. B., Weiss, L. T., & Vanderford, N. L. (2018). Evidence for a mental health crisis in graduate education. *Nature Biotechnology*, *36*, 282–284. https://doi.org/10.1038/nbt.4089

Ferrari, M., Hunt, C., Harrysunker, A., Abbott, M. J., Beath, A. P., & Einstein, D. A. (2019). Self-compassion interventions and psychosocial outcomes: A meta-analysis of RCTs. *Mindfulness*, *10*, 1455–1473. https://doi.org/10.1007/s12671-019-01134-6

Flagan, T., & Beer, J. S. (2013). Three ways in which midline regions contribute to self-evaluation. *Frontiers in Human Neuroscience*, *7*, 1–12. https://doi.org/10.3389/fnhum.2013.00450

Friedman, H., & Kern, M. (2014). Personality, well-being, and health. *Annual Review of Psychology*, *65*, 719–42. https://doi.org/10.1146/annurev-psych-010213-115123

Gilbert, P. (2017). A brief outline of the evolutionary approach for compassion focused therapy. *EC Psychology and Psychiatry*, *3*, 218–227.

Gilbert, P., & Allan, S. (1994). Assertiveness, submissive behaviour and social comparison. *British Journal of Clinical Psychology*, *33*, 295–306. https://doi.org/10.1111/j.2044-8260.1994.tb01125.x

Gilbert, P., Allan, S., & Trent, D. R. (1995). Involuntary subordination or dependency as key dimensions of depressive vulnerability? *Journal of Clinical Psychology*, *51*, 740–752.

Gilbert, P., Basran, J., MacArthur, M., & Kirby, J. N. (2019). Differences in the Semantics of Prosocial Words: an Exploration of Compassion and Kindness. *Mindfulness (N Y)*, *10*, 2259–2271. https://doi.org/10.1007/s12671-019-01191-x

Gilbert, P., Mcewan, K., Matos, M., & Rivis, A. (2011). Fears of compassion: Development of three self-report measures. *Psychol Psychother*, *84*, 239–255. https://doi.org/10.1348/147608310X526511

Goessmann, C., & Hemelrijk, C. (2000). The formation and maintenance of crayfish hierarchies: Behavioral and self-structuring properties. *Behavioral Ecology and Sociobiology*, *48*, 418–428. https://doi.org/10.1007/s002650000222

Gorno-Tempini, M. L., Rankin, K. P., Woolley, J. D., Rosen, H. J., Phengrasamy, L., & Miller, B. L. (2004). Cognitive and behavioral profile in a case of right anterior temporal lobe neurodegeneration. *Cortex; a Journal Devoted to the Study of the Nervous System and Behavior*, *40*, 631–644. https://doi.org/10.1016/S0010-9452(08)70159-X

Habihirwe, P., Porovecchio, S., Bramboiu, I., Ciobanu, E., Croituru, C., Cazacum, I., . . . Tavolacci, M. (2018). Depression, anxiety and stress among college students in three European countries. *European Journal of Public Health*, *28*, 317–318. https://doi.org/10.1093/eurpub/cky214.026

Henry, J. D., & Crawford, J. R. (2005). The short-form version of the Depression anxiety stress scales (DASS-21): Construct validity and normative data in a large non-clinical sample. *British Journal of Clinical Psychology*, *44*, 227–239. https://doi.org/10.1348/014466505X29657

Hermanto, N., & Zuroff, D. C. (2016). The social mentality theory of self-compassion and self-reassurance: The interactive effect of care- seeking and caregiving. *The Journal of Social Psychology*, *156*, 523–535. https://doi.org/10.1080/00224545.2015.1135779

Hildebrandt, L. K., Mccall, C., & Singer, T. (2017). Differential effects of attention-, compassion-, and socio-cognitively based mental practices on self-reports of mindfulness and compassion. *Mindfulness*, *8*, 1488–1512. https://doi.org/10.1007/s12671-017-0716-z

Hofmann, S. G., Grossman, P., & Hinton, D. E. (2012). Loving-kindness and compassion meditation: Potential for psychological interventions. *Clinical Psychology Review*, *31*, 1126–1132. https://doi.org/10.1016/j.cpr.2011.07.003.Loving-Kindness

Hope, N., Koestner, R., & Milyavskaya, M. (2014). The role of self-compassion in goal pursuit and well-being among university freshmen. *Self and Identity*, *13*, 579–593. https://doi.org/10.1080/15298868.2014.889032

Jazaieri, H., McGonigal, K., Jinpa, T., Doty, J. R., Gross, J. J., & Goldin, P. R. (2014). A randomized controlled trial of compassion cultivation training: Effects on mindfulness, affect, and emotion regulation. *Motivation and Emotion*, *38*(1), 23–35. https://doi.org/10.1007/s11031-013-9368-z

Judge, T. A., Bono, J. E., Locke, E. A., Tippie, H. B., & Judge, T. A. (2000). Personality and job satisfaction: The mediating role of job characteristics. *Journal of Applied Psychology*, *85*, 237–249. https://doi.org/10.1037/0021-9010.85.2.237

Kelly, A. C., & Carter, J. C. (2015). Self-compassion training for binge eating disorder: A pilot randomized controlled trial. *Psychology and Psychotherapy: Theory, Research and Practice*, *88*, 285–303. https://doi.org/10.1111/papt.12044

Kim, J., Cunnington, R., & Kirby, J. (2020). The neurophysiological basis of compassion: An fMRI meta-analysis of compassion and its related neural processes. *Neuroscience and Biobehavioral Reviews*, *108*, 112–123. https://doi.org/10.1016/j.neubiorev.2019.10.023

Kirby, J. N., Day, J., & Sagar, V. (2019). The 'Flow' of compassion: A meta-analysis of the fears of compassion scales and psychological functioning. *Clinical Psychology Review*, *70*, 26–39. https://doi.org/10.1016/j.cpr.2019.03.001

Kirby, J. N., Tellegen, C. L., & Steindl, S. R. (2017). A meta-analysis of compassion-based interventions: Current state of knowledge and future directions. *Behavior Therapy*, *48*, 778–792. https://doi.org/10.1016/j.beth.2017.06.003

Koelkebeck, K., Hirao, K., Kawada, R., Miyata, J., Saze, T., Ubukata, S., … Murai, T. (2011). Transcultural differences in brain activation patterns during theory of mind (ToM) task performance in Japanese and Caucasian participants. *Social Neuroscience*, *6*, 615–626. https://doi.org/10.1080/17470919.2011.620763

La Greca, A. M., & Harrison, H. M. (2005). Adolescent peer relations, friendships, and romantic relationships: Do they predict social anxiety and depression? *Journal of Clinical Child and Adolescent Psychology*, *34*(1), 49–61. https://doi.org/10.1207/s15374424jccp3401_5

Lachmann, B., Sariyska, R., Kannen, C., Błaszkiewicz, K., Trendafilov, B., Andone, I., … Montag, C. (2017). Contributing to overall life satisfaction: Personality traits versus life satisfaction variables revisited – is replication impossible? *Behavioral Sciences*, *8*(1), 1. https://doi.org/10.3390/bs8010001

Lee, K., & Ashton, M. C. (2004). Multivariate behavioral psychometric properties of the HEXACO personality inventory psychometric properties of the HEXACO personality inventory. *Multivariate Behavioral Research*, *39*, 329–358. https://doi.org/10.1207/s15327906mbr3902

Lindahl, J. R., Fisher, N. E., Cooper, D. J., Rosen, R. K., & Britton, W. B. (2017). The varieties of contemplative experience: A mixed-methods study of meditation-related challenges in Western Buddhists. *PLoS ONE*, *12*, e0176239. https://doi.org/10.1371/journal.pone.0176239

Lovibond, F., & Lovibond, S. H. (1995). The structure of negative emotional states: Scales (Dass) with the beck depression and Anxiety Inventories. *Behaviour Research and Therapy*, *33*, 335–343. https://doi.org/10.1016/0005-7967(94)00075-U

Lucre, K. M., & Corten, N. (2013). An exploration of group compassion-focused therapy for personality disorder. *Psychology and Psychotherapy: Theory, Research and Practice*, *86*, 387–400. https://doi.org/10.1111/j.2044-8341.2012.02068.x

Matos, M., Duarte, J., & Pinto-gouveia, J. (2017). The origins of fears of compassion: Shame and lack of safeness memories, fears of compassion and psychopathology. *The Journal of Psychology*, *151*, 804–819. https://doi.org/10.1080/00223980.2017.1393380

McDonald, J. H. (2014). *Handbook of biological statistics* (3rd ed.). Baltimore, MD: Sparky House Publishing.

Mihailovic, D., & Lojic, R. (2003). Interaction of personality and interpersonal relations. *Tourism Hospital Management*, *9*, 97–106.

Milgram, S. (1963). Behavioural study of obedience. *Journal of Abnormal and Social Psychology*, *67*, 371–378. https://doi.org/10.1108/BIJ-03-2016-0039

Molenberghs, P., Johnson, H., Henry, J. D., & Mattingley, J. B. (2016). Understanding the minds of others: A neuroimaging meta-analysis. *Neuroscience and Biobehavioral Reviews*, *65*, 276–291. https://doi.org/10.1016/j.neubiorev.2016.03.020

Neff, K. D. (2003). The development and validation of a scale to measure self-compassion. *Self and Identity*, *2*, 223–250. https://doi.org/10.1080/15298860390209035

Neff, K. D., Rude, S. S., & Kirkpatrick, K. L. (2007). An examination of self-compassion in relation to positive psychological functioning and personality traits. *Journal of Research in Personality*, *41*, 908–916. https://doi.org/10.1016/j.jrp.2006.08.002

Nesse, R. M. (2019). *Good reasons for bad feelings*. UK: Penguin Random House.

Norton, P. J., & Paulus, D. J. (2017). Transdiagnostic models of anxiety disorder: Theoretical and empirical underpinnings. *Clinical Psychology Review*, *56*, 122–137. https://doi.org/10.1016/j.cpr.2017.03.004

Okwaraji, F. E., Nduanya, C. U., Okorie, A., & Okechukwu, H. E. (2019). Personality traits, happiness and life satisfaction, in a sample of Nigerian adolescents. *The Journal of Medical Research*, *3*, 284–289. https://doi.org/10.31254/jmr.2017.3609

Osman, A., Wong, J. L., Bagge, C. L., Freedenthal, S., Gutierrez, P. M., & Lozano, G. (2012). The Depression Anxiety Stress Scales-21 (DASS-21): Further examination of dimensions, scale reliability, and correlates. *Journal of Clinical Psychology*, *68*, 1322–1338. https://doi.org/10.1002/jclp.21908

Perry, A. R., Kane, K. M., Bernesser, K. J., & Spicker, P. T. (1990). Type a behavior, competitive achievement-striving, and cheating among college students. *Psychological Reports*, *66*, 459–465. https://doi.org/10.2466/pr0.66.2.459-465

Price, J., Sloman, L., Gardner, R., Gilbert, P., & Rohde, P. (1994). The social competition hypothesis of depression. *British Journal of Psychiatry*, *164*, 309–315. https://doi.org/10.1192/bjp.164.3.309

Roelofs, J., Huibers, M., Peeters, F., & Arntz, A. (2008). Effects of neuroticism on depression and anxiety: Rumination as a possible mediator. *Personality and Individual Differences*, *44*, 576–586. https://doi.org/10.1016/j.paid.2007.09.019

Saleh, D., Camart, N., & Romo, L. (2017). Predictors of stress in college students. *Frontiers in Psychology*, *8*, 1–8. https://doi.org/10.3389/fpsyg.2017.00019

Santini, Z. I., Koyanagi, A., Tyrovolas, S., Mason, C., & Haro, J. M. (2015). The association between social relationships and depression: A systematic review. *Journal of Affective Disorders*, *175*, 53–65. https://doi.org/10.1016/j.jad.2014.12.049

Sapolsky, R. M. (1991). Review testicular function, social rank and personality among wild baboons. *Psychoneuroendocrinology*, *16*, 281–293. https://doi.org/10.1016/0306-4530(91)90015-L

Sapolsky, R. M. (2005). The influence of social hierarchy on primate health. *Science*, *308*, 648. https://doi.org/10.1126/science.1106477

Siddaway, A. P., Taylor, P. J., Wood, A. M., & Schulz, J. (2015). A meta-analysis of perceptions of defeat and entrapment in depression, anxiety problems, posttraumatic stress disorder, and suicidality. *Journal of Affective Disorders*, *184*, 149–159. https://doi.org/10.1016/j.jad.2015.05.046

Soto, C. J., & John, O. P. (2017). The next big five inventory (BFI-2). *Journal of Personality and Social Psychology*, *113*, 117–143. https://doi.org/10.2214/ajr.170.6.9609152

Teo, A. R., Choi, H. J., & Valenstein, M. (2013). Social relationships and depression: Ten-year follow-up from a nationally representative study. *PLoS ONE*, *8*, 1–8. https://doi.org/10.1371/journal.pone.0062396

Toronchuk, J. A., & Ellis, G. F. R. (2013). Affective neuronal selection: The nature of the primordial emotion systems. *Frontiers in Psychology*, *3*, 1–16. https://doi.org/10.3389/fpsyg.2012.00589

Van Dam, N. T., Van Vugt, M. K., Vago, D. R., Schmalzl, L., Saron, C. D., Olendzki, A., . . . Meyer, D. A. (2018a). Mind the hype: A critical evaluation and prescriptive agenda for research on mindfulness and meditation. *Perspectives on Psychological Science*, *13*(1), 36–61. https://doi.org/10.1177/1745691617709589

Van Dam, N. T., Van Vugt, M. K., Vago, D. R., Schmalzl, L., Saron, C. D., Olendzki, A., . . . Meyer, D. E. (2018b). Reiterated concerns and further challenges for mindfulness and meditation research: A reply to Davidson and Dahl. *Perspectives on Psychological Science*, *13*(1), 66–69. https://doi.org/10.1177/1745691617727529

von Hippel, W. (2018). *The social leap* (1st ed.). New York, NY: Harper Collins.

Weng, H. Y., Fox, A. S., Shackman, A. J., Stodola, D. E., Caldwell, J. Z. K., Olson, M. C., . . . Davidson, R. J. (2013). Compassion training alters altruism and neural responses to suffering. *Psychological Science*, *24*, 1171–1180. https://doi.org/10.1177/0956797612469537

Wetherall, K., Robb, K. A., & O'Connor, R. C. (2019). Social rank theory of depression: A systematic review of self-perceptions of social rank and their relationship with depressive symptoms and suicide risk. *Journal of Affective Disorders*, *246*, 300–319. https://doi.org/10.1016/j.jad.2018.12.045

Wyn, A., Wood, A. M., Maltby, J., Taylor, P. J., & Tai, S. (2014). The prospective role of defeat and entrapment in depression and anxiety: A 12-month longitudinal study. *Psychiatry Research*, *216*, 52–59. https://doi.org/10.1016/j.psychres.2014.01.037

Zuroff, D. C., Fournier, M. A., & Moskowitz, D. S. (2007). Depression, perceived inferiority, and interpersonal behavior: Evidence for the involuntary defeat strategy. *Journal of Social and Clinical Psychology*, *26*, 751–778. https://doi.org/10.1521/jscp.2007.26.7.751

Received 4 July 2019; revised version received 9 January 2020

Appendix A:

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

Appendix B:

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	–	–

Continued

Appendix B. (continued)

	Age	Sex	Social comparison	Submissive behaviour	Depression	Anxiety	Stress	Compassion	Neuroticism
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	–	–

Appendix C:

Sample 1 Pearson correlations

	Age	Sex	Social comparison	Submissive behaviour	Depression	Anxiety	Stress
Age							
Pearson's r	–						
p-value	–						
Sex							
Pearson's r	.183**	–					
p-value	.007	–					
Social comparison							
Pearson's r	.041	−.206*	–				
p-value	.552	.002	–				
Submissive behaviour							
Pearson's r	−.228**	−.148	.180*	–			
p-value	<.001	.032	.009	–			
Depression							
Pearson's r	−.270**	−.124	.090	.798**	–		
p-value	<.001	.070	.190	<.001	–		

Continued

Appendix C. (continued)

	Age	Sex	Social comparison	Submissive behaviour	Depression	Anxiety	Stress
Anxiety							
Pearson's r	−.222 *	−.116	.272**	.803**	.857 ***	–	
p-value	.001	.090	<.001	<.001	<.001	–	
Stress							
Pearson's r	−.253**	−.067	.088	.803**	.895 ***	.871 ***	–
p-value	<.001	.331	.200	<.001	<.001	<.001	–

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

Appendix D:

Sample 2 Pearson correlations

	Age	Sex	Social comparison	Submissive behaviour	Depression	Anxiety	Stress
Age							
Pearson's r	–						
p-value	–						
Sex							
Pearson's r	.183**	–					
p-value	.007	–					
Social comparison							
Pearson's r	.041	−.206**	–				
p-value	.552	.002	–				
Submissive behaviour							
Pearson's r	−.228***	−.148*	.180**	–			
p-value	<.001	.032	.009	–			

Continued

Appendix D. (continued)

	Age	Sex	Social comparison	Submissive behaviour	Depression	Anxiety	Stress
Depression							
Pearson's r	−.270***	−.124	.090	.798***	–		
p-value	<.001	.070	.190	<.001	–		
Anxiety							
Pearson's r	−.222**	−.116	.272***	.803***	.857***	–	
p-value	.001	.090	<.001	<.001	<.001	–	
Stress							
Pearson's r	−.253***	−.067	.088	.803***	.895***	.871 ***	–
p-value	<.001	.331	.200	<.001	<.001	<.001	–

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

Appendix E:

Sample 3 Pearson's correlations

Pearson correlations

	Age	Sex	Social comparison	Submissive behaviour	Depression	Anxiety	Stress	Agreeableness	Compassion	Politeness	Neuroticism	Volatility	Withdrawal
Age													
Pearson's r	–												
p-value	–												
Sex													
Pearson's r	−.029	–											
p-value	.684	–											
Social comparison													
Pearson's r	−.176*	.066	–										
p-value	.012	.352	–										

Continued

Appendix E. (continued)

Pearson correlations

	Age	Sex	Social comparison	Submissive behaviour	Depression	Anxiety	Stress	Agreeableness	Compassion	Politeness	Neuroticism	Volatility	Withdrawal
Submissive behaviour													
Pearson's r	.014	−.094	−.423***	–									
p-value	.845	.182	<.001	–									
Depression													
Pearson's r	.026	.031	−.462***	.402***	–								
p-value	.715	.664	<.001	<.001	–								
Anxiety													
Pearson's r	.031	.062	−.331***	.365***	.672***	–							
p-value	.658	.376	<.001	<.001	<.001	–							
Stress													
Pearson's r	−.060	.033	−.263***	.366***	.620***	.655***	–						
p-value	.394	.640	<.001	<.001	<.001	<.001	–						
Agreeableness													
=Pearson's r	.052	−.090	−.143*	.086	−.061	−.026	−.011	–					
p-value	.462	.204	.042	.223	.386	.716	.874	–					
Compassion													
Pearson's r	.033	.015	−.032	−.095	−.095	−.042	.020	.800	–				
p-value	.640	.829	.648	.177	.177	.555	.777	<.001	–				
Politeness													
Pearson's r	.053	−.146*	−.190**	.203**	−.019	−.006	−.033	.886***	.432***	–			
p-value	.457	.037	.007	.004	.793	.927	.646	<.001	<.001	–			
Neuroticism													
Pearson's r	−.012	.032	−.385***	.385***	.471***	.446***	.593***	−.096	−.068	−.092	–		
p-value	.865	.654	<.001	<.001	<.001	<.001	<.001	.175	.337	.194	–		
Volatility													
Pearson's r	−.015	.039	−.181*	.211**	.349***	.320***	.518***	−.197**	−.115	−.207**	.887***	–	
p-value	.827	.577	.010	.003	<.001	<.001	<.001	.005	.102	.003	<.001	–	
Withdrawal													
Pearson's r	.005	.003	−.445 ***	.398***	.406***	.387***	.425***	.014	−.012	.030	.805***	.513***	–
p-value	.946	.970	<.001	<.001	<.001	<.001	<.001	.844	.865	.669	<.001	<.001	–

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

Appendix F:

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	−.016	–					
p-value	.733	–					
Social comparison							
Pearson's r	−.029	−.134*	–				
p-value	.539	.004	–				
Submissive behaviour							
Pearson's r	−.460**	.087	−.267 ***	–			
p-value	<.001	.065	<.001	–			
Depression							
Pearson's r	−.352**	−.020	−.368***	.636 ***	–		
p-value	<.001	.668	<.001	<.001	–		
Anxiety							
Pearson's r	−.441**	.060	−.180***	.708 ***	.733***	–	
p-value	<.001	.201	<.001	<.001	<.001	–	
Stress							
Pearson's r	−.376**	.052	−.192	.688	.729***	.798 ***	–
p-value	<.001	0.271	<.001	<.001	<.001	<.001	–

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