

# UC San Diego

## UC San Diego Previously Published Works

### Title

Self-compassion, but not compassion toward others, is associated with better physical health: A cross-sectional study.

### Permalink

<https://escholarship.org/uc/item/80b9s28g>

### Authors

Ramsey, Arren

Govind, Tushara

Lam, Jeffrey

et al.

### Publication Date

2023-05-01

### DOI

10.1016/j.schres.2023.03.017

Peer reviewed



Published in final edited form as:

*Schizophr Res.* 2023 May ; 255: 17–23. doi:10.1016/j.schres.2023.03.017.

## Self-Compassion, But Not Compassion Toward Others, Is Associated with Better Physical Health: A Cross-Sectional Study

Arren Ramsey, BS<sup>a</sup>, Tushara Govind, BS<sup>a</sup>, Jeffrey A. Lam, BA<sup>b</sup>, Barton W. Palmer, PhD<sup>a,c,d</sup>, Dilip V. Jeste, MD<sup>a,c,d</sup>, Ellen E. Lee, MD<sup>a,c,e,\*</sup>

<sup>a</sup>Sam and Rose Stein Institute for Research on Aging, University of California San Diego, La Jolla, California, USA

<sup>b</sup>Warren Alpert Medical School of Brown University, Providence, Rhode Island, USA

<sup>c</sup>Department of Psychiatry, University of California San Diego, La Jolla, California, USA

<sup>d</sup>Department of Neurosciences, University of California San Diego, La Jolla, California, USA

<sup>e</sup>VA San Diego Healthcare System, San Diego, California, USA

### Abstract

Compassion is a modifiable construct that is associated with better physical health outcomes but, to our knowledge, has seldom been studied in people with schizophrenia (PwS) despite its applicability to counteract widespread depression in this community that might prevent positive health behaviors. We hypothesized that, compared to non-psychiatric comparison subjects (NCs), PwS would have lower compassion toward self (CTS), lower compassion toward others (CTO), and a positive association between compassion and health outcomes, such as physical wellbeing, comorbidities, and plasma hs-CRP. This cross-sectional study examined differences in physical health, CTS, and CTO in 189 PwS and 166 NCs. We used general linear models to analyze the relationship between compassion and health. As hypothesized, PwS had lower levels of CTS and CTO, worse physical well-being, more comorbidities, and higher levels of plasma hs-CRP than NCs. In the combined sample, higher CTS was significantly associated with better physical well-being and fewer comorbidities, while higher CTO was significantly associated with more comorbidities. In PwS alone, higher CTS was significantly associated with better physical well-being and lower levels of hs-CRP. CTS seemed to have a larger positive association with physical health than CTO, with depression acting as a potential mediator for CTS. Exploring effects of CTS interventions on physical health and health behaviors could be a promising next step.

### Twitter Promotion

More than compassion towards others, self-compassion is positively associated with physical health. As people with schizophrenia have lower self-compassion than non-psychiatric controls, improving it could enhance their quality of life.

\*Corresponding authors: Ellen E. Lee, MD, 9500 Gilman Drive, #0664, La Jolla, CA 92093-0664, Telephone: 858-246-2574, Fax: 858-534-5475, eel013@health.ucsd.edu.

Declarations of interest: none

## Keywords

physical well-being; comorbidities; hs-CRP; depression; health behavior

---

## 1. Introduction

Persons with schizophrenia (PwS) have a high burden of disability due to severe psychiatric symptoms such as positive symptoms (hallucinations and delusions) and negative symptoms (apathy, asociality, and blunted affect) (Andreasen, 1983, 1984). PwS also experience worse health outcomes and premature mortality. In fact, PwS have a life expectancy 15–20 years shorter than the general population. Lee et al. (2018a) reported an increase in this longevity gap during the recent decades. A large majority of deaths in PwS are due to physical illness, with one out of three of those deaths due to cardiovascular disease (Kritharides et al., 2017). PwS have worse biomarkers of metabolic function and higher levels of proinflammatory cytokines including high-sensitivity C-reactive protein (hs-CRP), which are key predictors of cardiovascular disease independent of age and smoking habits (Fond et al., 2018; Lee et al., 2018b). PwS are more likely to smoke, engage in sedentary behaviors, and have chronic treatment with antipsychotic medications, which also contribute to high cardiovascular risk and pro-inflammatory cytokine levels (Jeste et al., 2011). Depressive and anxiety symptoms are also highly prevalent in PwS (Achim et al., 2011; Li et al., 2020). Our group at Stein Institute for Research on Aging and other international groups have shown that aspects of positive psychiatry, like wisdom, resilience, and happiness, are beneficial toward the mental and physical health of PwS (Lee et al., 2018b; Palmer et al., 2014; Van Patten et al., 2019; Webster et al., 2014). Interventions aiming to improve aspects of positive psychiatry offer a useful way for PwS to combat their mental health challenges and improve physical health.

Empathy, the ability to understand others' emotions, is often described as having two necessary components. Cognitive empathy refers to the mental capacity to understand others' perspectives and emotions logically, whereas affective empathy refers to the ability to experience the emotional states of others (Beadle and de la Vega, 2019). Compassion moves a step beyond empathy in that it requires a stir to action. Two distinct types of compassion have been described in the literature: compassion toward others (CTO) and compassion toward self (CTS). CTO is commonly defined as the ability to identify suffering (akin to cognitive empathy), understand that all people experience suffering, empathize with the person suffering (akin to affective empathy), manage uncomfortable emotions, and make intentional actions to ease suffering (Strauss et al., 2016). On the other hand, CTS is defined as the ability to maintain mindfulness in adversity, recognize the universality of suffering, and approach mistakes with self-kindness (Neff, 2003).

CTO and CTS may be novel targets for future health interventions in PwS. Both forms of compassion are potentially modifiable, with multiple international meta-analyses demonstrating moderate effect sizes for compassion interventions in people with physical and mental illness as well as in community samples (Ferrari et al., 2019; Kirby et al., 2017; Lee et al., 2020).

Our group has shown that PwS report lower levels of wisdom, resilience, and happiness than the general population, although about a third of the samples fall within the normative range (Lee et al., 2018b; Palmer et al., 2014; Van Patten et al., 2019). Furthermore, PwS tend to have lower cognitive empathy due to impaired social cognitive function, compared to the general population (Bonfils et al., 2017; Green et al., 2015). As cognitive empathy is a necessary component of CTO, PwS would likely have lower CTO as well. CTS has not been studied extensively in PwS. However, one study of people experiencing auditory hallucinations found that higher levels of CTS were associated with decreased severity of voices (Dudley et al., 2018). Likewise, another study found that higher CTS was associated with fewer psychotic-like experiences in the general population (Scheunemann et al., 2019). As schizophrenia is a psychotic disorder, PwS would likely have lower baseline CTS than non-psychiatric populations.

International meta-analyses have also shown that higher levels of CTS have been linked to lower levels of psychopathology with a large effect size ( $r = -0.54$ ), CTS interventions in adults with mental health conditions can reduce depression and anxiety with medium effect sizes ( $g = 0.46$ ;  $g = 0.40$ , respectively), and CTO interventions in adults of various mental and physical health states can reduce depression, anxiety, and psychological distress with moderate effect sizes ( $d = 0.64$ ;  $d = 0.49$ ;  $d = 0.47$ , respectively) (Kirby et al., 2017; MacBeth and Gumley, 2012; Wilson et al., 2019). Numerous review papers and international meta-analyses have also linked anxiety and depression to higher inflammatory biomarkers and lower physical well-being in various populations (Felger, 2018; Köhler et al., 2017).

Moreover, both CTO and CTS been found to be linked to physical health in some but not all studies (Dunne et al., 2018; Friis et al., 2016; Heym et al., 2019; Hlabangana and Hearn, 2020; Pace et al., 2013). One intervention for adolescents in foster care found that, within the intervention group, participation in six weeks of Cognitively Based Compassion Training was associated with a reduction in CRP ( $n = 26$ ,  $r_s = -0.58$ ), although CTO and CTS were not specifically assessed (Pace et al., 2013). A cross-sectional study reported that higher levels of cognitive empathy, a component of CTO, were associated with lower levels of hs-CRP in the general population ( $n = 40$ ,  $r = 0.514$ ) (Heym et al., 2019). Moreover, another cross-sectional study of the general population showed that health promoting behaviors mediated the relationship between CTS and physical health (Dunne et al., 2018). In contrast, a study of partner caregivers showed that there was no correlation between CTS and physical health (Hlabangana and Hearn, 2020).

Existing interventions to improve health outcomes in persons with schizophrenia include the use of health coaches, peer-led health support, coordinated health coaching and mental healthcare, and residential community health education (Bartels et al., 2015; Cabassa et al., 2017; Daumit et al., 2020; Sommerfeld et al., 2022). However, due to the challenges of adopting consistent health-promoting behaviors and the physical comorbidity often associated with schizophrenia, new strategies to improve health in PwS are essential. Compassion's modifiable nature and association with physical health make it a compelling trait to study in relation to health among PwS, so this study aimed to clarify that relationship.

Based on our literature findings, we hypothesized that PwS would have lower CTS and lower CTO than non-psychiatric comparison subjects (NCs). Of greater consequence, we also hypothesized that higher CTS and CTO would be associated with better physical wellbeing, fewer comorbidities, and lower hs-CRP in both groups when adjusting for depression and anxiety and, specifically in PwS, when adjusting for positive symptoms, negative symptoms, depression, and anxiety. If confirmed this would point to potential value of examining CTO and CTS as part of standard clinical care.

## 2. Material and methods

### 2.1 Study Participants

Participants included 189 PwS and 166 NCs. The participants were part of the ongoing Schizophrenia and Aging study (Joseph et al., 2015; Lee et al., 2017). PwS were recruited from clinical and community settings throughout the greater San Diego area. NCs were recruited through community advertisements.

Eligibility criteria for the NC group included no current or previous diagnosis with a neuropsychiatric illness, verified by the Mini-International Neuropsychiatric Interview (MINI) (Sheehan et al., 1998). All participants in the PwS group had current diagnosis of schizophrenia/schizoaffective disorder, verified by the Structured Clinical Interview for the DSM-IV-TR (SCID) (First, 2002). Participants were excluded if they had: 1) other current DSM-IV-TR Axis I diagnoses; 2) alcohol or other non-tobacco substance abuse or dependence during the past three months; 3) diagnosis of dementia, intellectual disability disorder, or a major neurological disorder; 4) medical disability affecting the ability to complete study procedures.

This study was approved by the UC San Diego Human Research Protections Program. All participants gave informed written consent prior to involvement. Data were collected between June 2012 and December 2019 during the baseline visit of participants' involvement in the ongoing Schizophrenia and Aging study.

### 2.2 Sociodemographic and Clinical Measures

Trained study staff interviewed participants to obtain sociodemographic information, such as sex, age, education level, race/ethnicity, current marital status, current smoking habits, and, for PwS, duration of illness. Surveys were administered via in person via paper forms.

Standardized assessments were administered for depression (Patient Health Questionnaire-9), anxiety (Brief Symptom Inventory – Anxiety subscale) positive symptoms (Scale for the Assessment of Positive Symptoms), and negative symptoms (Scale for the Assessment of Negative Symptoms) (Andreasen, 1983, 1984; Derogatis and Melisaratos, 1983; Kroenke et al., 2001).

### 2.3 Compassion Measures

Compassion toward others (CTO) was measured using the Santa Clara Brief Compassion Scale, a shortened version of the 21-item Sprecher and Fehr's Compassionate Love Scale (Hwang et al., 2008; Sprecher and Fehr, 2005). The Santa Clara Brief Compassion Scale is

a self-reported measure with 5-items scored on a 7-point Likert scale where higher scores indicate higher levels of self-reported CTO.

Compassion toward self (CTS) was measured using the Neff Self-compassion Scale short form, a 12-item self-report scale derived from the original 26-item Neff Self-compassion Scale (Neff, 2003; Raes et al., 2011). Each item is scored on a 5-point Likert scale, with higher total scores indicating higher levels of self-reported CTS. Subscales include self-kindness, self-judgement, common humanity, isolation, mindfulness, and over-identification.

## 2.4 Health Measures

Physical well-being was measured using the physical component scale of the 36-item Short Form Health Survey (SF-36) (Ware and Sherbourne, 1992). The physical component scale is a self-assessment tool with subscales for physical functioning, activity limitations, bodily pain, and general health. Higher scores indicate better self-reported physical well-being.

Comorbidities were evaluated using the Cumulative Illness Rating Scale total score, which includes a 5-point Likert severity rating scale of 14 different organ systems (Linn et al., 1968). Higher scores indicate more severe and increased number of comorbidities.

To measure hs-CRP, blood was drawn from fasted participants. The blood samples were sent to the Altman Clinical and Translational Research Institute lab (La Jolla, CA) and analyzed using a commercially available (MSD, Rockville, MD) enzyme-linked immunosorbent assay (ELISA). The laboratory technician doing the analysis was blinded to the participant's diagnosis.

## 2.5 Statistical Analysis

Independent sample t-tests and Chi-squared tests were conducted to compare demographic variables, psychopathology, compassion levels, and health outcomes between NCs and PwS. Non-parametric testing was used to compare hs-CRP between NCs and PwS because it had a skewed distribution. Boxplots with scatterplot overlay were created to compare CTO and CTS between NCs and PwS.

In the total sample (NCs and PwS), general linear models were conducted for each health outcome (physical well-being, comorbidities, and hs-CRP) to evaluate its relationship to CTO and CTS. Model 1 adjusted for age, sex, and diagnostic group. Model 2 added depression. Model 3 added anxiety. Depression and anxiety could not be in the same models due to high multi-collinearity; the variance inflation factor (VIF) was greater than 2.

In just PwS, general linear models were conducted for each health outcome. Model 4 adjusted for age, sex, current smoking habits, and antipsychotic dosage. Model 5 added positive symptoms, Model 6 added negative symptoms, Model 7 added depression, and Model 8 added anxiety. The variables added in Models 5–8 could not be included in the same model due to high multi-collinearity (VIF > 2).

A p-value significance of Type I error  $\alpha = 0.05$  (two-tailed) was used for all analyses. Small-to-medium effect sizes (i.e., Cohen's  $d > 0.20$  or  $\eta_p^2 = 0.01$ ) were interpreted as meaningful.

### 3. Results

#### 3.1 Baseline Sample Characteristics

The PwS and NCs were comparable by sex and age (Table 1). The NC group had a greater mean number of years of education, a higher proportion of non-Latinx Caucasians, and a higher proportion of married people than the PwS group (Table 1). The PwS group smoked more and had higher levels of depressive and anxiety symptoms (Table 1).

CTO and CTS were normally distributed within both groups and had no major outliers. The PwS group had significantly lower levels of CTO with a small effect size and significantly lower levels of CTS with a large effect size (Table 1). Nonetheless, there was heterogeneity of these scores with about half of PwS falling within the normative range of CTO and about a third of PwS falling within the normative range of CTS (Figure 1). Physical well-being and physical comorbidities were worse and hs-CRP levels were higher in the PwS group (Table 1).

The correlation between CTO and CTS was not significant in either PwS ( $r = -0.02$ ) or NCs ( $r = 0.12$ ).

#### 3.2 Cross-Sectional Analysis

In the models of the entire sample (NCs and PwS) adjusting for variance related to age, diagnostic group, and sex, CTS, but not CTO, was significantly related to physical well-being such that higher CTS was associated with better physical well-being (Table 2a). This relationship remained significant when anxiety was added to the model ( $p = 0.004$ ,  $\eta_p^2 = 0.04$ ) but it was not statistically significant after depression was added to the model.

CTS and CTO were both significantly related to comorbidities such that higher CTS was associated with fewer comorbidities and higher CTO was associated with more comorbidities (Table 2b). Both relationships remained significant when anxiety was added to the model ( $p = 0.02$ ,  $\eta_p^2 = 0.03$ ;  $p = 0.04$ ,  $\eta_p^2 = 0.02$ , respectively). The CTO-comorbidities relationship also remained significant when depression was added to the model ( $p = 0.03$ ,  $\eta_p^2 = 0.03$ ), but the CTS-comorbidities relationship lost significance.

Neither CTS nor CTO was significantly related to hs-CRP in the base model or the models with added covariates (Table 2c).

In the models of just the PwS controlling for age, sex, current smoking habits, and antipsychotic dosage, CTS, but not CTO, was significantly related to physical well-being such that higher CTS was associated with better physical well-being (Table 3a). This relationship remained significant when positive symptoms ( $p < 0.001$ ,  $\eta_p^2 = 0.14$ ), negative symptoms ( $p < 0.001$ ,  $\eta_p^2 = 0.14$ ), or anxiety ( $p = 0.004$ ,  $\eta_p^2 = 0.08$ ) was added as a covariate. It lost significance when depression was added to the model.



Neither CTS nor CTO was significantly related to the number of comorbidities in the base model or the models with added covariates (Table 3b).

CTS, but not CTO, was significantly related to hs-CRP such that higher CTS was associated with lower hs-CRP levels (Table 3c). This relationship remained significant when positive symptoms ( $p = 0.04$ ,  $\eta_p^2 = 0.04$ ) or negative symptoms ( $p = 0.05$ ,  $\eta_p^2 = 0.04$ ) were added to the model. The relationship lost significance when anxiety or depression were added as covariates.

#### 4. Discussion

The findings partially supported our hypotheses. PwS had lower self-reported CTO and CTS. In general, self-reported levels of CTS were associated with health outcomes in the study sample. Depression and anxiety mediated the relationships between CTS and physical health. However, contrary to our hypotheses, higher levels of self-reported CTO were not associated with better health outcomes.

To our knowledge, this is one of the few studies directly examining both CTS and CTO in PwS. We observed lower CTS levels, CTO levels, and worse health outcomes in PwS than in NCs. These findings are consistent with previous studies reporting lower cognitive empathy in PwS (Bonfils et al., 2017; Green et al., 2015). They are also consistent with previous findings of worse physical health and higher inflammation in PwS (Fond et al., 2018; Lee et al., 2018b).

In support of our hypothesis, CTS was associated with better physical well-being and fewer comorbidities in the total group as well as better physical well-being and lower hs-CRP in PwS. These findings are consistent with prior compassion interventions in other populations: compassion training lowered CRP levels in adolescents and self-compassion training improved insulin resistance in people with diabetes (Friis et al., 2016; Pace et al., 2013). In contrast, Hlabangana and Hearn reported a lack of a relationship between CTS, measured with the Neff Self-Compassion scale, and the physical domain of quality of life (QoL), measured with the World Health Organization QoL scale; however, their sample was comprised of caregivers with high rates of depression and they did not control for depression (Hlabangana and Hearn, 2020).

Our findings show that the CTS-health relationship is affected by severity of depressive symptoms, highlighting that depression may mediate the CTS-health relationship. High CTS is associated with lower rates of depressive symptoms (MacBeth and Gumley, 2012). Moreover, depression is linked to worse physical health and increased inflammatory markers (Osimo et al., 2020; Stubbs et al., 2017).

It is possible that the positive psychological traits associated with CTS (self-kindness, common humanity, mindfulness) directly combat the negative psychological traits associated with depression (self-punishment, feelings of isolation, rumination) and improve physical health through promoting positive health behaviors. In support of this notion, Dunne et al. (2018) found that health behaviors mediate the relationship between self-compassion and physical health in the general population. Another study by Hochheiser et al. (2020) found



that higher levels of CTS are associated with better metacognition in PwS. Within a health context, better metacognition would lend itself to an increased tendency to perform health-related self-care. Additionally, shame is another negative trait highly prevalent in PwS, which itself is associated with increased dissociation (Gerlinger et al., 2013; McCarthy-Jones, 2017). The decreased connection one feels with their physical body in that state could lead to decreased tendency to perform health-related self-care. CTS interventions have already been shown to be effective in decreasing shame (Gilbert, 2018). Lifestyle interventions can be particularly challenging in PwS due to negative symptoms, smoking and sedentary behaviors, as well as medication side effects, so CTS interventions may be an aptly targeted method to improve health in PwS.

Contrary to our hypotheses, higher CTO scores were associated with a greater number of comorbidities, but not physical well-being or hs-CRP in the total sample. In the sample of PwS, CTO was not associated with any health markers that we examined. High CTO may be associated with worse physical health outcomes because of the Conservation of Resources (COR) Theory. According to COR Theory, when individuals experience a loss of resources, such as energy and care in this case, they seek to regain those resources or else they experience negative outcomes, such as worsening health (Hobfoll, 1989; Hong and Harrington, 2016). This explanation also aligns with Chang et al. (2010) who found that, in caregivers, higher burden of care was associated with worse physical health. The COR Theory could also extend to explain why CTO was not associated with health in PwS. Since PwS start with less resources than NCs due to their burden of disability, they are less able to take that initial step to give care and energy to others, as shown by their lower CTO. Ultimately, whether they have high or low CTO is of little consequence compared to their level of CTS, since they need to restore their own resources before they are able to give to others. This is supported by the fact that CTS has a much higher effect size than CTO when comparing the diagnostic groups as well as the fact that CTO and CTS are not significantly correlated with each other in PwS. However, this dynamic among CTO, CTS, and physical health may differ among populations without chronic illness. In the general population, improvement in CTO, rather than baseline CTO, was found to be associated with improved physical health over a five-year period, and higher cognitive empathy was found in foster care youth after completing six weeks of Cognitively Based Compassion Training was associated with lower CRP levels (Pace et al., 2013; Lee et al., 2021).

There are several limitations to our study. Due to the cross-sectional nature of the study, we could not infer causality from our findings nor track how changes in CTO or CTS could impact physical health. Additionally, since our study focused on three specific health measures, future work should more closely examine other metabolic, immune, and cognitive health outcomes. The measures based on self-report, including physical well-being, compassion, and psychopathology scales, could be biased by social desirability or other forms of systematic response biases such as an overall tendency to rate items in the negative direction or to use the extremes of score ranges rather than the middle range options (Althubaiti, 2016). The wide data collection period could introduce cohort effects as a possible confounder, i.e., health trends or access to healthcare in 2019 may have been different from 2012. Our PwS sample included stable outpatients with chronic illness, so these results might not extend to first-episode psychosis or PwS with active psychotic

symptoms. The accessibility of the study could have also impacted our sample selection. The PwS differed from NCs in education level, race/ethnicity, as well as prevalence of smoking. We did not have a comparison group of people with other psychiatric illnesses.

This study also had strengths. To our knowledge, this study was one of the few to analyze relationships between CTO, CTS, and health in PwS, while accounting for outside factors like age, sex, smoking habits, antipsychotics, and psychopathology. This is particularly important given that each of these factors are more common in PwS and are known to influence physical health (Achim et al., 2011; Jeste et al., 2011; Li et al., 2020). Additionally, the physical health outcomes in this study included both subjective (physical well-being) and objective (comorbidities and hs-CRP) health measures, providing different and valuable assessments of health (Graham et al., 2019).

#### 4.1 Conclusions

We found that CTS, mediated by depression, has a positive influence on health. Given this established positive connection between CTS and health in PwS and the fact that CTS interventions have demonstrated efficacy in improving CTS in the general population, CTS interventions to improve health and build positive health behaviors should be directly tested in PwS (Ferrari et al., 2019; Kirby et al., 2017; Lee et al., 2020). CTS interventions have the potential to be an important tool in the standard of care for PwS.

#### Acknowledgements

We thank the research staff and study participants for their valuable contributions.

#### Funding

This work was supported by the National Institute of Mental Health [K23MH119375-01 to EEL, R01MH094151-01 to DVJ; R01MH120201 to BWP]; the VA San Diego Healthcare System; and the Stein Institute for Research on Aging (Director: DVJ) at the University of California San Diego. The content of this paper is solely the responsibility of the authors and does not necessarily represent the official views of the NIH or the Department of Veteran Affairs. The Authors have declared that there are no conflicts of interest in relation to the subject of this study.

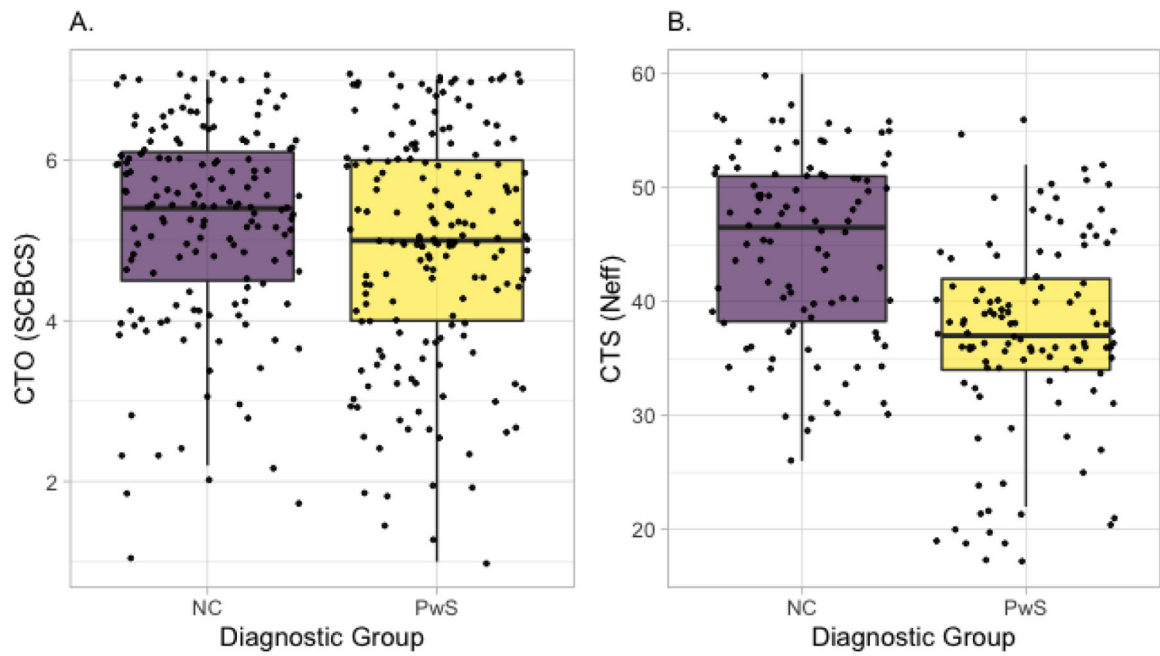
#### References

- Achim AM, Maziade M, Raymond E, Olivier D, Mérette C, Roy MA, 2011. How prevalent are anxiety disorders in schizophrenia? A meta-analysis and critical review on a significant association. *Schizophr Bull* 37 (4), 811–821. [PubMed: 19959704]
- Alhubaiti A, 2016. Information bias in health research: definition, pitfalls, and adjustment methods. *J Multidiscip Healthc* 9, 211–217. [PubMed: 27217764]
- Andreasen NC, 1983. Scale for the Assessment of Negative Symptoms (SANS). University of Iowa, Iowa City, IA.
- Andreasen NC, 1984. Scale for the Assessment of Positive Symptoms (SAPS). University of Iowa, Iowa City, IA.
- Bartels SJ, Pratt SI, Aschbrenner KA, Barre LK, Naslund JA, Wolfe R, Xie H, McHugo GJ, Jimenez DE, Jue K, Feldman J, Bird BL, 2015. Pragmatic replication trial of health promotion coaching for obesity in serious mental illness and maintenance of outcomes. *American Journal of Psychiatry*, 172(4), 344–352. [PubMed: 25827032]
- Beadle JN, de la Vega CE, 2019. Impact of Aging on Empathy: Review of Psychological and Neural Mechanisms. *Front Psychiatry* 10, 331. [PubMed: 31244684]

- Bonfils KA, Lysaker PH, Minor KS, Salyers MP, 2017. Empathy in schizophrenia: A meta-analysis of the Interpersonal Reactivity Index. *Psychiatry Res* 249, 293–303. [PubMed: 28142103]
- Cabassa LJ, Camacho D, Vélez-Grau CM, Stefancic A, 2017. Peer-based health interventions for people with serious mental illness: A systematic literature review. *Journal of Psychiatric Research*, 84, 80–89. [PubMed: 27701013]
- Chang H-Y, Chiou C-J, Chen N-S, 2010. Impact of mental health and caregiver burden on family caregivers' physical health. *Archives of Gerontology and Geriatrics* 50 (3), 267–271. [PubMed: 19443058]
- Daumit GL, Dalcin AT, Dickerson FB, Miller ER, Evins AE, Cather C, Jerome GJ, Young DR, Charleston JB, Gennusa JV 3rd, Goldsholl S, Cook C, Heller A, McGinty EE, Crum RM, Appel LJ, Wang NY, 2020. Effect of a comprehensive cardiovascular risk reduction intervention in persons with serious mental illness: A randomized clinical trial. *JAMA Network Open*, 3(6), e207247–e207247. [PubMed: 32530472]
- Derogatis LR, Melisaratos N, 1983. The Brief Symptom Inventory: an introductory report. *Psychol Med* 13 (3), 595–605. [PubMed: 6622612]
- Dudley J, Eames C, Mulligan J, Fisher N, 2018. Mindfulness of voices, self-compassion, and secure attachment in relation to the experience of hearing voices. *The British journal of clinical psychology* 57 (1), 1–17. [PubMed: 28801978]
- Dunne S, Sheffield D, Chilcot J, 2018. Brief report: Self-compassion, physical health and the mediating role of health-promoting behaviours. *J Health Psychol* 23 (7), 993–999. [PubMed: 27121978]
- Felger JC, 2018. Imaging the Role of Inflammation in Mood and Anxiety-related Disorders. *Current neuropharmacology* 16 (5), 533–558. [PubMed: 29173175]
- Ferrari M, Hunt C, Harrysunker A, Abbott MJ, Beath AP, Einstein DA, 2019. Self-compassion interventions and psychosocial outcomes: A meta-analysis of RCTs. *Mindfulness* 10 (8), 1455–1473.
- First M, Spitzer RL, Gibbon M, Williams JBW, November 2002. Structured Clinical Interview for DSM-IV-TR Axis I Disorders, Research Version, Patient Edition. (SCID-I/P). Biometrics Research, New York State Psychiatric Institute, New York.
- Fond G, Lancon C, Auquier P, Boyer L, 2018. C-Reactive Protein as a Peripheral Biomarker in Schizophrenia. An Updated Systematic Review. *Front Psychiatry* 9, 392. [PubMed: 30190688]
- Friis AM, Johnson MH, Cutfield RG, Consedine NS, 2016. Kindness Matters: A Randomized Controlled Trial of a Mindful Self-Compassion Intervention Improves Depression, Distress, and HbA1c Among Patients With Diabetes. *Diabetes Care* 39 (11), 1963–1971. [PubMed: 27335319]
- Gerlinger G, Hauser M, De Hert M, Lacluyse K, Wampers M, Correll CU, 2013. Personal stigma in schizophrenia spectrum disorders: a systematic review of prevalence rates, correlates, impact and interventions. *World Psychiatry*. 12(2):155–64. doi: 10.1002/wps.20040. [PubMed: 23737425]
- Gilbert P, 2009. Introducing compassion-focused therapy. *Advances in Psychiatric Treatment*, 15(3), 199–208. doi:10.1192/apt.bp.107.005264
- Graham SA, Jeste DV, Lee EE, Wu T-C, Tu X, Kim H-C, Depp CA, 2019. Associations Between Heart Rate Variability Measured With a Wrist-Worn Sensor and Older Adults' Physical Function: Observational Study. *JMIR mHealth and uHealth* 7 (10), e13757–e13757. [PubMed: 31647469]
- Green MF, Horan WP, Lee J, 2015. Social cognition in schizophrenia. *Nature reviews. Neuroscience* 16 (10), 620–631. [PubMed: 26373471]
- Heym N, Heasman BC, Hunter K, Blanco SR, Wang GY, Siegert R, Cleare A, Gibson GR, Kumari V, Sumich AL, 2019. The role of microbiota and inflammation in self-judgement and empathy: implications for understanding the brain-gut-microbiome axis in depression. *Psychopharmacology* 236 (5), 1459–1470. [PubMed: 30955108]
- Hlabangana V, Hearn JH, 2020. Depression in partner caregivers of people with neurological conditions; associations with self-compassion and quality of life. *Journal of Mental Health* 29 (2), 176–181. [PubMed: 31241383]
- Hobfoll SE, 1989. Conservation of resources. A new attempt at conceptualizing stress. *Am Psychol* 44 (3), 513–524. [PubMed: 2648906]

- Hochheiser J, Lundin NB, Lysaker PH, 2020. The Independent Relationships of Metacognition, Mindfulness, and Cognitive Insight to Self-Compassion in Schizophrenia. *The Journal of Nervous and Mental Disease* 208 (1).
- Hong M, Harrington D, 2016. The Effects of Caregiving Resources on Perceived Health among Caregivers. *Health Soc Work* 41 (3), 155–163. [PubMed: 29206951]
- Hwang JY, Plante T, Lackey K, 2008. The development of the Santa Clara Brief Compassion Scale: An abbreviation of Sprecher and Fehr's Compassionate Love Scale. *Pastoral Psychology* 56 (4), 421–428.
- Jeste DV, Wolkowitz OM, Palmer BW, 2011. Divergent trajectories of physical, cognitive, and psychosocial aging in schizophrenia. *Schizophrenia Bulletin* 37 (3), 451–455. [PubMed: 21505111]
- Joseph J, Depp C, Martin AS, Daly RE, Glorioso DK, Palmer BW, Jeste DV, 2015. Associations of high sensitivity C-reactive protein levels in schizophrenia and comparison groups. *Schizophr Res* 168 (1–2), 456–460. [PubMed: 26341579]
- Kirby JN, Tellegen CL, Steindl SR, 2017. A Meta-Analysis of Compassion-Based Interventions: Current State of Knowledge and Future Directions. *Behavior Therapy* 48 (6), 778–792. [PubMed: 29029675]
- Köhler CA, Freitas TH, Maes M, de Andrade NQ, Liu CS, Fernandes BS, Stubbs B, Solmi M, Veronese N, Herrmann N, Raison CL, Miller BJ, Lanctôt KL, Carvalho AF, 2017. Peripheral cytokine and chemokine alterations in depression: a meta-analysis of 82 studies. *Acta Psychiatrica Scandinavica* 135 (5), 373–387. [PubMed: 28122130]
- Kritharides L, Chow V, Lambert TJ, 2017. Cardiovascular disease in patients with schizophrenia. *Med J Aust* 206 (2), 91–95. [PubMed: 28152356]
- Kroenke K, Spitzer RL, Williams JB, 2001. The PHQ-9: validity of a brief depression severity measure. *J Gen Intern Med* 16 (9), 606–613. [PubMed: 11556941]
- Lee EE, Bangen KJ, Avanzino JA, Hou B, Ramsey M, Eglit G, Liu J, Tu XM, Paulus M, Jeste DV, 2020. Outcomes of Randomized Clinical Trials of Interventions to Enhance Social, Emotional, and Spiritual Components of Wisdom: A Systematic Review and Meta-analysis. *JAMA Psychiatry* 77 (9), 925–935. [PubMed: 32401284]
- Lee EE, Govind T, Ramsey M, Wu TC, Daly R, Liu J, Tu XM, Paulus MP, Thomas ML, Jeste DV, 2021. Compassion towards others and self-compassion predict mental and physical well-being: a 5-year longitudinal study of 1090 community-dwelling adults across the lifespan. *Translational Psychiatry* 11, 397. [PubMed: 34282145]
- Lee EE, Hong S, Martin AS, Eyler LT, Jeste DV, 2017. Inflammation in Schizophrenia: Cytokine Levels and Their Relationships to Demographic and Clinical Variables. *Am J Geriatr Psychiatry* 25 (1), 50–61. [PubMed: 27840055]
- Lee EE, Liu J, Tu X, Palmer BW, Eyler LT, Jeste DV, 2018a. A widening longevity gap between people with schizophrenia and general population: A literature review and call for action. *Schizophr Res* 196, 9–13. [PubMed: 28964652]
- Lee EE, Martin AS, Tu X, Palmer BW, Jeste DV, 2018b. Childhood Adversity and Schizophrenia: The Protective Role of Resilience in Mental and Physical Health and Metabolic Markers. *J Clin Psychiatry* 79 (3).
- Li W, Yang Y, An FR, Zhang L, Ungvari GS, Jackson T, Yuan Z, Xiang YT, 2020. Prevalence of comorbid depression in schizophrenia: A meta-analysis of observational studies. *J Affect Disord* 273, 524–531. [PubMed: 32560949]
- Linn BS, Linn MW, Gurel L, 1968. Cumulative illness rating scale. *J Am Geriatr Soc* 16 (5), 622–626. [PubMed: 5646906]
- MacBeth A, Gumley A, 2012. Exploring compassion: a meta-analysis of the association between self-compassion and psychopathology. *Clin Psychol Rev* 32 (6), 545–552. [PubMed: 22796446]
- McCarthy-Jones S, 2017. Is Shame Hallucinogenic? *Front Psychol*. 8:1310. doi: 10.3389/fpsyg.2017.01310. [PubMed: 28824494]
- Neff KD, 2003. The development and validation of a scale to measure self-compassion. *Self and Identity* 2 (3), 223–250.

- Osimo EF, Pillinger T, Rodriguez IM, Khandaker GM, Pariante CM, Howes OD, 2020. Inflammatory markers in depression: A meta-analysis of mean differences and variability in 5,166 patients and 5,083 controls. *Brain, Behavior, and Immunity* 87, 901–909. [PubMed: 32113908]
- Pace TWW, Negi LT, Dodson-Lavelle B, Ozawa-de Silva B, Reddy SD, Cole SP, Danese A, Craighead LW, Raison CL, 2013. Engagement with Cognitively-Based Compassion Training is associated with reduced salivary C-reactive protein from before to after training in foster care program adolescents. *Psychoneuroendocrinology* 38 (2), 294–299. [PubMed: 22762896]
- Palmer BW, Martin AS, Depp CA, Glorioso DK, Jeste DV, 2014. Wellness within illness: happiness in schizophrenia. *Schizophrenia Research* 159 (1), 151–156. [PubMed: 25153363]
- Raes F, Pommier E, Neff KD, Van Gucht D, 2011. Construction and factorial validation of a short form of the Self-Compassion Scale. *Clinical Psychology & Psychotherapy* 18 (3), 250–255.
- Scheunemann J, Schlier B, Ascone L, Lincoln TM, 2019. The link between self-compassion and psychotic-like experiences: A matter of distress? *Psychol Psychother* 92 (4), 523–538. [PubMed: 30091175]
- Sheehan DV, Lecrubier Y, Sheehan KH, Amorim P, Janavs J, Weiller E, Hergueta T, Baker R, Dunbar GC, 1998. The Mini-International Neuropsychiatric Interview (M.I.N.I.): the development and validation of a structured diagnostic psychiatric interview for DSM-IV and ICD-10. *J Clin Psychiatry* 59 Suppl 20, 22–33;quiz 34–57.
- Sommerfeld DH, Brunner AM, Glorioso D, Lee EE, Ibarra C, Zunshine E, Daly RE, Zoumas C, Jeste DV, 2022. Improving Healthy Living in Residential Care Facilities: Feasibility, Acceptability, and Appropriateness of Implementing a Multicomponent Intervention for Diabetes Risk Reduction in Adults with Serious Mental Illnesses. *Adm Policy Ment Health* 49, 646–657, 10.1007/s10488-022-01189-z [PubMed: 35113264]
- Sprecher S, Fehr B, 2005. Compassionate love for close others and humanity. *Journal of Social and Personal Relationships* 22 (5), 629–651.
- Strauss C, Lever Taylor B, Gu J, Kuyken W, Baer R, Jones F, Cavanagh K, 2016. What is compassion and how can we measure it? A review of definitions and measures. *Clinical Psychology Review* 47, 15–27. [PubMed: 27267346]
- Stubbs B, Vancampfort D, Veronese N, Kahl K, Mitchell A, Lin P, Tseng P, Mugisha J, Solmi M, Carvalho A, 2017. Depression and physical health multimorbidity: primary data and country-wide meta-analysis of population data from 190 593 people across 43 low-and middle-income countries. *Psychological Medicine* 47 (12), 2107. [PubMed: 28374652]
- Van Patten R, Lee EE, Daly R, Twamley E, Tu XM, Jeste DV, 2019. Assessment of 3-dimensional wisdom in schizophrenia: Associations with neuropsychological functions and physical and mental health. *Schizophr Res* 208, 360–369. [PubMed: 30773419]
- Ware JE Jr., Sherbourne CD, 1992. The MOS 36-item short-form health survey (SF-36). I. Conceptual framework and item selection. *Med Care* 30 (6), 473–483. [PubMed: 1593914]
- Webster JD, Bohlmeijer ET, Westerhof GJ, 2014. Time to flourish: the relationship of temporal perspective to well-being and wisdom across adulthood. *Aging & Mental Health* 18, 8.
- Wilson AC, Mackintosh K, Power K, Chan SWY, 2019. Effectiveness of Self-Compassion Related Therapies: a Systematic Review and Meta-analysis. *Mindfulness* 10 (6), 979–995.



**Figure 1:**  
Boxplots Comparison with Scatterplot Overlay of Compassion Toward Others (CTO) and  
Compassion Toward Self (CTS) between Non-psychiatric Comparison Subjects (NC) and  
People with Schizophrenia (PwS)  
Neff = Neff Self-Compassion Scale short form, SCBCS = Santa Clara Brief Compassion  
Scale

Demographic and Clinical Comparison of Non-Psychiatric Comparison Subjects (NCs) and People with Schizophrenia (PwS)

Table 1:

	NCs			PwS			t or X <sup>2</sup>	df	p	Cohen's d
	N	Mean or %	SD	N	Mean or %	SD				
<b>Sociodemographic</b>										
Sex (% female)	90	54		92	49		1.09	1	0.30	
Age at Visit (years)	166	47.4	11.6	189	48.1	10.4	-0.63	353	0.53	-0.07
Education (%)							72.74	2	<0.001	
High School & Below	22	13		103	55					-3.18
Some College to Bachelor	120	72		82	43					
Post-Graduate Degree	24	15		4	2					
Duration of Illness (years)				176	25.6	11.4				
Race (% Caucasian)	99	60		88	47		6.06	1	0.01	
Marital Status (% married)	61	37		11	6		50.91	1	<0.001	
Smoking (packs/day)	158	0.02	0.08	178	0.4	0.5	-10.27	188	<0.001	-1.09
Antipsychotics (daily dose)	166	0.002	0.03	189	1.87	1.71	-15.02	188	<0.001	-1.54
<b>Psychopathology</b>										
Depression (PHQ9)	154	2.1	2.9	170	7.6	6.7	-9.73	237	<0.001	-1.06
Anxiety (BSIA)	155	1.4	2.4	175	7.2	6.5	-11.06	223	<0.001	-1.19
Positive Symptoms (SAPS)				187	6.5	4.2				
Negative Symptoms (SANS)				187	7.1	4.3				
<b>Compassion</b>										
CTS (Neff)	98	44.7	8.2	112	37.0	8.6	6.62	208	<0.001	0.92
CTO (SCBCS)	155	5.2	1.2	174	4.9	1.4	1.95	327	0.05	0.22
<b>Physical Health</b>										
Physical Well-being (SF-36)	155	51.6	9.0	175	43.6	10.0	7.62	328	<0.001	0.84
Comorbidities (CIRS)	161	2.9	3.3	187	6.6	4.5	-8.53	346	<0.001	-0.93
hs-CRP	156	2.1	3.4	174	5.2	8.6	6.44 <sup>a</sup>		<0.001	

<sup>a</sup>Mann-Whitney U standardized test statistic

PHQ9 = Patient Health Questionnaire-9, BSIA = Brief Symptom Inventory – Anxiety Subscale, SAPS = Scale for the Assessment of Positive Symptoms, SANS = Scale for the Assessment of Negative Symptoms, Neff = Neff Self-Compassion Scale short form, SCBCS = Santa Clara Brief Compassion Scale, SF-36 = Physical Component Scale of the 36-Item Short Form Health Survey, CIRS = Cumulative Illness Rating Scale, hs-CRP = high-sensitivity C-reactive protein



**Table 2:**

General Linear Model with Both Groups (Non-psychiatric Comparison Subjects and People with Schizophrenia) with Physical Health Outcomes as Dependent Variables

**A.**

	Physical Well-being (SF-36)					
	B	SE	F	df	p	$\eta_p^2$
Age at Visit (years)	-0.10	0.06	2.97	1	0.09	0.01
Diagnostic Group (NC) <sup>a</sup>	5.67	1.40	16.47	1	<0.001	0.08
Sex (female) <sup>b</sup>	-0.69	1.31	0.28	1	0.60	0.001
CTS (Neff)	0.29	0.08	14.88	1	<0.001	0.07
CTO (SCBCS)	-0.53	0.45	1.35	1	0.247	0.007

<sup>a</sup> compared to PwS, <sup>b</sup> compared to male

\*VIFs <2

**B.**

	Comorbidities (CIRS)					
	B	SE	F	df	p	$\eta_p^2$
Age at Visit (years)	0.11	0.02	23.46	1	<0.001	0.11
Diagnostic Group (NC) <sup>a</sup>	-2.09	0.54	14.62	1	<0.001	0.07
Sex (female) <sup>b</sup>	-0.27	0.50	0.29	1	0.59	0.001
CTS (Neff)	-0.07	0.03	5.10	1	0.03	0.03
CTO (SCBCS)	0.37	0.17	4.45	1	0.04	0.02

<sup>a</sup> compared to PwS, <sup>b</sup> compared to male

\*VIFs <2

**C.**

	hs-CRP					
	B	SE	F	df	p	$\eta_p^2$
Age at Visit (years)	<0.001	0.003	0.001	1	0.97	<0.001
Diagnostic Group (NC) <sup>a</sup>	-0.39	0.08	22.08	1	<0.001	0.10
Sex (female) <sup>b</sup>	0.04	0.08	0.28	1	0.60	0.001
CTS (Neff)	-0.006	0.004	1.91	1	0.17	0.01
CTO (SCBCS)	0.04	0.03	2.09	1	0.15	0.01

<sup>a</sup> compared to PwS, <sup>b</sup> compared to male

\*VIFs <2

Neff = Neff Self-Compassion Scale short form, SCBCS = Santa Clara Brief Compassion Scale, SF-36 = Physical Component Scale of the 36-Item Short Form Health Survey, CIRS = Cumulative Illness Rating Scale, hs-CRP = high-sensitivity C-reactive protein

**Table 3:**

General Linear Model of People with Schizophrenia with Physical Health Outcomes as Dependent Variables

**A.**

	Physical Well-being (SF-36)					
	B	SE	F	df	p	$\eta_p^2$
Age at Visit (years)	0.06	0.09	0.36	1	0.55	0.004
Sex (female) <sup>a</sup>	-2.32	1.94	1.43	1	0.24	0.01
Current Smoking (no) <sup>b</sup>	3.96	1.96	4.10	1	<b>0.05</b>	0.04
Antipsychotics (daily dose)	0.99	0.61	2.59	1	0.11	0.03
CTS (Neff)	0.44	0.11	15.69	1	<b>&lt;0.001</b>	0.14
CTO (SCBCS)	-0.38	0.64	0.34	1	0.56	0.003

<sup>a</sup> compared to male, <sup>b</sup> compared to yes

\*VIFs &lt;2

**B.**

	Comorbidities (CIRS)					
	B	SE	F	df	p	$\eta_p^2$
Age at Visit (years)	0.12	0.04	11.51	1	<b>0.001</b>	0.10
Sex (female) <sup>a</sup>	-0.70	0.74	0.90	1	0.35	0.009
Current Smoking (no) <sup>b</sup>	0.66	0.75	0.78	1	0.38	0.008
Antipsychotics (daily dose)	0.44	0.23	3.56	1	0.06	0.04
CTS (Neff)	-0.04	0.04	0.77	1	0.38	0.008
CTO (SCBCS)	0.36	0.24	2.16	1	0.14	0.02

<sup>a</sup> compared to male, <sup>b</sup> compared to yes

\*VIFs &lt;2

**C.**

	hs-CRP					
	B	SE	F	df	p	$\eta_p^2$
Age at Visit (years)	-0.006	0.005	1.19	1	0.28	0.01
Sex (female) <sup>a</sup>	0.18	0.11	2.80	1	0.10	0.03
Current Smoking (no) <sup>b</sup>	0.09	0.11	0.61	1	0.44	0.006
Antipsychotics (daily dose)	0.06	0.03	3.17	1	0.08	0.03
CTS (Neff)	-0.01	0.006	4.18	1	<b>0.04</b>	0.04
CTO (SCBCS)	0.02	0.04	0.32	1	0.58	0.003

<sup>a</sup> compared to male, <sup>b</sup> compared to yes

\*VIFs &lt;2

Neff = Neff Self-Compassion Scale short form, SCBCS = Santa Clara Brief Compassion Scale, SF-36 = Physical Component Scale of the 36-Item Short Form Health Survey, CIRS = Cumulative Illness Rating Scale, hs-CRP = high-sensitivity C-reactive protein