Assessment

The validity of the self-compassion scale: A study on post-traumatic growth and post-traumatic stress symptoms in a sample of rescue workers

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Abstract

It is debated whether self-compassion (a construct from within the Buddhist psychology) should be understood as a "holistic" construct, or as a two-factor structure corresponding to the positively phrased items (self-kindness, common humanity, mindfulness) and the negatively phrased items (self-judgment, isolation, over-identification) of the Self-Compassion Scale (SCS; Neff, 2003). Here, we examined a sample of rescue workers who manifest greater compassionate responding (CS) and reduced uncompassionate responding (RUS) than traditional community and student samples. The factor structure of the SCS was studied by examining the relations among self-compassion, coping, perceived social support, neuroticism, post-traumatic stress (PTS), and post-traumatic growth (PTG). Through structural equation modeling (SEM), we found that a two-factor characterization (CS vs RUS) of the SCS provided a better fit to the nomological network including the above-mentioned variables, rather than a one-factor characterization of the SCS. We also found that the CS and RUS components of self-compassion had a different functional role when considering their effects on PTS and PTG. These results differ from those of previous studies because the relation of self-compassion to adaptive/disadaptive psychological functioning is context specific. The present results strengthen the idea that CS and RUS are functionally different components of self-compassion.

Introduction

A growing interest has been recently directed to the concept of the "self" as a relevant construct for advancing our understanding of individual differences in relation to coping and stress (Beck, 2016). Specific ways of interacting with the self, which can be described with constructs from within the Buddhist psychology, such as self-compassion (SC), have been shown to be beneficial for mental health (MacBeth & Gumley, 2012). In particular, a compassionate mindset towards oneself has been proposed as a protective factor against psychopathology, including Post-Traumatic Stress Disorder (PTSD; Kirby et al., 2017; Wilson et al., 2019), and as a factor promoting a positive change that is sometimes experienced by individuals dealing with traumatic events, which is known as Post-Traumatic Growth (PTG; Wong & Yeung, 2017).

Self-compassion has emerged as a protective factor against PTSD because it has been shown to be associated (1) with easing the negative impact of trauma and PTSD symptoms (Janoff-Bulman, 1989), (2) with lower levels of shame, which is a form of internal threat following trauma (Keene & Epps, 2016), (3) with adaptive coping strategies (Seligowski et al., 2015), (4) with improved emotional regulation (Badour & Feldner, 2013), resilience (Seligowski et al., 2015), and a greater ability to manage distress (Barlow et al., 2017), (5) and with feeling interpersonally connected to others (Aspy & Proeve, 2017), which is a trauma-resilience factor (Bistricky et al., 2017) – for a recent review, see Winders et al. (2020).

Self-compassion has also been shown to lead to PTG, that is, to positive changes that follow a traumatic event and bring about changes in self-perception, in interpersonal relationships, and in a reevaluation of one's own view of the world (Tedeschi & Calhoun, 2004). Such positive changes take place by reducing ruminations and depressive symptoms (Nolen-Hoeksema et al., 2008) and by providing a more effective coping strategy with stress through reliance on positive cognitive

THE VALIDITY OF SELF-COMPASSION SCALE   3

restructuring (Allen & Leary, 2010). For example, Wong & Yeung (2017) showed that the relation

between self-compassion and PTG is mediated by several adaptive cognitive processes such as

acceptance, positive reframing and presence of meaning. Moreover, Chishima et al. (2018) found that

high self-compassion participants tended to judge stressful events as less threatening and more

controllable than low self-compassion participants.

Despite the enormous interest in self-compassion in recent years, and despite the plethora of

studies that have examined self-compassion in relation to PTSD and PTG, the usefulness of the self-

compassion construct in relation to psychopathology has been strongly challenged (*e.g.*, Muris et al.,

2021). The purpose of the present study is to contribute to this debate by examining the relation

between self-compassion, PTS, and PTG in a sample of rescue workers, that is, in a context in which

the effects of self-compassion on the other two constructs may be more evident than in community or

student samples that have been typically examined in previous studies.

The Self-Compassion Scale

Self-compassion is commonly assessed with the Self-Compassion Scale (SCS), a 26 item self-

report scale which spans six dimensions of the construct (Neff, 2003b). Three sub-sets of items are

considered indicators of Compassionate Self-responding (CS): (a) being kind and understanding toward

one's fallibility, (b) acknowledging that personal failures and pain are something that everyone

experiences, and (c) having a mindful awareness of one's painful thoughts and feelings. The remaining

three sub-sets of items are considered indicators of Reduced Uncompassionate Self-responding (RUS):

(a) being critical and not understanding toward personal shortcomings, (b) having the tendency of

isolating from others, and (c) avoiding one's painful thoughts and feelings or overidentifying with them

(Muris & Otgaar, 2020). The SCS total score is given by the sum of the self-responding on the

compassionate items and the reversely scored uncompassionate items.

THE VALIDITY OF SELF-COMPASSION SCALE   4

Although the SCS has been extremely popular in the recent psychological literature (for a recent

review, see Muris & Otgaar, 2020), questions have been raised about its validity as a measure of self-

compassion (Kandler et al., 2017; Muris, 2016; Muris et al., 2016, 2019; Muris & Petrocchi, 2017). It

has been pointed out that, rather than presenting a more nuanced picture of this construct, by means of

the SCS self-compassion is understood as a "pure protective factor" (*e.g.*, Gu et al., 2020; Montero-

Marin et al., 2018; Seppälä et al., 2017; Strauss et al., 2016). This depends on the fact that the data of

the SCS are (usually) summarized in terms of the SCS total score. However, this choice is problematic

for several reasons (Muris & Otgaar, 2020).

1. The SCS total score might inflate the link with psychopathology, given that the relations found

    between the SCS total score and other psychological constructs might mainly depend on the

    RUS component of the SCS (Muris et al., 2018). The RUS component of the SCS is strongly

    associated with symptoms such as anxiety and depression (Muris & Petrocchi, 2017) and, once

    RUS is removed from the SCS, the added value of CS might be marginal (Muris et al., 2019).

2. Some scholars have proposed that RUS may be redundant, because it overlaps with the

    personality trait of Neuroticism: Once Neuroticism is controlled, there is no evidence of

    reduced uncompassionate self-responding (Geiger et al., 2018; Kandler et al., 2017).

3. Lastly, it has been suggested that the common use of the SCS total score may obscure the

    associations that may be found in therapeutic interventions between treatment effects and the

    putative components of the SCS (Wadsworth et al., 2018).

One limit of previous studies on the SCS was that they mostly included community or student

populations, that is, they examined situations in which PTS and PTG were only present in mild forms.

The purpose of the present study is to evaluate the hypotheses of Muris et al. (2019) and of Geiger et al.

THE VALIDITY OF SELF-COMPASSION SCALE   5

(2018) in a sample of rescue workers, where the individual differences in adaptive or maladaptive

responses to stress are expected to be stronger than in community or student samples.

Self-compassion, PTS, and PTG in rescue workers

Rescue workers are first responders to traumatic events such as earthquakes, geological

disasters, fire, meteorological disasters, and are involved in acute health crises, such as the current

pandemic. They engage in out-of-hospital acute medical care, contribute to transportation to definitive

care, or provide assistance during disasters and life-threatening conditions in a professional or

voluntary capacity (Berger et al., 2012). The high exposure to traumatic events of rescue workers, as

part of their professional practice, often comes at a personal cost, resulting in psychological problems

such as depression, anxiety, and PTSD at a much higher prevalence than the general public (*e.g.*, Palgi

et al., 2009; Witteveen et al., 2007). Psychological factors can exacerbate or ameliorate the

consequences of such exposure to trauma: It has been shown that a personal history of negative life

events increases the likelihood of negative consequences accompanying the hardships of caring for

victims, whereas other factors, including compassion satisfaction (*i.e.*, the positive experiences deriving

from being able to help others; Sodeke-Gregson et al., 2013), may act as protection (Adams et al.,

2006). In the present study, we will use a sample of rescue workers to examine some of the outstanding

questions that have been raised in the previous literature concerning the validity of the SCS (Neff,

2003a).

Aims of the study

- **Question Q1**: It has been proposed that the relations of the SCS (Neff, 2003a) with

  psychopathology are only due to the negative component of SC, with the effects of the positive

  component of SC being negligible (Muris et al., 2019). Here, we examine the factor structure of

  the SCS in the context of a nomological network including PTS and PTG. We ask whether the

associations between these constructs are better described by using the SCS total score, or by distinguishing between the CS and RUS components of the SCS (Muris et al., 2021; Muris & Otgaar, 2020; *e.g.*, Neff et al., 2019).

- **Question Q2**: Previous studies on self-compassion have focused, for the most part, on a population which is not normally exposed to events leading to PTG or PTS (*i.e.*, undergraduate students). Here, we examine the possibility that self-compassion may be experienced differently by individuals with different levels of exposure to traumatic events.

- **Question Q3**: The validity of the SCS has been challenged by arguing that reduced uncompassionate self-responding reduces to Neuroticism (Geiger et al., 2018). To evaluate this claim, we examine the added value that can be attributed to the CS and RUS in a nomological network that includes Neuroticism, PTG, and PTS.

Methods

Participants

A call for the participation in the study was advertised in the Italian Red Cross websites of Lombardy and Tuscany. This resulted in a sample of $n = 783$ participating emergency (first-time responders) rescue-workers (46% female) with 8.77 (8.08) mean years of experience as rescue worker, and in a sample of $n = 324$ students and community participants (74% female). Mean age was 41.1 (*SD* = 13.9) and 25.6 (10.8) years for rescue workers and controls, respectively. For rescue workers, the mean rate of activity was 0.94 (0.58) times per week.

Materials

Specific questions for ambulance personnel were developed to investigate the rescue-workers' role (such as driver, team leader, rescuer, etc.), number of weekly shifts, and number of psychological support meetings (such as debriefing and defusing). Moreover, participants were asked whether they had experienced traumatic events in their lives.

The *Post-Traumatic Growth Inventory* (PTGI; Tedeschi & Calhoun, 1996) is a 21-item self-report measure. PTGI evaluates the growth following one or more stressful or traumatic events in one's life. The PTGI comprises five sub-scales (Relation with others, New possibilities, Personal strength, Appreciation of life, and Spiritual changes) and has good internal consistency, construct-convergent validity, and discriminant validity (Tedeschi & Calhoun, 1996). Also, the Italian version has good internal consistency and validity (Prati & Pietrantoni, 2014). In the present sample, each sub-scale shows good-to-excellent Chronbach's α values: Relation with others = 0.94, New possibilities = 0.91, Personal strength = 0.86, Appreciation of life = 0.85, Spiritual changes = 0.89; total = 0.97.

The *Impact of Event Scale - Revised* (IES-R; Weiss, 2007) is a 22-item self-report measure assessing subjective distress caused by traumatic events and it is based on the views of the core phenomena of traumatic-stress reactions: intrusion (B criteria in the DSM-IV PTSD diagnosis), avoidance (C criteria), and persistent hyper-arousal. Correspondingly, the IES-R comprises the sub-scales of Intrusion, Avoidance, and Hyper-arousal. The IES-R is widely used to assess the symptomatology of PTSD in rescue workers. The IES-R shows good internal consistency and test–retest stability. The Italian translation shows good psychometric properties, good concurrent and discriminant validity, and good test–retest reliability (Craparo et al., 2013). In the present sample, each sub-scale shows good-to-excellent Chronbach's α values: Intrusion = 0.93, Avoidance = 0.86, Hyperarousal = 0.91; total = 0.96.

THE VALIDITY OF SELF-COMPASSION SCALE   8

The *Multi-dimensional Scale of Perceived Social Support* (MSPSS; Zimet et al., 1988), a 12-item self-report questionnaire, was used to assess the perceived adequacy of social support from family members, friends, and significant others. We used the Italian version of the MSPSS. The original version of the MSPSS has very good internal reliability properties for the three sub-scales (Zimet et al., 1990). The Italian version shows good internal consistency, test–retest reliability (Fabio & Kenny, 2012), and validity (Prezza & Pacilli, 2002). In the present sample, the three sub-scales show excellent Chronbach's α values: Family = 0.96, Friends = 0.97, Significant Others = 0.96; total = 0.95.

The *NEO-Five Factor Inventory* (NEO-FFI-60; Costa & McCrae, 1992), a 60-item self-report questionnaire, was used to assess five broad domains of personality: Neuroticism (N), Extraversion (E), Openness to experience (O), Agreeableness (A), and Conscientiousness (C). The internal consistency of the five sub-scales of the NEO-FFI-60 is adequate (Murray et al., 2003). In the present sample, the Italian version by Caprara et al. (2001), produce the following Chronbach's α values: N = 0.89, E = 0.83, O = 0.72; A = 0.73, C = 0.88; total = 0.77. In the present study, only the Neuroticism sub-scale was used.

The *Coping Orientation to Problems Experienced* test (COPE; Carver et al., 1989), a 60-item self-report questionnaire, was used to evaluate the skills and strategies adopted to face stressful and difficult events. The COPE comprises five dimensions (social support, avoidance strategies, positive attitude, problem-solving, and transcendent orientation) and has adequate internal consistency, and convergent and discriminant validity (Carver et al., 1989). Factor analyses on the Italian version of the COPE (Sica et al., 1997; Sica et al., 2008; Sica et al., 2021) have demonstrated that the scales can be grouped into the following dimensions: Problem-focused, Social Support, Avoidance-oriented, Positive-oriented, and Transcendent-oriented. Internal consistency values of these five dimensions in the present sample exceeded 0.80, with the exception of the Avoidance-oriented coping (Cronbach's α

= 0.75). In the present sample, internal consistency values for the Italian version are the following: Social support = 0.91, Avoidance strategies 0 =.87, Positive attitude = 0.79, Problem-solving = 0.87, Transcendent orientation = 0.82; total = 0.86. In the present study, only the Positive attitude and Problem-solving sub-scales were used.

The *Self-Compassion Scale* (SCS; Neff, 2003a; Italian version by Veneziani et al., 2017), a 26-item self-report questionnaire, was used to evaluate self-compassion. High levels of self-compassion reflect an ability to be kind and understanding toward oneself, even in difficult times. The psychometric properties of the SCS in the present sample are discussed in the Results section.

Data analysis plan

To answer Question Q1 (*i.e.*, what is the dimensionality of the SCS?), we performed confirmatory factor analysis (CFA). Several factor structures were compared, and goodness-of-fit was evaluated according to the Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), Root Mean Square Error Approximation (RMSEA), and Standardized Root Mean Square Residual (SRMR). In order to avoid falsely rejecting viable latent variable models, the following cut-off criteria were used: RMSEA and SRMR near or less than 0.08, and CFI and TLI near or greater than 0.90 (Little, 2013; West et al., 2012). A weighted least squares mean- and variance-adjusted estimator (WLSMV) was used to assess each latent construct, as it is more adequate than maximum-likelihood for ordered-categorical items with five or less response options (*e.g.*, Bandalos, 2014). To study the dimensionality of the SCS, we used both traditional CFA models and Exploratory Structural Equation Modeling (ESEM; Asparouhov & Muthén, 2009). The ESEM strategy is used for modeling multidimensional constructs comprising a certain overlap between the hypothesized theoretical dimensions. In such circumstances, ESEM overcomes the limitation stemming from the fact that the zero cross-loading specification assumed by traditional CFA can be too rigid (see also Neff et al., 2019). To further validate the bidimensional

structure of the SCS, CFA and ESEM modeling was complemented by Latent Profiles Analysis (LPA).

LPA is a person-centered modeling approach aiming at identifying subgroups of participants based on

patterns of characteristics assessed within a study. Specifically, we compared the groups recovered by

LPA, which were identified in terms of the CS and RUS components of the SCS, according to their

PTG and PTS scores. In this context, we examined two extreme hypotheses: The first assumes that CS

is related to PTG but not to PTS, and that RUS is related to PTS but not to PTG; the second assumes

the opposite (*i.e.*, RUS is related to PTG but not to PTS; CS is related to PTS but not to PTG). If CS

and RUS are equivalent measures of the self-compassion construct, then both hypotheses should be

confirmed. Conversely, if CS and RUS represent distinct dimensions of the self-compassion construct,

then only the first hypothesis should be accepted.

To answer Question Q2 (*i.e.*, does self-compassion vary across groups with different levels of

exposure to traumatic events?), we compared the SCS total score, CS, and RUS across rescue workers

and a control group, when also considering age and gender. If the results showed group differences

articulated in terms of CS and RUS, or different interactions between group and age or gender when

considering CS or RUS, we would conclude that is not meaningful to operationalize self-compassion in

terms of the SCS total score.

To answer Question Q3 (*i.e.*, does the CS component of the SCS reduce to neuroticism?), we

compared several Structural Equations Models (SEMs) examining self-compassion within a larger

nomological network which comprised PTG, PTS, coping, and neuroticism.

Nested models were compared by using the χ^2-difference test and not nested models were

compared by several fit indices: decreases in the CFI and TLI more than .01 and increases in the

RMSEA more than .015 (Chen, 2007; Cheung & Rensvold, 2002). All CFA and SEM models were

tested using Mplus version 8.6 (Muthén & Muthén, 2017) using all available data. For ordinal

measures, the robust weighted least squares (mean and variance adjusted)-procedure (WLSMV) was

used for parameter estimation and assessing model fit (Muthén et al., 2015).

We report how we determined our sample size, all data exclusions, all manipulations, and all

measures in the study. A justification for the sample size of the present study is provided in the

Supplementary Materials.

Results

Preliminary analysis and descriptive statistics

The traumatic events that were experienced by the rescue-workers during their activity fell

more often into one of the following categories: cardiorespiratory arrest (36%), major trauma (25%),

suicide (10%), domestic violence (6%), intervention for cardiac arrest on a minor (4%), child

maltreatment (3%), car accident (2%). Major life events experienced by the rescue-workers fell more

often into one of the following categories: death of a first-degree relative including a child or spouse

(45%), serious illness or injury to the subject (17%), becoming unemployed or seeking work for more

than one month (7%), a major financial crisis (5%), separation due to marital difficulties (5%), serious

problems with a close friend, neighbor or relative (4%), being sacked from one's job, (4%), serious

illness or injury to a close relative (2%), breaking off a steady relationship (1%).

The mean total score on the IES-R was 17.76 (SD = 15.75). By using a cut-off of 33 on the IES-

R total score (Creamer et al., 2003), 135 (17%) rescue workers participants were identified as probable

PTS cases; of them, 60% were women. For rescue workers, the average PTG was 39.21 (24.65). IES-R

and PTG data were not collected for controls.

Q1: Dimensionality of the SCS

SCS factor structure

To examine the factor structure of the SCS (Muris et al., 2021; Muris & Otgaar, 2020; *e.g.*, Neff et al., 2019), all items from the Self-judgment, Isolation, and Over-identification subscales of the SCS were reverse-coded before analyses. In a set of preliminary analyses, we tested all factor-structure models described by Neff et al. (2019) (see Supplementary Materials). Consistent with Neff et al. (2019), the bifactor ESEM models – Models 4b and 5b in Neff et al. (2019) – were found to provide the best description of the factor structure of the SCS. Such models are closer to the view that self-compassion is comprised of six components that interact as a global system, as proposed by Neff (2003a). We then considered three further factor models not discussed by Neff et al. (2019).

1.   A bifactor two-factor ESEM model, with correlated SC and RUS factors. This model identifies an ESEM CS factor with 13 target items (*i.e.*, the items for self-kindness, common humanity, and mindfulness) and a RUS factor with 13 target items (*i.e.*, the items for reduced self-judgment, reduced isolation, and reduced over-identification). The correlation between the CS and RUS factors was -0.190. A further general factor, uncorrelated with CS and RUS, saturated on all indicators. The fit indices were the following: CFI = 0.92, TLI = 0.89, RMSEA = 0.09 [90% CI 0.09-0.10], SRMR = 0.04, ω_t = 0.96.

2.   Given that the previous model approximated psychometric adequacy, we examined its modification indices. The modification indices of the previous model suggested allowing residual correlations between items SCCH10 ("When I feel inadequate in some way, I try to remind myself that feelings of inadequacy are shared by most people") and SCCH7 ("When I'm down and out, I remind myself that there are lots of other people in the world feeling like I am"), and between items SCIS18 ("When I'm really struggling, I tend to feel like other people

THE VALIDITY OF SELF-COMPASSION SCALE   13

must be having an easier time of it") and SCIS13 ("When I'm feeling down, I tend to feel like

most other people are probably happier than I am"). Although allowing correlated indicator

residuals is generally inappropriate, this issue may be in part alleviated by considering the

strong content similarity of the two pairs of indicators listed above (*e.g.*, Siefert et al., 2020).

With this change, quality of fit was acceptable: CFI = 0.95, TLI = 0.93, RMSEA = 0.08 [90%

CI 0.07-0.08], SRMR = 0.03, ω_t = 0.96. The correlation between the SC and RUS factors was -

0.207; $r_{10,\,7}$ = 0.340; $r_{18,\,13}$ = 0.223.

3.   A two-factor ESEM model for the correlated CS and RUS factors. Although this model was

already examined by Neff et al. (2019), we used a different factor extraction procedure – see

Supplementary Materials. Also, this model showed an adequate fit of our data: CFI = 0.93, TLI

= 0.93, RMSEA = 0.07 [90% CI 0.07-0.08], SRMR = 0.07, ω_t = 0.95. The correlation between

the CS and RUS factors was -0.277.

In summary, two measurement models with two separate factors for the CS and RUS components

met our criteria for at least adequate fit. Although the "holistic" bifactor ESEM model with six specific

factors (which supports the use of the SCS total score) showed slightly better goodness of fit indices,

the two-factor model (which supports the differential coding of the CS and RUS components) showed

sufficient psychometric adequacy to warrant its use in further statistical analyses.

Latent Profiles Analysis

A further test of the two-dimensional nature of self-compassion was carried out by means of a

Latent Profiles Analysis (LPA). LPA allows to identify underlying latent sub-groups, or profiles, based

on common response patterns. Prior to the analysis, the six self-compassion dimensions were

standardized and scores on the three RUS sub-scales were reversed (*i.e.*, they were considered as

indicators of "lack of" Self-judgment, Overidentification, and Isolation). For the present data, the best

LPA solution was a model with 6 classes (see Ullrich-French & Cox, 2020) – see Figure 1 for a description of the obtained profiles.

A first result is that the LPA solution identified self-compassion profiles that clearly reflect the distinction between the CS and RUS dimensions [*i.e.*, groups differing in terms of self-compassionate, reduced uncompassionate, and average (moderate) scores]. These dimensional patterns are consistent with Neff's description of responses that mirror the inverse relationships between the negative and positive dimensions of self-compassion and support the ideas that self-compassion is best represented in terms of a description comprising two-dimensional scores (see also Phillips, 2019; Ullrich-French & Cox, 2020).

To validate the LPA solution and, implicitly, the two-dimensional characterization of self-compassion, we related the groups identified by LPA with two external dimensions: IES-R and PTG. We contrasted two alternative hypotheses. **H1:** CS and RUS have functionally different purposes: CS promotes adaptive responses (operationalized in terms of PTG scores), whereas RUS prevents maladaptive responses (operationalized in terms of IES-R scores). **H2:** the CS and RUS components have the same functional purpose (*i.e.*, they are related in the similar manner to PTG and IES-R); H2 is thus consistent with the "holistic" characterization of the SCS structure. H1 predicts, for example, higher PTG scores in a profile with high CS levels and low RUS levels than in a profile with low CS levels and high RUS levels. For the same two profiles, conversely, H1 predicts lower IES-R scores in a profile with high CS levels and low RUS levels than in a profile with low CS levels and high RUS levels.

To contrast these two hypotheses, we examined two multilevel Bayesian regression models predicting the PTG or IES-R scores from group membership according to the six-profile solution. All possible contrasts between PTG or IES-R mean pairs were evaluated with the Tukey correction and the

resulting HPD 95% intervals not including the zero point were examined. The direction of each of these 13 contrasts was coded with 1 if it was consistent with the prediction formulated according to the relevant dimensions specified by H1 or H2, and with 0 if it was not.

When the direction of the contrasts was predicted by the relevant dimension specified by H1, we obtained 13 "successes" out of 13 comparisons. Conversely, when the direction of the contrasts was predicted by H2, we obtained only 5 "successes" out of 13 comparisons (see Supplementary Materials for details). We therefore conclude that the CS and RUS components are associated to functionally different psychological dimensions and, thus, should be considered as distinct dimensions of the self-compassion construct.

Q2: Self-compassion and level of exposure to trauma

We employed Bayesian regression to examine the associations between the SCS total score and group (rescue workers and a community/student sample not involved in rescue activities), age, gender, and their interactions. We found a group by age interaction, $\beta = -0.19$, 95% CI [-0.28, -0.11], Cohen's $d = 0.21$. This interaction indicates that, at the lower age levels, there was no difference between the two groups; conversely, at higher levels of age, rescue workers showed progressively higher levels of the SCS total score as compared to the control group. Bayes $R^2 = 0.09$. When considering the RUS component as the dependent variable and the same predictors of the previous regression model, we found a similar interaction between group and age as in the previous regression model, $\beta = -0.21$, 95% CI [-0.29, -0.12], Cohen's $d = 0.22$. Bayes $R^2 = 0.09$. Finally, when considering CS as the dependent variable, we found no reliable effects of group, nor any reliable interaction between group and the other variables. We found an age by gender interaction, $\beta = -0.04$, 95% CI [-0.19, -0.02], but the effect size was negligible, Cohen's $d = 0.11$. Bayes $R^2 = 0.03$. We interpret these results as indicating that the use

of the SCS total score may conceal differences between groups with different levels of exposure to (indirect) trauma.

Q3: The CS/RUS components of the SCS and Neuroticism

To examine the possible separate roles of CS and RUS within a larger nomological network, we compared a number of alternative structural equation models (SEMs). In the context of the concurring effects of coping, perceived social support, and neuroticism, we asked (1) whether the effects of self-compassion on post-traumatic growth and post-traumatic stress symptoms are better accounted for by considering self-compassion as a unitary construct or by distinguishing between CS and RUS; and (2) whether self-compassion is better understood as an exogenous or as a mediator variable.

CS and RUS as exogenous variables

Model 3 considers the two separate components of the SCS (RUS and CS), Coping, Social support, and Neuroticism as exogenous variables, and PTG and PTS as endogenous variables, taking the sub-scales as indicators of latent factors. The structural component of Model 3 is presented in Figure 2 (only the statistical significant path coefficients at the $\alpha = 0.05$ level are shown). The model's fit is adequate, $\chi^2(167) = 617.86$, $\chi^2/df = 3.70$, CFI = 0.95, NFI = 0.93, TLI = 0.93, RMSEA = 0.06, and SRMS = 0.06 (for details, see Supplementary Materials). Two model's modifications were considered to test additional substantive questions. Model 4 removed from Model 3 the direct regression paths from RUS to the endogenous factors. Removing the direct RUS effects decreased the model fit, $\Delta\chi^2(2) = 19.69$, $p = 0.001$. Model 5 removed from Model 3 the direct regression paths from CS to the endogenous factors. Also removing the direct CS effects decreased the model fit, $\Delta\chi^2(2) = 7.07$, $p = 0.03$.

THE VALIDITY OF SELF-COMPASSION SCALE   17

CS and RUS as mediator variables

Model 6 placed CS and RUS as mediators between Coping, Perceived social support, and Neuroticism (as exogenous variables), and PTG and PTS (as endogenous variables). Model-fitting parameters were indicative of good overall fit: $\chi^2(168) = 618.00$, $\chi^2/df = 3.68$, CFI = 0.95, NFI = 0.93, TLI = 0.93, RMSEA = 0.06, and SRMS = 0.06. The structural component of Model 6 is presented in Figure 3 (only the statistical significant path coefficients at the $\alpha = 0.05$ level are shown).

We used SEM to answer several substantive questions. Model 7 was identical to Model 6, except that self-compassion was considered as a single latent variable with six indicators. By not distinguishing between the CS and RUS, model fit decreased in comparison to Model 6: $\Delta\chi^2(5) = 640.96$, $p = 0.001$. In a further modification of Model 6, we considered Neuroticism as a mediator variable rather than an exogenous variable, together with CS and RUS. Compared to Model 6, the model fit decreased: $\Delta\chi^2(2) = 2010.7$, $p = 0.001$.

To ask whether CS and RUS are better understood as endogenous variables or as mediators, we compared Models 3 and Model 6 with the Vuong closeness test. Such comparison indicated that Models 3 and 6 were too close to be distinguished, $p = 0.74$. However, the confidence intervals for the difference in the models' AIC and BIC statistics showed an advantage for the mediation Model 6: 95% C.I. of AIC difference = (0.14, 3.60) and 95% C.I. of BIC difference = (4.73, 8.19). This suggests an advantage for the mediation Model 6 over Model 3.

In order to examine more closely the mediation structure, we computed the bias-corrected bootstrapped confidence interval with 10,000 samples. Such approach does not rely on distribution assumptions and can be used when the assumptions of large sample size and multivariate normality may not hold (Ryu & Cheong, 2017). If the 95% confidence intervals do not include zero, this is taken as evidence that the mediation effect is non-zero. We found no evidence of a direct effect of Coping on

neither PTG nor on PTS. Conversely, we found evidence of an indirect effect of Coping on PTG, with

a total effect of 0.238, 95% CI = [0.127, 0.355]. This suggests a fully mediated effect of Coping on

PTG. Instead, no evidence was found of a mediated effect of Coping on PTS, 95% CI = [-0.026,

0.219]. We found no evidence of a direct effect of Perceived social support on PTS, nor evidence of an

indirect effect, 95% CI = [-0.057, 0.037]. Instead, we found evidence of a direct effect of perceived

social support on PTG, but no evidence of an indirect effect, 95% CI = [-0.023, 0.031]; for the total

effect, 95% CI = [0.085, 0.282]. Finally, we found no evidence of a direct effect of Neuroticism on

PTS, but we found evidence of an indirect effect, 95% CI = [0.283, 0.755], with a total effect of 0.571,

95% CI = [0.451, 0.711]. This suggests that the effect of Neuroticism on PTS is fully mediated.

Conversely, we found no evidence of a direct effect of Neuroticism on PTG, nor evidence of an

indirect effect of Neuroticism on PTG, with a total effect of 0.032, 95% CI = [-0.184, 0.232].

Discussion

Based on the present results, we provide the following responses to the three questions that have

motivated the present study. About Question Q1, we found that, in our sample, the best factor structure

for the SCS is provided by the six-factor correlated solution, both in ESEM models and in bifactor

ESEM models (see Neff et al., 2019). However, we also found that a factor structure which

distinguishes between the CS and RUS components of the SCS provides an adequate fit to the data

(*e.g.*, Coroiu et al., 2018). We speculate that this result may be due to the specific characteristics of our

sample. Rescue workers are constantly confronted with the sufferance of others, a phenomenological

condition which is markedly different from the living experience of community participants and

undergraduate students who had been often (although not exclusively) employed in previous studies.

Exposure to the sufferance of others may encourage loving-kindness (metta), which entails directing a

sense of compassion toward oneself and the others and produces stronger self-care and greater inter-

connectedness. Different populations may thus be characterized by different levels of compassionate responding and reduced uncompassionate responding.

Our SEM analyses show that CS offered additional explanatory power to what was offered by RUS; correspondingly, RUS offered additional explanatory power to what was offered by CS. This is an important result which indicates that self-compassion cannot be reduced to the RUS dimension only (*e.g.*, Muris et al., 2019).

The dichotomy between CS and RUS was confirmed when considering the SCS profiles identified by LPA: the CS sub-scales were mainly associated with group differences in PTG, whereas the RUS sub-scales were mainly associated with group differences in IES-R. This suggests that the CS and RUS components of the SCS measure psychological dimensions serving different functional purposes.

When considering the nomological structure that relates self-compassion to other psychological variables, we found that the relations between the examined variables were better described by distinguishing the CS and RUS components of the SCS, rather than by considering self-compassion as a unitary construct. The two components of self-compassion had different effects on PTG and PTS. When CS and RUS were considered as exogenous variables, SC had a direct effect on PTG (but not on PTS), whereas RUS had a direct effect on PTS (but not on PTG; see Fig. 2). This same pattern was replicated when CS and RUS were considered as mediators. Our data thus suggest that self-compassion is better conceptualized as a bipolar construct.

About Question Q2, we found that the SCS total score and the RUS component increased with age for rescue workers, but not for the control group. Instead, no reliable group difference was found in terms of the CS component. These results suggest that, in the present sample, an increased level of (indirect) trauma did not produce compassion fatigue – *i.e.*, did not produce a decrease of CS which

actively enacts kindness and understanding to oneself (self-kindness), recognizes that suffering is a

common and normal aspect in life shared by all human beings (common humanity), and achieves a

balanced perspective on one's difficulties (mindfulness). Rather, a greater exposure to the sufferance of

others promoted an enhancement of the coping strategies with age (*i.e.*, higher levels of RUS). Such

"recalibration of self-compassion" (*i.e.*, greater defensive attitudes without compromising a proactive

positive attitude in relation with the self) is obscured when the CS and RUS components of the SCS are

subsumed under a single, overarching dimension (*i.e.*, the SCS total score).

About Question Q3, we found that neuroticism did not overlap with RUS (see, Geiger et al.,

2018; Kandler et al., 2017). In fact, we found the opposite result: In a SEM model which included both

RUS and neuroticism, these two variables played separate roles. This result is consistent with what was

found by Neff et al. (2018).

The present study contributes to the growing literature on the self-compassion construct and on

the SCS as a psychometric operationalization of this same construct. Neff suggests that the use of the

six subscales is to be preferred to the use of the global SCS score as it "provides more precise and

nuanced information" without "obscuring key difference between the individual components" (Neff,

2020, p. 1902). Consistently with this proposal, the present study, while providing psychometric

support to the "holistic" SCS dimension, also adds that the bidimensional conceptualization of self-

compassion provides a useful summary description of the six subscales.

In this regard, the LPA results are relevant for understanding how the different SCS subscales

are configured within individuals. If CS and RUS were unrelated, then we should expect many

individuals with high CS and low RUS levels, or with low CS and high RUS levels. Conversely, if CS

and RUS dimensions are distinct "but form a balanced system" (Neff, 2020, p. 1906), then most

individuals should either be high in CS and high in RUS, or low in CS and low in RUS, or moderate in

both. As indicated by Figure 1 (top), profiles 1, 2, and 5 are consistent with the second alternative mentioned above (52% of the sample size), whereas profiles 3, 4, 6 (48% of the sample) are consistent with the first alternative. This indicates that, in the present sample, the fraction of individuals for whom the configuration of the SCS subscales is consistent with the idea that CS and RUS represent separate dimensions is far from marginal. These results do not replicate those of Phillips (2019; but see also Ullrich-French & Cox, 2020). We speculate that these differences may be due to the fact that self-compassion is expressed in different forms in individuals that are often confronted with the sufferance of others and in community samples or college students. The present considerations, together the previous results concerning the associations between CS and RUS, on the one side, and PTG and PTS, on the other, strengthen the idea that CS and RUS are functionally different components of self-compassion.

Limitations and future directions

Limitations include the cross-sectional design, which precludes determination of the development and of the causal role of the risk and protective functions of the self-compassion dimensions. Developmental studies would be important to understand whether the CS and RUS dimensions change over time, and to isolate the factors responsible for such changes.

A strength of the study is the use of a sample of rescue workers. Given the direct personal relevance of the experiences of suffering and failure in rescue workers, in such a sample the study of self-compassion (*i.e.*, of an adaptive response to stress) is facilitated. At the same time, however, the use of such an extreme and specific sample raises the question of the degree to which the present results can generalize to individuals who are engaged to a lesser extent in situations of difficulty or adversity. Therefore, an important extension of this study would be to examine the associations of self-

compassion dimensions to adaptive/disadaptive psychological functioning at different levels of context specificity.

Self-compassion can be studied in the context of developmental processes, or as an interactive process in real time. Both when considered as a developmental process or an episodic process, self-compassion is recruited in response to situational demands (environmental or intrapsychic), and is shaped by the individual's resources. From this perspective, the open questions involve the understanding of how particular social contexts, demands, social factors, and individual differences in specific abilities (*e.g.*, cognitive flexibility) shape self-compassion, and whether these factors affect the self-compassion components differently.

Of particular importance would be studying, within clinical settings, the effectiveness of interventions aimed at strengthening self-compassion as a protective factor. Specifically, it would be important to understand of the effectiveness of tailored interventions based on specific patterns of self-compassion dimensions (*i.e.*, deficits in the CS component as distinguished from deficits in the RUS component, or the other way around).

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THE VALIDITY OF SELF-COMPASSION SCALE   25

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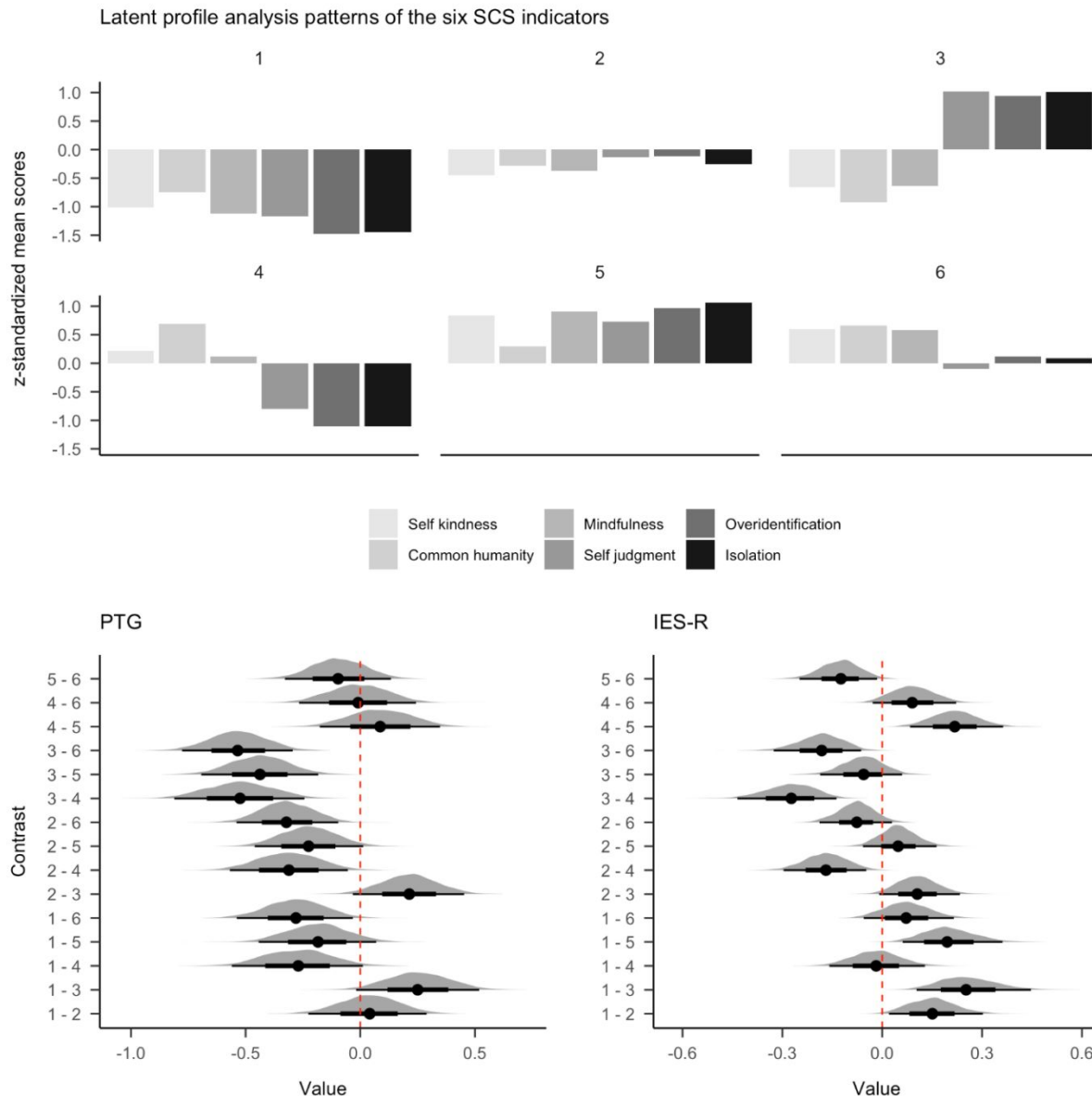
Figure 1. *Top. The first profile (12% of sample) was labelled Low CS Low RUS, because had the lowest relative self-compassion scores on both CS and RUS dimensions; the second profile (21% of sample), Medium CS Medium RUS, was characterized by relatively even scores close to the sample average on both the CS and RUS dimensions; the third profile (15% of sample), Low CS High RUS, was characterized by relatively low levels of the CS dimensions and high levels of the RUS dimension; the fourth profile (13% of sample), High CS Low RUS, was characterized by relatively high levels of the CS dimensions and low levels of the RUS dimension; the fifth profile (19% of sample), High CS Low RUS, was characterized by relatively high levels of both the CS and the RUS dimensions; the sixth profile (19% of sample), High CS Medium RUS, was characterized by relatively high levels of the CS dimension and average levels of the RUS dimension.* **Bottom left.** *Contrasts between latent profiles with HPD 95% intervals computed with PTG as the dependent variable.* **Bottom right.** *Contrasts between latent profiles with HPD 95% intervals computed with IES-R as the dependent variable (see Supplementary Materials for details).*
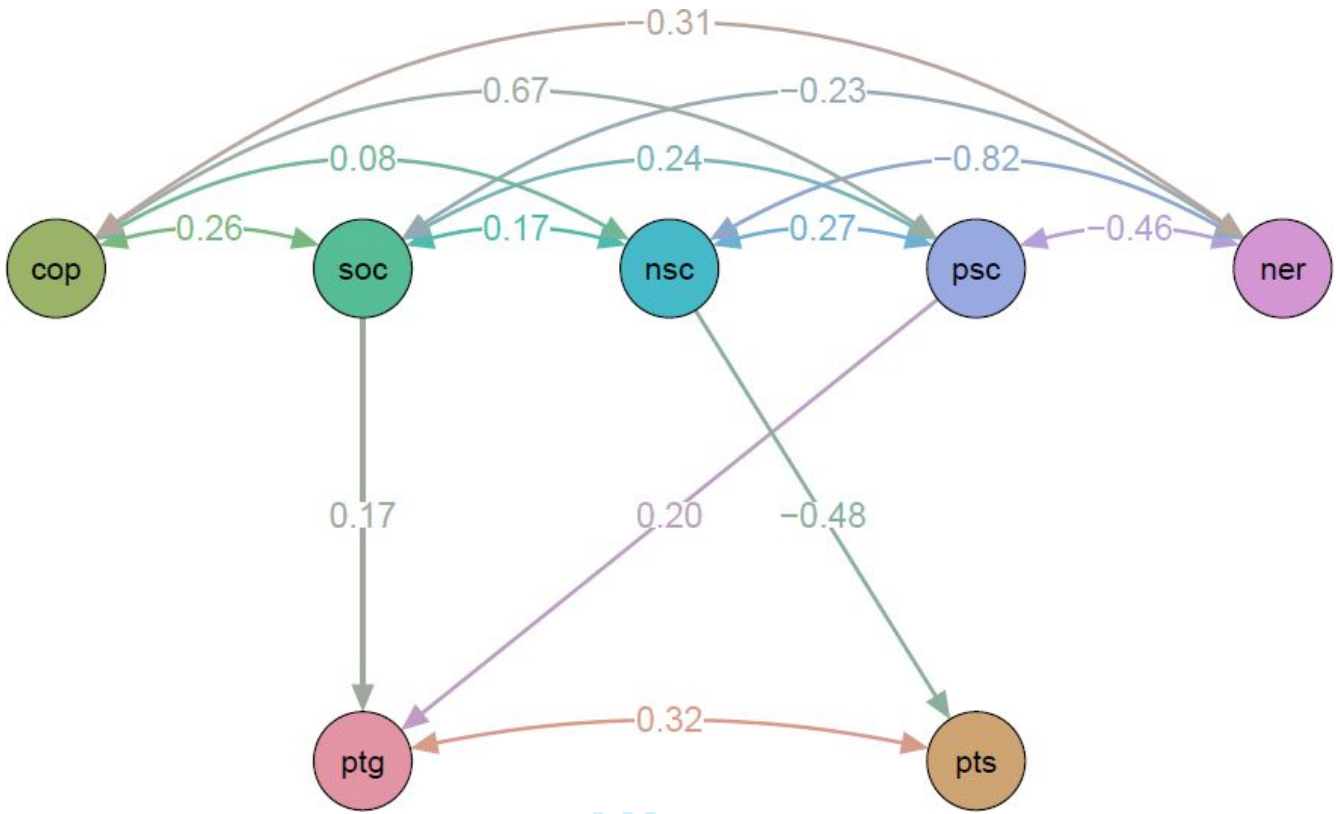
Figure 2. Direct effects of coping (**cop**) perceived social support (**soc**), Reduced Uncompassionate Self-responding (**rus**), Compassionate Self-responding (**sc**), neuroticism (**neu**) on Post-Traumatic Growth (**ptg**) and Post-Traumatic Stress (**pts**) (only significant results are shown).

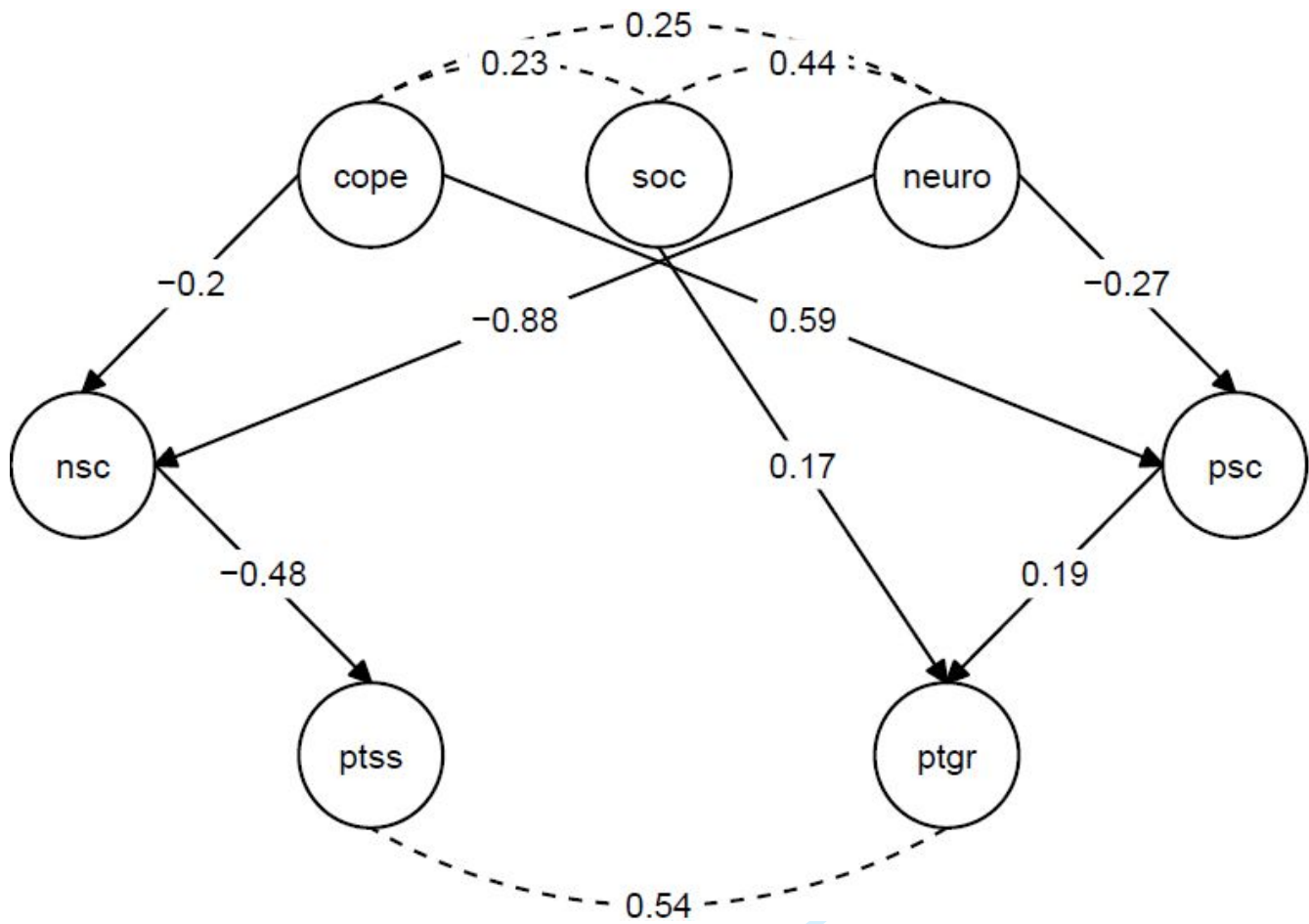**Figure 3.** *Structural component of a SEM model with CS and RUS as mediators between coping, perceived social support, and neuroticism, as exogenous variables, and Post-Traumatic Growth (**ptg**) and Post-Traumatic Stress (**pts**), as endogenous variables. **cop** = coping, **soc** = perceived social support, **rus** = Reduced Uncompassionate Self-responding, **sc** = Compassionate Self-responding, **neu** = neuroticism.*

Table 1. *Indirect and total effects for the three endogenous variables Coping (coping), Perceived social support (soc. supp.), and Neuroticism (neuro.) on post-traumatic stress (PTSS) and post traumatic growth (PTG). S.E. = standard error; 'C.I. lower' and 'C.I. upper' = lower and upper limits of the 95% bootstrap confidence interval.*

Effect	Estimate	S.E.	C.I. lower	C.I. upper
Ind. eff. Coping -> PTS	0.10	0.06	-0.03	0.22
Ind. eff. Coping -> PTG	0.14	0.06	0.02	0.26
Tot. eff. Coping -> PTS	0.19	0.07	0.07	0.33
Tot. eff. Coping -> PTG	0.24	0.06	0.13	0.35
Ind. eff. Soc. supp. -> PTS	-0.01	0.02	-0.06	0.04
Ind. eff. Soc. supp. -> PTG	0.00	0.01	-0.02	0.03
Tot. eff. Soc. supp. -> PTS	0.05	0.06	-0.06	0.17
Tot. eff. Soc. supp. -> PTG	0.18	0.05	0.08	0.28
Ind. eff. Neuro. -> PTS	0.50	0.12	0.28	0.76
Ind. eff. Neuro. -> PTG	0.03	0.10	-0.18	0.23
Tot. eff. Neuro. -> PTS	0.57	0.07	0.45	0.71
Tot. eff. Neuro. -> PTG	0.15	0.05	0.05	0.25

Supplementary Information A

Sample characteristics

Concerning the relation between personality traits and the SCS total score, we found that the SCS total score was negatively associated with neuroticism, $b = -0.59$, $SE = 0.03$, Bayesian 95% CI [-0.65, -0.53] (Neff et al., 2007), and positively associated with extroversion, $b = 0.10$, $SE = 0.03$, Bayesian 95% CI [0.03, 0.17], and with agreeableness, $b = 0.07$, $SE = 0.03$, Bayesian 95% CI [0.01, 0.12]. We found no evidence of an association with level of education, years of experience as rescue worker, time gap since the last training, and rate of rescue worker activity.

We also found that PTG was positively associated with neuroticism, $b = 0.19$, $SE = 0.05$, Bayesian 95% CI [0.10, 0.28], extroversion, $b = 0.24$, $SE = 0.05$, Bayesian 95% CI [0.14, 0.33], conscientiousness, $b = 0.10$, $SE = 0.04$, Bayesian 95% CI [0.01, 0.18], age, $b = 0.15$, $SE = 0.04$, Bayesian 95% CI [0.06, 0.24] (see Garnefski et al., 2008), and rate of rescue-worker activity, $b = 0.08$, $SE = 0.04$, Bayesian 95% CI [0.00, 0.16]; moreover, males showed lower levels of PTG than females, $b = -0.20$, $SE = 0.08$, Bayesian 95% CI [-0.36, -0.04].

IES-R scores were positively associated with neuroticism, $b = 0.18$, $SE = 0.04$, Bayesian 95% CI [0.11, 0.25] (Inoue et al., 2006), and educational level, $b = -0.06$, $SE = 0.02$, Bayesian 95% CI [-0.10, -0.01] (Wu et al., 2005), but negatively associated with age, $b = -0.05$, $SE = 0.03$, Bayesian 95% CI [-0.10, -0.00].

Supplementary Information B

SCS factor structure

We compared the fit of all models discussed by Neff et al. (2019). We started with the

unidimensional CFA model, which clearly proved to be inadequate, CFI = 0.61, TLI = 0.58, RMSEA

= 0.18 [90% CI 0.18-0.19], SRMR = 0.16, ω_t = 0.44. We then considered all the factor structures that

had been discussed by Neff et al. (2019). The list of the examined models, together with their fit

indexes, is provide below:

- a two-factor CFA for the positive and the negative components of SC, CFI = 0.83, TLI

  = 0.82, RMSEA = 0.12 [90% CI 0.12-0.12], SRMR = 0.10, ω_t = 0.96;

- a two-factor ESEM, CFI = 0.85, TLI = 0.82, RMSEA = 0.12 [90% CI 0.12-0.12],

  SRMR = 0.06, ω_t = 0.96;

- a six-factor CFA, CFI = 0.90, TLI = 0.88, RMSEA = 0.10 [90% CI 0.09-0.10], SRMR

  = 0.07, ω_t = 0.97;

- a six-factor ESEM, CFI = 0.98, TLI = 0.96, RMSEA = 0.05 [90% CI 0.05-0.06],

  SRMR = 0.02, ω_t = 0.98;

- a bifactor-CFA (1 G- and 6 S-factors), CFI = 0.76, TLI = 0.71, RMSEA = 0.15 [90% CI 0.15-

  0.16], SRMR = 0.12, ω_t = 0.97;

- a bifactor-ESEM (1 G- and 6 S-factors), CFI = 0.98, TLI = 0.96, RMSEA = 0.05 [90%

  CI 0.05-0.06], SRMR = 0.02, ω_t = 0.99;

- a two-bifactor (two-tier) CFA model (2 G- and 6 S-factors), CFI = 0.90, TLI = 0.88, RMSEA

  = 0.10 [90% CI 0.10-0.10], SRMR = 0.08, ω_t = 0.99;

- a two-bifactor (two-tier) ESEM model (2 G- and 6 S-factors), CFI = 0.99, TLI = 0.98,

  RMSEA = 0.04 [90% CI 0.04-0.05], SRMR = 0.01, ω_t = 0.99.

For the two-factor CFA for the CS and RUS of SC, the correlation between the factors was -0.28. For the two-factor ESEM, the correlation between the factors was -0.21. For the 6-factor CFA, the correlations between factors ranged between -0.44 and 0.95. For the 6-factor ESEM, the correlations between factors ranged between -0.36 and 0.58. For the two-bifactor (two-tier) CFA model (2 G- and 6 S-factors), the correlation between the CS and RUS factors is -0.34. For the two-bifactor (two-tier) ESEM model (2 G- and 6 S-factors), the correlation between the CS and RUS factors is -0.55.

In our sample, the two-bifactor (two-tier) ESEM model, which included 6 uncorrelated factors (self-kindness, reduced self-judgment, common humanity, reduced isolation, mindfulness, and reduced over-identification) and two correlated CS (loading on the self-kindness, common humanity, and mindfulness items) and RUS (loading on the reduced self-judgment, reduced isolation, and reduced over-identification items) factors showed a marginally better fit than the one bifactor-ESEM (1 G- and 6 S-factors) model. What is crucial is that, among the considered models, those that provide the best fits to the data include distinct factors corresponding to the six dimensions of the SCS (self-kindness, reduced self-judgment, common humanity, reduced isolation, mindfulness, and reduced over-identification).

Supplementary Information C

A two-factor correlated model with two unitary factors representing CS and RUS

Mplus syntax

```
TITLE: 2 factor ESEM.

DATA:

FILE IS selfcompassionitems.dat;

VARIABLE:

NAMES ARE scsj1 scoi2 scch3 scis4 scsk5 scoi6

scch7 scsj8 scmi9 scch10 scsj11 scsk12 scis13

scmi14 scch15 scsj16 scmi17 scis18 scsk19 scoi20

scsj21 scmi22 scsk23 scoi24 scis25 scsk26;

MISSING ARE ALL(-9);

USEVARIABLES ARE scsj1 scoi2 scch3 scis4 scsk5 scoi6

scch7 scsj8 scmi9 scch10 scsj11 scsk12 scis13 scmi14

scch15 scsj16 scmi17 scis18 scsk19 scoi20 scsj21 scmi22

scsk23 scoi24 scis25 scsk26;

CATEGORICAL ARE all;

ANALYSIS:

! Requesting the weighted least squares mean- and variance-adjusted
estimator

ESTIMATOR = WLSMV;

ROTATION = target;

MODEL:

pos BY scsk5 scsk12 scsk19 scsk23 scsk26 scsj1~0 scsj8~0

scsj11~0 scsj16~0 scsj21~0 scch3 scch7 scch10 scch15 scis4~0

scis13~0 scis18~0 scis25~0 scmi9 scmi14 scmi17 scmi22

scoi2~0 scoi6~0 scoi20~0 scoi24~0 (*1);
```

```
neg BY scsk5~0 scsk12~0 scsk19~0 scsk23~0 scsk26~0 scsj1

scsj8 scsj11 scsj16 scsj21 scch3~0 scch7~0 scch10~0 scch15~0

scis4 scis13 scis18 scis25 scmi9~0 scmi14~0 scmi17~0

scmi22~0 scoi2 scoi6 scoi20 scoi24 (*1);

! Requesting standardized parameter
estimates

OUTPUT: stdyx;
```

Standardized Factor Loadings

Items	CS	RUS
Self-kindness		
SCSK05	0.69	0.12
SCSK12	0.76	-0.04
SCSK19	0.76	-0.08
SCSK23	0.60	-0.27
SCSK26	0.66	-0.11
Mindfulness		
SCMI09	0.52	0.06
SCMI14	0.56	-0.19
SCMI17	0.63	-0.23
SCMI22	0.66	-0.08
Common Humanity		
SCCH03	0.46	0.23
SCCH07	0.57	0.40
SCCH10	0.62	0.30
SCCH15	0.69	0.00
Self-judgment		
SCSJ01	0.07	0.55
SCSJ08	0.02	0.77
SCSJ11	0.03	0.74
SCSJ16	-0.01	0.74
SCSJ21	0.03	0.60

Isolation

SCIS04	-0.08	0.82
SCIS13	-0.04	0.78
SCIS18	0.02	0.82
SCIS25	-0.05	0.78

Over-identification

SCOI02	-0.07	0.81
SCOI06	-0.04	0.81
SCOI20	0.04	0.67
SCOI24	-0.03	0.68

Supplementary Information D

A two-factor correlated model with two unitary factors representing CS and RUS

Mplus syntax – R factor extraction

```
TITLE: 2 factor ESEM v2.

DATA:

FILE IS selfcompassionitems.dat;

VARIABLE:

NAMES ARE scsj1 scoi2 scch3 scis4 scsk5 scoi6

scch7 scsj8 scmi9 scch10 scsj11 scsk12 scis13

scmi14 scch15 scsj16 scmi17 scis18 scsk19 scoi20

scsj21 scmi22 scsk23 scoi24 scis25 scsk26;

MISSING ARE ALL(-9);

USEVARIABLES ARE scsj1 scoi2 scch3 scis4 scsk5 scoi6

scch7 scsj8 scmi9 scch10 scsj11 scsk12 scis13 scmi14

scch15 scsj16 scmi17 scis18 scsk19 scoi20 scsj21 scmi22

scsk23 scoi24 scis25 scsk26;

CATEGORICAL ARE all;

ANALYSIS:

ESTIMATOR = WLSMV;

ROTATION = oblimin;

MODEL:

pos BY scsj1@.06 scoi2@-.05 scch3@.41 scis4@-.070 scsk5@.65

scoi6@-.03 scch7@0.49 scsj8@.01 scmi9@0.46 scch10@0.55

scsj11@.02 scsk12@.69 scis13@-.04 scmi14@0.47 scch15@0.66

scsj16@-0.01 scmi17@0.58 scis18@0.03 scsk19@0.70 scoi20@0.07

scsj21@0.02 scmi22@0.65 scsk23@0.56 scoi24@-0.01 scis25@-0.04

scsk26@0.64;
```

```
neg BY scsj1@.49 scoi2@.78 scch3@.22 scis4@.78 scsk5@.13

scoi6@.79 scch7@.33 scsj8@.70 scmi9@.07 scch10@.24 scsj11@.68

scsk12@-.03 scis13@.71 scmi14@-.17 scch15@.02 scsj16@.69

scmi17@-.2 scis18@.77 scsk19@-.06 scoi20@.64 scsj21@.56

scmi22@-.05 scsk23@-.22 scoi24@0.62 scis25@.75 scsk26@-.06;

pos@1;

neg@1;

OUTPUT: stdyx;
```

Standardized Factor Loadings

Items	CS	RUS
Self-kindness		
SCSK05	0.65	0.13
SCSK12	0.69	-0.03
SCSK19	0.70	-0.06
SCSK23	0.56	-0.22
SCSK26	0.64	-0.06
Mindfulness		
SCMI09	0.46	0.07
SCMI14	0.47	-0.17
SCMI17	0.58	-0.20
SCMI22	0.65	-0.05
Common Humanity		
SCCH03	0.41	0.22
SCCH07	0.49	0.33
SCCH10	0.55	0.24
SCCH15	0.66	0.02
Self-judgment		
SCSJ01	0.06	0.49
SCSJ08	0.01	0.70
SCSJ11	0.02	0.68
SCSJ16	-0.01	0.69
SCSJ21	0.02	0.56

Isolation

SCIS04	-0.07	0.78
SCIS13	-0.04	0.71
SCIS18	0.03	0.77
SCIS25	-0.04	0.75

Over-identification

SCOI02	-0.05	0.78
SCOI06	-0.03	0.79
SCOI20	0.07	0.64
SCOI24	-0.01	0.62

Supplementary Information E

A two-correlated factors bifactor model

Mplus syntax

```
TITLE: bifactor 2-correlated-factors
ESEM.

DATA:

FILE IS selfcompassionitems.dat;

VARIABLE:

NAMES ARE scsj1 scoi2 scch3 scis4 scsk5 scoi6

scch7 scsj8 scmi9 scch10 scsj11 scsk12 scis13

scmi14 scch15 scsj16 scmi17 scis18 scsk19 scoi20

scsj21 scmi22 scsk23 scoi24 scis25 scsk26;

MISSING ARE ALL(-9);

USEVARIABLES ARE scsj1 scoi2 scch3 scis4 scsk5 scoi6

scch7 scsj8 scmi9 scch10 scsj11 scsk12 scis13 scmi14

scch15 scsj16 scmi17 scis18 scsk19 scoi20 scsj21 scmi22

scsk23 scoi24 scis25 scsk26;

CATEGORICAL ARE all;

ANALYSIS:

! Requesting the weighted least squares mean- and variance-adjusted
estimator

ESTIMATOR = WLSMV;

ROTATION = target;

MODEL:

sc BY scsk5 scsk12 scsk19 scsk23 scsk26 scsj1 scsj8

scsj11 scsj16 scsj21 scch3 scch7 scch10 scch15 scis4

scis13 scis18 scis25 scmi9 scmi14 scmi17 scmi22 scoi2

scoi6 scoi20 scoi24(*1);
```

```
pos BY scsk5 scsk12 scsk19 scsk23 scsk26 scsj1~0 scsj8~0

scsj11~0 scsj16~0 scsj21~0 scch3 scch7 scch10 scch15

scis4~0 scis13~0 scis18~0 scis25~0 scmi9 scmi14 scmi17

scmi22 scoi2~0 scoi6~0 scoi20~0 scoi24~0 (*1);

neg BY scsk5~0 scsk12~0 scsk19~0 scsk23~0 scsk26~0 scsj1

scsj8 scsj11 scsj16 scsj21 scch3~0 scch7~0 scch10~0

scch15~0 scis4 scis13 scis18 scis25 scmi9~0 scmi14~0

scmi17~0 scmi22~0 scoi2 scoi6 scoi20 scoi24(*1);

! Requesting standardized parameter
estimates

OUTPUT: stdyx;
```

Standardized Factor Loadings

Items	GEN	CS	RUS
Self-kindness			
SCSK05	0.19	0.70	0.08
SCSK12	0.15	0.76	-0.09
SCSK19	0.13	0.77	-0.12
SCSK23	0.09	0.62	-0.30
SCSK26	0.12	0.68	-0.14
Mindfulness			
SCMI09	-0.46	0.46	0.13
SCMI14	-0.60	0.47	-0.11
SCMI17	-0.46	0.59	-0.18
SCMI22	-0.17	0.65	-0.06
Common Humanity			
SCCH03	-0.22	0.43	0.26
SCCH07	0.09	0.58	0.38
SCCH10	-0.04	0.62	0.29
SCCH15	-0.21	0.67	0.02
Self-judgment			
SCSJ01	-0.25	0.03	0.59
SCSJ08	-0.19	-0.01	0.80
SCSJ11	-0.14	0.00	0.76
SCSJ16	-0.10	-0.04	0.76
SCSJ21	-0.14	0.01	0.64

Isolation

SCIS04	0.24	-0.07	0.79
SCIS13	0.40	-0.01	0.72
SCIS18	0.36	0.05	0.77
SCIS25	0.24	-0.04	0.76

Over-identification

SCOI02	0.22	-0.06	0.79
SCOI06	0.19	-0.04	0.80
SCOI20	0.37	0.08	0.62
SCOI24	0.36	0.00	0.63

Correlated residuals between items SCCH10 and SCCH7, and between items SCIS18

and SCIS13

Mplus syntax

```
TITLE: 2 factor bi-factor ESEM with correlated residuals.

DATA:

FILE IS selfcompassionitems.dat;

VARIABLE:

NAMES ARE scsj1 scoi2 scch3 scis4 scsk5 scoi6

scch7 scsj8 scmi9 scch10 scsj11 scsk12 scis13

scmi14 scch15 scsj16 scmi17 scis18 scsk19 scoi20

scsj21 scmi22 scsk23 scoi24 scis25 scsk26;

MISSING ARE ALL(-9);

USEVARIABLES ARE scsj1 scoi2 scch3 scis4 scsk5 scoi6

scch7 scsj8 scmi9 scch10 scsj11 scsk12 scis13 scmi14

scch15 scsj16 scmi17 scis18 scsk19 scoi20 scsj21 scmi22

scsk23 scoi24 scis25 scsk26;

CATEGORICAL ARE all;

ANALYSIS:

! Requesting the weighted least squares mean- and variance-adjusted
estimator

ESTIMATOR = WLSMV;

ROTATION = target;

MODEL:

sc BY scsk5 scsk12 scsk19 scsk23 scsk26 scsj1 scsj8

scsj11 scsj16 scsj21 scch3 scch7 scch10 scch15 scis4

scis13 scis18 scis25 scmi9 scmi14 scmi17 scmi22 scoi2

scoi6 scoi20 scoi24 (*1);
```

```
pos BY scsk5 scsk12 scsk19 scsk23 scsk26 scsj1~0 scsj8~0

scsj11~0 scsj16~0 scsj21~0 scch3 scch7 scch10 scch15

scis4~0 scis13~0 scis18~0 scis25~0 scmi9 scmi14 scmi17

scmi22 scoi2~0 scoi6~0 scoi20~0 scoi24~0 (*1);

neg BY scsk5~0 scsk12~0 scsk19~0 scsk23~0 scsk26~0 scsj1

scsj8 scsj11 scsj16 scsj21 scch3~0 scch7~0 scch10~0

scch15~0 scis4 scis13 scis18 scis25 scmi9~0 scmi14~0

scmi17~0 scmi22~0 scoi2 scoi6 scoi20 scoi24 (*1);

scch10 WITH scch7;

scis18 WITH scis13;

! Requesting standardized parameter
estimates

OUTPUT: stdyx;
```

Standardized Factor Loadings

Items	GEN	CS	RUS
Self-kindness			
SCSK05	-0.20	0.71	0.10
SCSK12	-0.15	0.78	-0.06
SCSK19	-0.13	0.78	-0.10
SCSK23	-0.09	0.63	-0.28
SCSK26	-0.12	0.69	-0.12
Mindfulness			
SCMI09	0.47	0.46	0.13
SCMI14	0.60	0.47	-0.12
SCMI17	0.46	0.59	-0.18
SCMI22	0.16	0.66	-0.05
Common Humanity			
SCCH03	0.23	0.43	0.26
SCCH07	-0.09	0.50	0.34
SCCH10	0.08	0.54	0.25
SCCH15	0.22	0.68	0.03
Self-judgment			
SCSJ01	0.25	0.03	0.59
SCSJ08	0.20	-0.02	0.80
SCSJ11	0.15	0.00	0.76
SCSJ16	0.11	-0.04	0.76
SCSJ21	0.15	0.01	0.64

Isolation

SCIS04	-0.24	-0.07	0.80
SCIS13	-0.28	-0.04	0.68
SCIS18	-0.24	0.03	0.74
SCIS25	-0.23	-0.03	0.77

Over-identification

SCOI02	-0.22	-0.05	0.80
SCOI06	-0.19	-0.03	0.80
SCOI20	-0.38	0.10	0.63
SCOI24	-0.37	0.02	0.64

Supplementary Information F

Latent Profile Analysis

Prior to the analysis, the six self-compassion dimensions were standardized and scores on the three

RUS SCS sub-scales were reversed (*i.e.*, they were indicators of "lack of" Self-judgment,

Overidentification, and Isolation). By following Ullrich-French & Cox (2020), we select the best

LPA model of the SCS by specifying 1 through 6 profiles. Model selection was based on an

analytic hierarchy process resting on the comparison of fit indexes. The best solution was a model

with 6 classes. All models were fit in MPLUS 8.6 and freely estimated the means and variances of

indicators with robust maximum likelihood.

Two multilevel Bayesian regressions models were run with either PTG or IES-R scores as

the dependent variable and group membership according to the six-profile solution as independent

variable. All contrasts between PTG or IES-R mean pairs were evaluated with the Tukey

correction. The resulting HPD 95% intervals not including the zero point were coded with 1, if they

were consistent with the prediction formulated according to the relevant dimensions specified by

H1 or H2, and with 0 if they were not. For example, let us consider the contrast between the

profiles 3 and 6 described in Fig. 1 for the PTG dependent variable. According to H1, the mean

difference in PTG scores should only depend on the SC components of the SCS scale. Therefore,

profile 6 (*High CS Medium RUS*) is expected to have a higher PTG mean value than profile 3 (*Low

CS High RUS*). This prediction was satisfied in the present sample (0.21 vs. -0.32) and, therefore,

we coded the results of this contrast as 1 ("success"). If we compare these same two profiles in

terms of H2 (*i.e.*, the mean difference in PTG scores should only depend on the RUS components

of the SCS scale), then we should expect a higher PTG score in profile 3 than in profile 6. This did

not happen and, therefore, in terms of H2, this contrast was coded as 0.

Adjusted posterior means were then computed with the **emmeans** R package.

The procedure described in the example provided in the manuscript was applied to each of the 13 contrasts with HPD 95% intervals not including the zero point (by considering both for the contrasts computed with PTG as the dependent variable and the contrasts computed with IES-R as the dependent variable). In this manner, we obtained 13 out of 13 successes when "success" was coded according to H1, and 5 out of 13 successes when "success" was coded according to H2.

The analysis of this difference in terms of "proportion correct" produced a posterior median difference of 4.16 with a MAD standard deviation of 1.49 (or, in frequentist terms, prop. = 0.62, *SE* = 0.13, *p* = 0.00), which indicates a reliable difference. We interpret this result as supporting H1 (*i.e.*, the CS and RUS components have functionally difference purposes) rather than H2 (*i.e.*, the six sub-scales of the SCS do not measure functionally difference dimensions of the construct).

THE VALIDITY OF SELF-COMPASSION SCALE   22

Supplementary Information G

SEM models

Model M0

M0 considers two endogenous variables: post-traumatic growth (ptgr) and post-traumatic

stress (pts) and their relations with 4 exogenous variables: coping (cope), perceived social support

(soc), self-compassion (sc), and neuroticism (neuro). In model M0, only the regression effects of

cope and soc are considered. Other two variables also included (self-compassion and neuroticism),

although they have no effects on the endogenous variables, in order to allow comparisons between

nested models.

Model 0 comprised six latent factors: self-compassion, coping, perceived social support,

Neuroticism, post-traumatic growth, and post-traumatic stress disorder.

Each latent variable was identified by its sub-scale scores as indicators.

Self-compassion was represented as a unitary construct with six indicators. Model 0 included direct

paths between two exogenous variables (coping, perceived social support) and the two endogenous

variables of interest (post-traumatic growth, and post-traumatic stress disorder). No direct paths

were specified between both self-compassion and neuroticism and the two exogenous variables.

Model's definition (lavaan syntax)

```
model0 <- "
# post-traumatic growth
ptgr =~ life_appreciation +
new_possibilities + personal_strength +
```

```
spirituality_changes +

interpersonal_relationships

# pts

ptss =~ avoiding + intrusivity +

iperarousal

# coping

cope =~ social_support +

avoiding_strategies +

positive_attitude +

problem_orientation +

transcendent_orientation

# perceived social support

soc =~ family + friends +

significant_other

# self-compassion

sc =~ self_judgment + isolation +

over_identification + self_kindness +

common_humanity + mindfulness

# neuroticism

neuro =~ negative_affect +

self_reproach

# regressions

ptgr ~ cope +

soc ptss ~

cope + soc

# Residual correlations

self_judgment ~~ self_kindness
```

THE VALIDITY OF SELF-COMPASSION SCALE   24

"

       Modification indexes suggested the inclusion of a residual covariance between the

subscales of Self judgment and Self kindness. Also with this specification, Model 0 showed an

unacceptable fit with the data, χ^2 (240) = 2,484.79, χ^2/df = 10.35, CFI = 0.76, NFI = 0.74, TLI =

0.72, RMSEA = 0.11, and SRMS = 0.15. Overall, the CFA fit indexes did not support Model 0,

which did not include regression effects for both self-compassion and neuroticism.

Model 1

M1 considers, besides the regression effects of M0, also an effect of self-compassion, but without distinguishing the RUS and CS components. Modification indexes suggested the addition of a residual correlation between Self-judgment and Self-kindness.

Model's definition (lavaan syntax)

In model M1, self-compassion was conceived as a unitary construct defined by six indicators (*i.e.*, no distinction between CS and RUS was made). Model 1 comprised two additional direct regression paths between self-compassion and the two endogenous variables, which improved model fit compared to Model 0, $\Delta\chi^2$ (2) = 123, p= 0. However, the overall model fit was still unacceptable, $\chi^2(238) = 2,302.08$, χ^2/df = 9.67, CFI = 0.78, NFI = 0.76, TLI = 0.74, RMSEA = 0.11, and SRMS = 0.13.

```
model1 <- "
# post-traumatic growth
ptgr =~ life_appreciation +
new_possibilities + personal_strength +
spirituality_changes +
interpersonal_relationships
# ptsd
ptss =~ avoiding + intrusivity +
iperarousal
# coping
cope =~ social_support +
avoiding_strategies + positive_attitude
```

THE VALIDITY OF SELF-COMPASSION SCALE   26

```
+ problem_orientation +

transcendent_orientation

# perceived social support

soc =~ family + friends +

significant_other

# self-compassion

sc =~ self_judgment + isolation +

over_identification + self_kindness +

common_humanity + mindfulness

# neuroticism

neuro =~ negative_affect +

self_reproach

# regressions

ptgr ~ cope + soc + sc

ptss ~ cope + soc + sc

# residual correlations

self_judgment ~~ self_kindness

"
```

Model 1a

Model 1a attempted to improve the fit of Model 1 by including only a subset of indicators for Coping (*i.e.*, Positive attitude and Problem orientation), because Coping was poorly defined by the other indicators. This modification improved the model fit substantially, $\Delta\chi^2(63) = 850.08$, $p= 0$. However, the overall model fit was still unacceptable, $\chi^2(175) = 1{,}389.15$, $\chi^2/df = 7.94$, CFI = 0.85, NFI = 0.84, TLI = 0.83, RMSEA = 0.10, and SRMS = 0.10.

Model's definition (lavaan syntax)

```
model1a <- "
# post-traumatic growth
ptgr =~ life_appreciation +
new_possibilities + personal_strength +
spirituality_changes +
interpersonal_relationships
# ptsd
ptss =~ avoiding + intrusivity +
iperarousal
# coping
cope =~ positive_attitude +
problem_orientation
# perceived social support
soc =~ family + friends +
significant_other
# self-compassion
```

```
sc =~ self_judgment + isolation +

over_identification + self_kindness +

common_humanity + mindfulness

# neuroticism

neuro =~ negative_affect +

self_reproach

sc ~~ neuro

soc ~~ cope

soc ~~ sc

soc ~~neuro

cope ~~ sc

cope~~neuro

#regressions

ptgr ~ cope + soc + sc

ptss ~ cope + soc + sc

# residual correlations

self_judgment ~~ self_kindness

"
```

Model 2

Model 2 was identical to Model 1a, except from the fact that, instead of having a unitary

self-compassion latent variable, the "lack of" Self-judgment, Overidentification, and Isolation

indicators revealed the RUS latent variable, and the Self-kindness, Common humanity, and

Mindfulness indicators revealed the CS latent variable. Model 2 represented an improvement of fit

relative to Model 1a, $\Delta\chi^2(6) = 626.20$, $p = 0$. Overall, the model fit indexes underlined a good fit of

Model 2, $\chi^2(169) = 618.93$, $\chi^2/df = 3.66$, CFI = 0.95, NFI = 0.93, TLI = 0.93, RMSEA = 0.06, and

SRMS = 0.06.

Model's definition (lavaan syntax)

```
model2 <- "
# post-traumatic growth
ptgr =~ life_appreciation +
new_possibilities + personal_strength +
spirituality_changes +
interpersonal_relationships
# ptsd
ptss =~ avoiding + intrusivity +
iperarousal
# coping c
ope =~ positive_attitude +
problem_orientation
# perceived social support
soc =~ family + friends +
significant_other
```

```
# self-compassion

nsc =~ self_judgment + isolation +

over_identification

psc =~ self_kindness + common_humanity +

mindfulness

# neuroticism

neuro =~ negative_affect +

self_reproach

psc ~~ nsc

psc ~~ neuro

nsc ~~ neuro

soc ~~ cope

soc ~~ nsc

soc ~~ psc

soc ~~ neuro

cope ~~ nsc

cope ~~ psc

cope ~~ neuro

# regressions

ptgr ~ cope + soc + nsc +

psc

ptss ~ cope + soc + nsc +

psc

# residual correlations

self_judgment ~~ self_kindness

"
```

Supplementary Information H

Model 3

Model M3 adds the regression coefficient for Neuroticism.

```
model3 <- "
# post-traumatic growth
ptgr =~ life_appreciation +
new_possibilities + personal_strength +
spirituality_changes +
interpersonal_relationships
# ptsd
ptss =~ avoiding + intrusivity +
iperarousal
# coping
cope =~ positive_attitude +
problem_orientation
# perceived social support
soc =~ family + friends +
significant_other
# self-compassion
psc =~ self_kindness + common_humanity +
mindfulness
nsc =~ self_judgment + isolation +
over_identification
# neuroticism
neuro =~ negative_affect +
self_reproach
```

THE VALIDITY OF SELF-COMPASSION SCALE   32

```
# regressions

ptss ~ cope + soc + nsc + psc +

neuro

ptgr ~ cope + soc + nsc + psc +

neuro

# residual correlations

self_judgment ~~ self_kindness

"
```

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Supplementary Information I

Model 4

Model 4 remove the two self-compassion regression effects from M3.

```
model4 <- "

# post-traumatic growth

ptgr =~ life_appreciation +

new_possibilities + personal_strength +

spirituality_changes +

interpersonal_relationships

# ptss

ptss =~ avoiding + intrusivity +

iperarousal

# coping

cope =~ positive_attitude +

problem_orientation

# perceived social support

soc =~ family + friends +

significant_other

# neuroticism

neuro =~ negative_affect +

self_reproach

# self-compassion

nsc =~ self_judgment + isolation +

over_identification

psc =~ self_kindness + common_humanity +

mindfulness
```

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```
# regressions

ptgr ~ cope + soc +

neuro

ptss ~ cope + soc +

neuro

# residual correlations

self_judgment ~~ self_kindness

"
```

Supplementary Information J

Model 5

M5 remove only the regression effect of the negative component of self-compassion from

M4.

```
model5 <- "
# post-traumatic growth
ptgr =~ life_appreciation +
new_possibilities + personal_strength +
spirituality_changes +
interpersonal_relationships
# ptsd
ptss =~ avoiding + intrusivity +
iperarousal
# coping
cope =~ positive_attitude +
problem_orientation
# perceived social support
soc =~ family + friends +
significant_other
# self-compassion
nsc =~ self_judgment + isolation +
over_identification
psc =~ self_kindness + common_humanity +
mindfulness
# neuroticism
```

THE VALIDITY OF SELF-COMPASSION SCALE

36

```
neuro =~ negative_affect +

self_reproach

# regressions

ptgr ~ cope + soc + psc +

neuro

ptss ~ cope + soc + psc +

neuro

# residual correlations

self_judgment ~~ self_kindness

"
```

Supplementary Information K

Model 6

M6 removes only the positive component of self-compassion from M4.

Supplementary Information L

Model 7

M7: mediation model with the two components of self-compassion

```
model7 <- "

# post-traumatic growth

ptgr =~ life_appreciation + new_possibilities +

personal_strength + spirituality_changes +

interpersonal_relationships

# ptsd

ptss =~ avoiding + intrusivity +

iperarousal

# coping

cope =~ positive_attitude +

problem_orientation

# perceived social support

soc =~ family + friends +

significant_other

# self-compassion

nsc =~ self_judgment + isolation +

over_identification

psc =~ self_kindness + common_humanity +

mindfulness

# neuroticism

neuro =~ negative_affect +

self_reproach

# regressions
```

```
ptgr ~ dg_cope*cope + dg_soc*soc +

dg_neuro*neuro

ptss ~ ds_cope*cope + ds_soc*soc +

ds_neuro*neuro

nsc ~ nsc_cope*cope + nsc_soc*soc +

nsc_neuro*neuro

psc ~ psc_cope*cope + psc_soc*soc +

psc_neuro*neuro

ptgr ~ ig_nsc*nsc + ig_psc*psc

ptss ~ is_nsc*nsc + is_psc*psc

# residual correlations
self_judgment ~~ self_kindness

# indirect and total effects

# cope

i_cope_s := nsc_cope * is_nsc + psc_cope

* is_psc

i_cope_g := nsc_cope * ig_nsc + psc_cope

* ig_psc

tot_cope_s := i_cope_s + ds_cope

tot_cope_g := i_cope_g + dg_cope

tot_cope := i_cope_s + i_cope_g

# soc

i_soc_s := nsc_soc * is_nsc + psc_soc *

is_psc

i_soc_g := nsc_soc * ig_nsc + psc_soc *

ig_psc

tot_soc_s := i_soc_s + ds_soc
```

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```
tot_soc_g := i_soc_g + dg_soc

tot_soc := i_soc_s + i_soc_g

# neuro

i_neuro_s := nsc_neuro * is_nsc + psc_neuro

* is_psc

i_neuro_g := nsc_neuro * ig_nsc + psc_neuro

* ig_psc

tot_neuro_s := i_neuro_s + ds_neuro

tot_neuro_g := i_neuro_g + dg_neuro

tot_neuro := i_neuro_s + i_neuro_g

"
```

Supplementary Information M

Sample size and statistical power

We used the function semPower.aPriori of the R package semPower to determine the required

sample size to detect misspecifications of a model involving df = 168 degrees of freedom -- our

final SEM model -- corresponding to RMSEA = .05 with a power of 80% on an alpha error of .05.

The results show that a sample size of N = 123 yields a power of approximately 80% to reject a

wrong model (with df = 168) with an amount of misspecification corresponding to RMSEA = .05

on alpha = .05.

We also used the semPower.postHoc function to determine the actually achieved power with the

sample size of the present sample. The results show that a sample size of N = 783 (in the main

study) is associated with a power larger than > 99.99% to reject a wrong model (with df = 168) with

an amount of misspecification corresponding to RMSEA = .06 (the actual value that we obtained)

on alpha = .05.

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