



# Assessing Self-Compassion in Older Adults: Factorial Structure of the Self-Compassion Scale and Invariance Across Sex at Birth

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Accepted: 21 August 2024  
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## Abstract

**Objectives** Self-compassion is a valuable resource for positive ageing and should be measured in a reliable and valid manner. However, findings regarding the factor structure of the Self-Compassion Scale (SCS) have been inconsistent and have been particularly lacking in older adults. Hence, the present study intended to investigate the factor structure, internal consistency, and measurement invariance across sex at birth of the SCS in adults  $\geq 65$  years old.

**Method** The present study used a sample of 418 community-dwelling, Portuguese older adults aged 65–94 years ( $M = 74.45$ ,  $SD = 6.94$ ; 59.3% female). Confirmatory factor analyses were conducted to test six different measurement models, and reliability and multigroup analyses were performed for the best fitting model.

**Results** Although all models initially showed poor adjustment, the correlated 6-factor model had the comparatively better fit. After modifications, this model achieved an acceptable fit ( $RMSEA = 0.060$  and  $SRMR = 0.062$ ). Internal consistency of this model was adequate (Cronbach's alpha values ranging from 0.67 to 0.86) and strong invariance across sex at birth was demonstrated (i.e., configural, metric, and scalar models showed non-significant  $\Delta\chi^2$ ).

**Conclusions** Current findings suggest that assessing the self-compassion components is advised in older adults, as this 6-component model was reliable and provided an acceptable fit for both male and female older adults. This 6-component model is a parsimonious, theoretically sound, and statistically valid option to assess self-compassion in this population. It is, however, not an ideal solution, and an acceptable fit was only achieved after modifications in the initial 6-component model.

**Preregistration** This study is not preregistered.

**Keywords** Older Adults · Self-Compassion Scale · Factor Structure · Measurement Invariance · Confirmatory Factor Analysis

Compassion has been defined by the Dalai Lama (1995, p. 61) as “an openness to the suffering of others with a commitment to relieve it”. Gilbert (2005) defines

compassion as an inherently human feeling or motivation for caregiving that recruits motives, emotions, and cognitive competencies (e.g., attention and theory of mind) for care

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and to be sensitive to others' needs. According to this framework, self-compassion entails a similar sensitivity to the suffering of the self and the motivation to assuage this suffering. Self-compassionate individuals are better able to deal with setbacks via a caring and compassionate orientation to the self, and by stimulating a sense of safeness and soothing that helps to balance different emotions and act in a prosocial way (Gilbert, 2009, 2010).

Neff (2003a, 2003b) focused specifically on self-compassion and defined it as an adaptive relationship with the self during times of difficulty or failure, by being understanding and kind instead of critical. Being self-compassionate, we understand that mistakes are inherent to the human condition rather than a sign of personal inadequacy, which allows for a mindful awareness of unpleasant sentiments and cognitions without avoiding, suppressing, or overidentifying the self with them. Neff (2003a, 2003b) further conceptualized self-compassion as based on three interrelated components: self-kindness, common humanity, and mindfulness. Self-kindness entails being gentle and soothing toward the self when facing challenges or failure, encouraging motivation for personal improvement and growth. Common humanity entails having a broader and holistic perspective of personal flaws, recognizing that negative experiences are shared by every human being. Mindfulness entails being aware of one's experiences, feelings, and thoughts in the present moment, thus acknowledging negative circumstances in an adaptive manner. Neff (2003a, 2003b) also identified negative counterparts to each of these three components. Self-judgment, as opposed to self-kindness, represents a relationship with the self that is highly critical, where the self is perceived as not deserving of kindness or forgiveness. Isolation, as opposed to common humanity, represents a feeling of disconnectedness, where one becomes overwhelmed by difficulties and forgets that others may experience similar circumstances. Over-identification, as opposed to mindfulness, represents a state where one becomes so consumed by intense emotional reactions that other characteristics and resources of the self become blocked, leading to avoidance or repression of these painful feelings.

Research in the field of self-compassion has bloomed over the last two decades, and the literature suggests that self-compassion is associated with positive psychological constructs (e.g., well-being, positive affect, life satisfaction) and may be a protective factor in face of distress and diverse mental health problems (Han & Kim, 2023; MacBeth & Gumley, 2012; Zessin et al., 2015), as well as physical health and health-related conditions (Kılıç et al., 2021; Phillips & Hine, 2021). Self-compassion also seems to be a useful resource for younger age groups, such as adolescents (Bluth et al., 2016; Marsh et al., 2018; Neff & McGehee, 2009), and even for sexual minority groups (Carvalho & Guiomar, 2022; Helminen et al., 2023).

Moreover, the literature has demonstrated the benefits of fostering self-compassion in different settings (e.g., work-related well-being, Kotera & Van Gordon, 2021; mental health professionals, Crego et al., 2022) and in relation to specific mental health conditions (e.g., suicidal thoughts and behaviors and non-suicidal self-injury, Suh & Jeong, 2021; eating and body image concerns, Turk & Waller, 2020). Self-compassion also seems to be a stable psychological resource, associated with improved mental health outcomes over time (Marshall et al., 2015; Stolow et al., 2016). Furthermore, research has demonstrated that self-compassion is a malleable construct and able to be taught/learned and trained, and such findings fostered the development of (self)compassion-based interventions for several contexts, with positive outcomes (Ferrari et al., 2019; Kirby, 2017).

Although most research has been conducted with younger populations, Allen et al. (2011) pioneered the self-compassion research in older adults and, in the past decade, the literature has suggested that self-compassion may, indeed, be a useful resource to foster positive ageing. Similar to the findings in younger age-groups, self-compassion has also been associated with beneficial psychological constructs in older adults (e.g., psychological well-being, Homan, 2016; resilience, Smith, 2015) and, likewise, seems to act as a protection factor in relation to psychopathology symptoms (e.g., depressive symptoms, Gao et al., 2023; Hodgetts et al., 2021) and physical health conditions (e.g., daily physical symptoms and chronic illness; Herriot & Wrosch, 2022). In the systematic review and meta-analysis by Brown et al. (2019), in older adults, self-compassion was associated with decreased depressive and anxious symptoms, and with increased levels of hedonic (i.e., the presence of positive emotions and life satisfaction, and the absence of negative emotions) and eudaemonic (i.e., happiness or contentment achieved through self-actualization and by having a meaningful life purpose) well-being. Self-compassion also moderated the relationship between self-reported health and well-being outcomes, and was therefore considered particularly important for the more physically vulnerable older adults (Brown et al., 2019). This evidence was complemented by a scoping review by Tavares et al. (2020), showing that self-compassion was positively associated with, and a predictor of, beneficial mental health constructs (e.g., life satisfaction, psychological well-being), and/or negatively associated with, and a predictor of, psychopathology symptoms (e.g., depression). Additionally, self-compassion was negatively associated with detrimental physical health constructs (e.g., pain, sleep disturbances, diurnal cortisol secretion), and emerged as a protection factor regarding the mental health of older adults in face of negative life events normatively associated with ageing (e.g., decline or loss of general health or physical skills).

Whereas empirical evidence illustrating the usefulness of overall self-compassion is well-established, less attention has been given to its components. The meta-analysis by Ferrari et al. (2019) reported that randomized controlled trials targeting self-compassion also improved all of its components, and Dreisoerner et al. (2021) reported that training one of the positive self-compassion components (i.e., self-kindness, mindfulness, common humanity) fostered improvements in the other positive components, although the findings regarding self-kindness were less conclusive. These authors also suggested that mindfulness interventions may be particularly useful to improve overall self-compassion. Such findings highlighted the impact that the self-compassion components may have on mental health, be it along with overall self-compassion or when considered individually. In fact, in the case of older adults, Perez-Blasco et al. (2016) demonstrated that an intervention program promoting both self-compassion and mindfulness helped to improve resilience and coping strategies and to reduce anxiety and stress symptoms. In this population, mindfulness-based interventions have also been demonstrated to successfully reduce symptoms of anxiety (Hatch et al., 2022) and depression (Reangsing et al., 2020). Notwithstanding, very few studies so far have investigated the efficacy of self-compassion-based interventions in older adults, and some reviews and meta-analyses regarding mindfulness-based interventions in this age-group caution about the lack of methodological rigor and high risk of bias present in many studies (Geiger et al., 2016; Kayser et al., 2023; Li & Bressington, 2019; Sanchez-Lara et al., 2022).

Taken together, these findings emphasize the need for more research, which, in turn, accentuates the importance of assessing self-compassion and its components in a reliable and valid manner. In this regard, another finding reported by Tavares et al. (2020) in their review was that the instrument more frequently used to assess self-compassion in older adults is the Self-Compassion Scale (SCS), in its long (Neff, 2003b) and short (Raes et al., 2011) forms. Critical appraisal of the psychometric properties of the short form (SCS-SF) is beyond the scope of the present article. The long form of the SCS (SCS-LF) is a self-report questionnaire that measures levels of self-compassion in situations of perceived failure and difficulty and intends to assess the facets of self-compassion according to Neff's conceptualization. Regarding the instrument's factor structure, in its original study, Neff (2003b) suggested that the positive and negative aspects of self-compassion formed six separate but correlated factors, and that a single higher-order factor of self-compassion explained the intercorrelations between the six factors. Therefore, the positive and the negative items were separated into six intercorrelated subscales: Self-kindness, Self-judgment, Common Humanity, Isolation, Mindfulness, and Over-identification.

Neff (2003b) suggested that the SCS-LF could be used to assess the total score of self-compassion, as well as scores for each subscale.

Some posterior studies, however, were not able to replicate the original factorial solution of the SCS-LF nor to confirm the higher-order single-factor structure (Lopez et al., 2015; Petrocchi et al., 2014; Tóth-Király et al., 2017). Furthermore, it has been suggested that the items assessing the negative counterparts of the key components of self-compassion may be problematic, as they measure constructs already known to be associated with psychopathology (e.g., self-judgment may be similar to self-criticism). On the other hand, the association between the negative components of self-compassion and mental health symptoms seems to be stronger than the association between the positive components of self-compassion and the same symptoms. Taken together, these arguments have sustained the idea that the total score of the SCS-LF, which includes the reversely scored negative items, may result in an inflated negative relationship between self-compassion and psychopathology (Muris, 2016; Muris & Petrocchi, 2017). Such findings originated an ongoing controversy over whether or not self-compassion should be measured by the SCS-LF as an overall construct.

To address this criticism, Neff (2016) argued that the SCS-LF is consistent with her definition of self-compassion, i.e., a dynamic balance between the compassionate *versus* uncompassionate ways in which individuals emotionally respond to difficulties and failure (with kindness *versus* judgment), cognitively understand their predicament (as part of the human experience *versus* as isolating), and pay attention to suffering (in a mindful *versus* over-identified manner). This would justify why the SCS-LF assesses the lack of uncompassionate responses as well as the presence of compassionate ones. Neff et al. (2017) further examined the psychometric properties and the factor structure of the SCS-LF across a variety of populations (i.e., student, community, meditator, and clinical). Confirmatory factorial analyses (CFA) were used to examine a 1-factor model, a 2-factor correlated model, a 6-factor correlated model, a higher-order model, and a bifactor model. Results suggested that a total SCS-LF score could be interpreted using a bifactor model, but not a higher-order model. Fit indices also generally supported the 6-factor correlated model across samples. Additionally, the 1- and 2-factor models showed poor fit in all samples. The authors concluded that the SCS-LF can be seen as having six subscale factors and a general factor of self-compassion simultaneously, rather than being comprised of two factors, one positive and one negative (Neff et al., 2017). Similar conclusions, i.e., inferior fit of a 2-factor model and support for the 6-factor and bifactor models, were also reported by Neff et al. (2019) and by Rakhimov et al. (2023).

Notwithstanding, the controversy was not settled and a growing number of studies continue to suggest that a 2-factor solution, formed by the positive and negative subscales of the SCS-LF, may provide the best fit model (Brenner et al., 2017; Brown et al., 2015; Costa et al., 2016; Lopez et al., 2015; Muris & Petrocchi, 2017; Muris et al., 2016, 2018; Zeng et al., 2016). In particular, Halamová et al. (2020) examined the factor structure of the SCS-LF and tested a series of bifactor (i.e., all items loaded directly onto a general factor, Self-compassion, as well as onto one of the six specific components) and two-tier (i.e., all items loaded directly onto one of two general factors, Self-Compassionate Responding and Self-Uncompassionate Responding, as well as onto one of the six specific components) models across 11 different populations and 10 language versions. In each sample, the authors compared the two-tier model with the bifactor model using the likelihood ratio test. Results showed that all the two-tier models had a significantly better fit than the corresponding bifactor models and that, by using the likelihood ratio tests, the two-tier models also outperformed the bifactor models. Additionally, correlations between the total scores of the two general factors, Self-Compassionate Responding and Self-Uncompassionate Responding, were significant but did not have a magnitude large enough to suggest a unitary construct. Taken together, these findings were considered evidence that the positive and negative components of self-compassion should be distinguished. The authors, therefore, recommended to avoid using the SCS-LF total score as an indicator of self-compassion and suggested, instead, to measure the Self-Compassionate Responding and Self-Uncompassionate Responding constructs as separate.

In the present state of the art, it must be noted that most studies that have investigated the properties of the SCS-LF recruited samples consisting of relatively young participants. Regardless, the instrument's factor structure seems to be controversial for the older adult population as well. Phillips and Ferguson (2013) conducted CFAs to assess the goodness of fit of the original structure of the SCS-LF (Neff, 2003b) on data from 185 participants aged  $\geq 65$  years. A correlated 6-factor model and a higher-order model were tested and neither fit the data well, and the higher-order model showed particularly poor adjustment. A subsequent exploratory factor analysis (EFA) identified two factors representing a positive facet containing items relating to self-kindness, common humanity, and mindfulness, and a negative facet containing items relating to self-judgment, isolation, and over-identification. In interpreting this disparity, the authors argued that conducting an EFA of all 26 items simultaneously in younger participants, which was a procedure not done by Neff (2003b), might also have resulted in a similar 2-factor structure. Similarly, Bratt and Fagerström (2019) investigated the factor structure of the short form of the SCS using a sample of 594 participants aged 66–102 years. A principal

component analysis (PCA) indicated that only a 2-factor model, comprising a compassionate or uncompassionate way of relating to oneself, had an acceptable fit. Nonetheless, when CFAs were then conducted to test a single general self-compassion factor model, a 2-factor model, and a 6-factor model, none of these models showed adequate fit. In this same study, the authors also conducted telephone interviews where the SCS-SF was administered to an independent sample of ten older adults, aged 75–87 years old. Based on the feedback obtained, it was suggested that the poor model fit in the aforementioned CFAs might have been due to the abstract nature of some items and difficulty in understanding reversed items and items containing double negatives. In other words, the authors proposed that it was possible that some participants were unable to truly understand the meaning of certain items (Bratt & Fagerström, 2019). To our knowledge, these are the only two studies so far that have examined the factor structure of the SCS specifically in older adults, and the study by Phillips and Ferguson (2013) is the only one that addressed the SCS-LF in particular.

Finally, there are some findings with Portuguese adult samples that also reflect the aforementioned controversy. Namely, Castilho et al. (2015) tested the factorial structure of the long and short forms of the SCS in both clinical and non-clinical Portuguese samples, and CFAs were conducted to test whether the factor solution of the SCS-LF proposed by Neff (2003b) had a good fit. Overall, results suggested that the 6-factor and the higher-order models presented a good fit to the data in both samples, indicating that, for the Portuguese population, the six individual components or the total score of the SCS-LF could be used. The instrument also showed good internal consistency, test–retest reliability, and convergent validity. Nonetheless, Costa et al. (2016), in also exploring the factor structure of the SCS-LF in clinical and non-clinical Portuguese samples, reported different conclusions. The 6-factor and higher-order 1-factor models, as defined by Neff (2003b), were tested against a 2-factor model (named Self-Compassionate Attitude and Self-Critical Attitude) and CFA results showed that the 2-factor solution fit the data better than the other models. The instrument also showed good internal consistency, construct-related and external validity, and invariance among the studied groups. It should also be noted that these two studies used general adult samples and did not specifically focus on older adults.

The present study's main objective was to account for this literature gap by studying the factor structure of the SCS-LF in a community-dwelling sample of Portuguese older adults. To achieve the study's main purpose, CFAs were conducted to test six different measurement models that have been the most studied (e.g., Halamová et al., 2020; Neff et al., 2019): a 1-factor model, a 6-factor model, a 2-factor model, a higher-order model, a bifactor model, and a two-tier model. Details about these models

are presented in the data analysis section. Additionally, the present study also investigated the internal consistency and the invariance across sex at birth of the best-fitting model. Measurement invariance is an important statistical procedure in psychometric research, as it ensures comparability across the considered groups (Schmitt & Ali, 2015). Some studies have suggested that males seem to be more self-compassionate than females, although these differences in self-compassion mostly apply to younger populations and tend to become non-significant for older adults (Tavares et al., 2023; Yarnell et al., 2015). Whereas some works have previously demonstrated the invariance across sex at birth of the SCS-LF factorial structure in younger samples (e.g., Cunha et al., 2016; Petrocchi et al., 2014; Tóth-Király & Neff, 2021), the present study was the first to implement this statistical procedure in a sample consisting exclusively of older adults, aiming to further investigate the validity of the SCS-LF in this population.

Given the scarce literature focusing specifically on older adults in this field, the present study was mostly exploratory. Nonetheless, based on the results by Phillips and Ferguson (2013) and Bratt and Fagerström (2019), it was hypothesized that the 2-factor model solution would provide the best fit and that the 1-factor, 6-factor, and higher-order models would provide an inadequate fit. Based on the literature focused on general adult samples (e.g., Halamová et al., 2020; Neff et al., 2019), it was also hypothesized that the bifactor and the two-tier models would provide an acceptable, if not good, fit. Furthermore, based on the evidence of invariance across sex at birth of the SCS-LF factorial structure for younger age-groups (Cunha et al., 2016; Petrocchi et al., 2014; Tóth-Király & Neff, 2021) and based on the literature suggesting that differences across sex at birth in the levels of self-compassion tend to become non-significant as the individuals grow older (Tavares et al., 2023; Yarnell et al., 2015), it was hypothesized that the factorial structure of the SCS-LF would also be invariant across sex at birth in older adults.

## Method

### Participants

Based on the recommendations by Tabachnick and Fidell (2013) for CFAs, a minimum sample size of 300 participants was defined a priori. Participants were 418 older adults aged 65–94 years ( $M = 74.45$ ,  $SD = 6.94$ ). The majority of participants was female ( $n = 248$ , 59.3% females;  $n = 170$ , 40.7% males), married or in a relationship ( $n = 246$ , 58.9% married or in a relationship;  $n = 155$ , 37.1% divorced or widowed;  $n = 17$ , 4.1% single), and had completed the

4th grade of formal education ( $n = 130$ , 31.1% 4th grade;  $n = 96$ , 23.0% 9th grade;  $n = 84$ , 20.1% 6th grade;  $n = 41$ , 9.8% university education;  $n = 36$ , 8.6% 12th grade;  $n = 31$ , 7.4% no formal education). Preliminary analyses showed that age did not significantly differ between males ( $M = 74.99$ ,  $SD = 6.78$ ) and females ( $M = 74.08$ ,  $SD = 7.03$ ),  $t(416) = 1.32$ ,  $p > 0.05$ . Similarly, there were no significant differences in the proportion of male and female participants according to education,  $X^2(5) = 9.08$ ,  $p > 0.05$ . On the other hand, there were significant differences in the proportion of male and female participants according to marital status,  $X^2(2) = 14.71$ ,  $p < 0.001$ , and the standardized residual values showed that this sample contained significantly fewer males who were divorced or widowed (STD residual = -2.1) than statistically expected.

### Procedure

The present study is part of a broader, ongoing research project. The sample was recruited from institutions such as Universities for the Third Age, care houses, and recreative centers located in the north and central regions of Portugal. Inclusion criteria included: (a) age  $\geq 65$  years; (b) no formal diagnosis of neurological and psychiatric disorders; and (c) capacity to give informed consent. Participants were given an informed consent form containing information regarding the project and their rights as participants. Some participants expressed difficulty reading and/or writing on their own, due to either a low level of literacy or poor eyesight. In these cases, one of the researchers read aloud the informed consent form and then administered the instruments to these participants in interview format. Otherwise, the instruments were filled in self-response format. Participation was entirely voluntary and the participants did not receive any form of monetary or material incentive or compensation for their participation.

### Measures

#### Sociodemographic Questionnaire

This instrument was created to assess age, sex at birth, marital status, and years of education, as a way of characterizing the present study's sample.

#### Self-Compassion Scale (SCS)

The long form of this instrument (SCS-LF; Neff, 2003b) contains 26 items and was originally proposed to include 6 subscales: Self-kindness, Self-judgement, Common humanity, Isolation, Mindfulness, and Over-identification. Items are rated on a 5-point Likert-format scale, varying from 1

(*Almost never*) to 5 (*Almost always*). The original version of the scale (Neff, 2003b) showed adequate internal consistency for the total score ( $\alpha=0.92$ ) and for the subscales ( $\alpha=0.75\text{--}0.81$ ), and high test–retest reliability over three weeks for the total score ( $r=0.93$ ) and for the subscales ( $r=0.80\text{--}0.88$ ). The SCS-LF also showed adequate construct validity in relation to social desirability, convergent validity in relation to social connectedness and emotional intelligence, and discriminant validity in relation to self-criticism, social connectedness, and emotional intelligence. As for the Portuguese version of the SCS-LF (Castilho & Pinto-Gouveia, 2011), adequate values were reported for internal consistency of the total scale ( $\alpha=0.89$ ) and of the subscales ( $\alpha=0.73\text{--}0.84$ ), as well as adequate test–retest reliability over four weeks for the total score ( $r=0.78$ ). Likewise, adequate convergent and discriminant validity results were reported in relation to social comparison, optimism, depression, anxiety, and stress.

## Data Analyses

IBM-SPSS was used to check the data for normality and to perform the internal consistency analyses. Univariate normality was assessed by the Kolmogorov–Smirnov test and multivariate normality was assessed by the values of skewness (Sk) and kurtosis (Ku) recommended by Kline (2005;  $Sk < 3$  and  $Ku < 8$ ). Regarding reliability analyses, Cronbach's alpha was calculated. Given that CFA explicitly tests the fit of a hypothesized factor structure to the observed covariance structure of the data (Floyd & Widaman, 1995), it was considered the most adequate statistical procedure to accomplish the present study's objective. Mplus was used to perform CFAs and to test model invariance across sex at birth. The Mplus syntax files for all analyses are available in the present article's Supplementary Information.

Six models were tested: a 1-factor model, a 6-factor correlated model, a 2-factor correlated model (positively formulated SCS-LF items load onto one factor, i.e., self-compassionate responding, and negatively formulated SCS-LF items load onto another factor, i.e., self-uncompassionate responding), a higher-order model (6 factors, i.e., the self-compassion components, load onto 1 factor, i.e., self-compassion), a bifactor model, and a two-tier model. The bifactor model was based on Reise (2012) and incorporated a general factor, i.e., self-compassion, onto which all items load directly, and a series of grouping factors, i.e., the self-compassion components, each loading on a sub-set of items. The grouping factors in the bifactor model are hypothesized to be orthogonal with the general factor and, in the present study, the grouping factors were also defined as orthogonal among themselves. The two-tier model was based on Cai (2010) and was defined so that all items load directly onto one of two general factors, i.e., self-compassionate responding and

self-uncompassionate responding, as well as onto one of six specific factors, i.e., the self-compassion components. In the two-tier model, the general dimensions and specific dimensions are orthogonal and the specific dimensions are also assumed to be orthogonal among themselves. Whereas the general dimensions are allowed to correlate, in the present study they were defined as orthogonal as well.

Due to the ordinal nature of the item responses on the SCS-LF, and to account for mild violations of normality, the robust version of maximum likelihood estimation (MLR) was used to estimate model parameters. Normal theory ML estimation has been shown to produce accurate parameter estimates for CFAs with ordered variables having five or more categories (Beauducel & Herzberg, 2006; Rhemtulla et al., 2012), as is the case for the SCS-LF, whereas the MLR estimation is useful to adequately correct for underestimated standard errors and inaccurate test statistics that tend to occur with ordered categorical variables when using ML estimation (Rhemtulla et al., 2012).

To evaluate model fit, in addition to the chi-square test, which is highly sensitive to sample size (i.e., can lead to incorrect rejection of the model fit; Reise et al., 1993), the comparative fit index (CFI), the Tucker–Lewis index (TLI), the root mean square error of approximation (RMSEA) with accompanying 90% confidence interval (CIRMSEA), and the standardized root mean square residual (SRMR) were used. Model fit criteria were chosen based on the recommendations by Hu and Bentler (1999): CFI and  $TLI \geq 0.90$  was considered acceptable, values  $\geq 0.95$  were considered a good model fit; RMSEA values in the range of 0.06–0.08 were considered acceptable, values  $\leq 0.06$  were considered good; SRMR values  $\leq 0.08$  were considered acceptable, values  $\leq 0.05$  were considered good. The 2-index presentation strategy suggested by the same authors, which includes using the SRMR and supplementing it with either TLI, CFI, or RMSEA, was also used. To compare the relative fit of the competing models, Akaike's (1973) information criterion (AIC) was used. The model with the smallest AIC was assumed to have the better fit. However, when conducting CFAs, analyses of data should not be based solely on fit indices. Therefore, factor loadings, cross-loadings, and inter-factor correlations were also examined (Marsh et al., 2004). For factor loadings and cross-loadings to be considered meaningful, the criteria of 0.32 proposed by Worthington and Whittaker (2006) was used. If modifying the models was necessary, improvements were conducted based on Mplus modification indices and only if they were theoretically supported (Brown, 2015; Schreiber et al., 2006).

Finally, a multigroup analysis was conducted to test the equivalence of the best-fitting model across sex at birth. Configural invariance, metric/weak measurement invariance, and scalar/strict measurement invariance were

tested. Non-significant  $\Delta\chi^2$  among the configural, metric, and scalar models were used as criteria to demonstrate invariance across sex at birth (Dimitrov, 2010).

## Results

According to the selected criteria, no model initially showed adequate fit. The 6-factor model had the comparatively better fit (AIC = 29,654.04), followed by the two-tier model (AIC = 29,750.18) and the 2-factor model (AIC = 29,888.58), respectively. The 6-factor model also had comparatively higher values of CFI (0.83) and TLI (0.81) and lower values of RMSEA (0.071) and SRMR (0.080). Subsequent analyses, therefore, were focused on this model. Fit indices for all the models tested are available in Table 1.

Modification indices were used to improve fit. Because Item 24 (“When something painful happens I tend to blow the incident out of proportion.”), initially, and then Item 25 (“When I fail at something that's important to me, I tend to feel alone in my failure.”) were found to lack specificity (i.e., Item 24 cross-loaded on five factors, Item 25 cross-loaded on all six factors), they were excluded from the model. Next, modification indices suggested correlating the residual errors of Items 9 (“When something upsets me I try to keep my emotions in balance.”) and 14 (“When something painful happens I try to take a balanced view of the situation.”), which was theoretically plausible given that both items belong to the Mindfulness factor. After these modifications were applied, one at a time, fit indices improved and could be considered acceptable according to Hu and Bentler’s (1999) 2-index approach, given the values of

RMSEA = 0.060 and SRMR = 0.062. At this point, it was decided not to modify the model any further. Otherwise, it was likely that a good fit (as opposed to acceptable fit) would only be attainable by removing more items, which, in turn, might compromise the integrity of some subscales (e.g., being reduced to only two items).

Regarding local adjustment (Fig. 1), all factor loadings were statistically significant ( $p < 0.001$ ) and were considered meaningful, ranging from 0.40 (Item 9) to 0.85 (Item 10). Overall, the modified 6-factor model showed acceptable global and local adjustment.

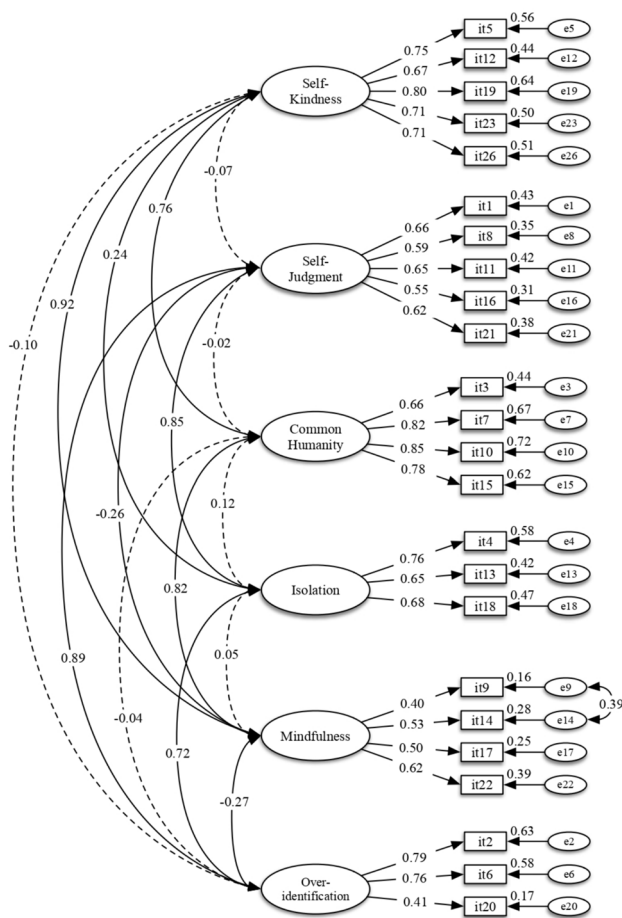
Regarding the multi-group analysis, the results were as follows: for the metric model against configural model,  $\Delta\chi^2(18) = 9.18, p > 0.05$ ; for the scalar model against metric model,  $\Delta\chi^2(18) = 12.16, p > 0.05$ . These comparisons among the configural, metric, and scalar models showed non-significant  $\Delta\chi^2$ , therefore demonstrating invariance across sex at birth. Fit indices for the configural, metric, and scalar models are available in Table 1.

Finally, regarding the reliability analysis (please see Table 2), the corrected item-total correlations generally showed good values ( $r \geq 0.40$ ), supporting the adequacy of the items to the construct of the SCS-LF. Cronbach's alpha for the six subscales was acceptable to good, ranging from 0.67 to 0.86. However, it must be noted that Items 20 (“When something upsets me I get carried away with my feelings.”) and 22 (“When I'm feeling down I try to approach my feelings with curiosity and openness.”) were problematic based on corrected item-total values and Cronbach's alpha if item deleted. In fact, the deletion of both items would represent an increase in Cronbach's alpha for the respective subscale. Nonetheless, deleting Item 20 would leave the Over-identification subscale with only two items. On the other hand, a model where Item 22 was removed showed only a

**Table 1** Confirmatory Factor Analyses and Measurement Invariance on the Internal Structure of the SCS-LF

	$\chi^2$	Df	CFI	TLI	RMSEA	CIRMSEA	SRMR	AIC
Confirmatory factor analyses								
1-factor model	2921.74	299	0.27	0.21	0.145	0.140–0.150	0.206	31,902.51
6-factor model (original)	880.52	284	0.83	0.81	0.071	0.066–0.076	0.080	29,654.04
6-factor model (modified)	595.59	236	0.89	0.87	0.060	0.054–0.066	0.062	27,112.88
2-factor model	1079.77	298	0.78	0.76	0.079	0.074–0.084	0.086	29,888.58
Higher-order model	1250.72	293	0.73	0.71	0.088	0.083–0.094	0.167	30,086.75
Bifactor model	1090.94	273	0.77	0.73	0.085	0.079–0.090	0.164	29,915.87
Two-tier model	954.41	281	0.81	0.78	0.076	0.070–0.081	0.123	29,750.18
Measurement invariance across sex at birth								
Configural model	865.50	472	0.88	0.86	0.063	0.056–0.070	0.070	27,218.03
Metric model	875.57	490	0.89	0.87	0.061	0.055–0.068	0.071	27,192.60
Scalar model	891.04	508	0.89	0.88	0.060	0.054–0.067	0.072	27,168.67

*Note.* Measurement invariance across sex at birth refers to the modified 6-factor model. Df = degrees of freedom; CFI = comparative fit index; TLI = Tucker–Lewis index; RMSEA = root mean square error of approximation; CIRMSEA = 90% confidence interval for RMSEA; SRMR = standardized root mean square residual; AIC = Akaike information criterion. All chi-square values were significant at  $p < 0.001$ .



**Fig. 1** Confirmatory Factor Analysis of the 6-Factor Model of the SCS-LF for Older Adults ( $n=418$ ). Note. Standardized coefficients and measurement errors are shown; all paths are statistically significant ( $p < 0.001$ ) except for the paths drawn in dotted lines

very slight improvement in indices ( $RMSEA = 0.060$  and  $SRMR = 0.061$ ) and not enough for adjustment to improve from acceptable to good, according to Hu and Bentler's (1999) 2-index approach. Therefore, it was decided to keep these items.

## Discussion

Several studies have demonstrated the psychological and physical benefits of fostering self-compassion and this protective role has been found in persons of all ages (e.g., Han & Kim, 2023; Marsh et al., 2018; Tavares et al., 2020). Self-compassion may be a resource particularly relevant to older adults, given the challenging life events typically associated with ageing (Brown et al., 2019; Tavares et al., 2020). Nonetheless, the instrument more frequently used to assess self-compassion in older adults, the SCS-LF, has been the object of an ongoing controversy over its factor structure.

Whereas some studies suggest that the SCS-LF can be used to assess self-compassion as an overall construct as well as to assess its six components individually (e.g., Neff et al., 2019), other studies suggest that, instead, the SCS-LF should be used to assess two distinct general factors, often named Self-Compassionate Responding and Self-Uncompassionate Responding (e.g., Halamová et al., 2020). Such controversy also applies to Portuguese-speaking adult samples (Castilho et al., 2015; Costa et al., 2016), and results in the older adult population are even less conclusive. Only two studies so far have examined the factor structure of the SCS specifically in older adults (Bratt & Fagerström, 2019; Phillips & Ferguson, 2013) and only one study addressed the SCS-LF in particular (Phillips & Ferguson, 2013). Constructs that may contribute to a kinder, more accepting, and more adaptive attitude toward the effects of aging and that may be fostered through psychological interventions, such as self-compassion, are of crucial importance in both research and practice. As such, it is also crucial that these constructs can be measured in a reliable and valid manner.

The present study aimed to address this literature gap by studying the factor structure of the SCS-LF in a community-dwelling sample of Portuguese older adults. CFAs were conducted to test six different measurement models that have been the most studied (e.g., Halamová et al., 2020; Neff et al., 2019): a 1-factor model, a 6-factor model, a 2-factor model, a higher-order model, a bifactor model, and a two-tier model. The present study, therefore, aimed to provide comparative evidence regarding the goodness of fit of these six models and to identify a model that is parsimonious and theoretically and statistically valid with which to assess self-compassion in the older adult population.

Results showed that no initial factor solution of the SCS-LF fit the data adequately. This is in line with Phillips and Ferguson (2013) and Bratt and Fagerström (2019). However, results from fit and comparative indices (AIC) indicated that the 6-factor model presented better fit in comparison with others, after modifications on the saturated model. Specifically, Item 24 ("When something painful happens I tend to blow the incident out of proportion.") and Item 25 ("When I fail at something that's important to me, I tend to feel alone in my failure.") were particularly problematic due to cross-loadings and had to be removed for the 6-factor model to achieve adequate fit. This suggests that these two items were unspecific and possibly misunderstood by participants, both due to low educational levels (i.e., about 40% of our participants had no formal education or had only finished the fourth grade) and to cultural and historical reasons. On the one hand, it is possible that the low education levels made it difficult for some participants to understand the more abstract items of the SCS-LF (e.g., regarding Item 25, understand the concept of subjectively feeling alone while experiencing failure). On the other hand, and within the Portuguese

**Table 2** Means, Standard Deviations, Corrected Item-Total Correlations, and Cronbach's Alpha for SCS-LF in an Older Adult Sample ( $n=418$ )

Items	<i>M</i>	<i>SD</i>	Corrected item-total <i>r</i>	Cronbach's alpha if item deleted
Self-kindness ( $\alpha=0.85$ )	15.90	4.45		
5. I try to be loving towards myself when I'm feeling emotional pain	3.17	1.26	0.66	0.82
12. When I'm going through a very hard time, I give myself the caring and tenderness I need	3.04	1.08	0.62	0.83
19. I'm kind to myself when I'm experiencing suffering	3.12	1.11	0.72	0.80
23. I'm tolerant of my own flaws and inadequacies	3.23	1.08	0.64	0.82
26. I try to be understanding and patient towards those aspects of my personality I don't like	3.34	1.12	0.65	0.82
Self-judgment ( $\alpha=0.75$ )	14.81	4.14		
1. I'm disapproving and judgmental about my own flaws and inadequacies	2.77	1.08	0.49	0.72
8. When times are really difficult, I tend to be tough on myself	3.10	1.25	0.55	0.70
11. I'm intolerant and impatient towards those aspects of my personality I don't like	3.01	1.20	0.57	0.69
16. When I see aspects of myself that I don't like, I get down on myself	2.86	1.07	0.42	0.74
21. I can be a bit cold-hearted towards myself when I'm experiencing suffering	3.06	1.24	0.55	0.69
Common Humanity ( $\alpha=0.86$ )	14.52	3.59		
3. When things are going badly for me, I see the difficulties as part of life that everyone goes through	3.59	1.03	0.60	0.86
7. When I'm down and out, I remind myself that there are lots of other people in the world feeling like I am	3.64	1.09	0.75	0.80
10. When I feel inadequate in some way, I try to remind myself that feelings of inadequacy are shared by most people	3.54	1.08	0.76	0.79
15. I try to see my failings as part of the human condition	3.74	1.09	0.70	0.82
Isolation ( $\alpha=0.75$ )	8.91	2.90		
4. When I think about my inadequacies, it tends to make me feel more separate and cut off from the rest of the world	2.98	1.23	0.53	0.71
13. When I'm feeling down, I tend to feel like most other people are probably happier than I am	2.89	1.12	0.60	0.64
18. When I'm really struggling, I tend to feel like other people must be having an easier time of it	3.04	1.21	0.60	0.63
Mindfulness ( $\alpha=0.67$ )	13.66	2.98		
9. When something upsets me I try to keep my emotions in balance	3.62	1.04	0.48	0.58
14. When something painful happens I try to take a balanced view of the situation	3.56	1.01	0.56	0.53
17. When I fail at something important to me I try to keep things in perspective	3.49	1.12	0.47	0.59
22. When I'm feeling down I try to approach my feelings with curiosity and openness	3.00	1.04	0.30	0.70
Over-identification ( $\alpha=0.67$ )	8.40	2.66		
2. When I'm feeling down I tend to obsess and fixate on everything that's wrong	2.70	1.18	0.59	0.43
6. When I fail at something important to me I become consumed by feelings of inadequacy	2.72	1.14	0.56	0.48
20. When something upsets me I get carried away with my feelings	2.99	1.11	0.33	0.76

Note. This analysis refers to the modified 6-factor model

historical context, this cohort of participants endured several years of dictatorship that greatly exposed these individuals to conservative and authoritarian values and traditional societal roles. It is possible that some of these participants are not used to exploring their emotional states and suffering and are not familiar with certain words and expressions used in Items 24 and 25. These two potential explanations for the present study's results are in line with the findings by Bratt and Fagerström (2019), where all participants in the telephone interviews considered that the SCS-SF questions were abstract and different compared to other questionnaires. Given the scarce currently available literature, more research

specifically using older adult samples is sorely needed, especially considering how the SCS, in both its long and short forms, is the instrument more frequently used to assess self-compassion in this population (Tavares et al., 2020).

It is also possible that older adults understand and experience self-compassion in a manner that is conceptually different than younger populations and that may not be easily grasped by self-report instruments. Bennett et al. (2017), using semi-structured interviews and thematic analysis in a sample of women aged 65–94 years, examined the experiences of self-compassion and perceptions of its utility as a resource in the face of ageing body-related changes. Results

showed that self-compassion for the ageing body may be perceived as difficult and idealistic because of the physical changes accompanying ageing (i.e., deviating from Western feminine societal beauty standards). Despite being self-compassionate, in the sense of accepting their physical limitations, those participants were also critical of their body's functionality and appearance, which led the authors to suggest that age and cohort may influence the perceptions and experiences of body-related self-compassion. Although this study had a very specific focus, it highlighted the importance of understanding how older adults interpret self-compassion.

Regarding the present study's specific hypotheses, based on the literature focused on general adult samples (e.g., Halamová et al., 2020; Neff et al., 2019), it was expected that the bifactor and the two-tier models would provide adequate, if not good, fit. This hypothesis was not confirmed given that, as mentioned, no model initially showed adequate fit. Nonetheless, it is noteworthy that the two-tier model had the second-best comparative adjustment after the 6-factor model, and adjustment indices for these two models weren't too disparate. Additionally, the present study's results are in line with Halamová et al. (2020), who demonstrated that a two-tier model fits the SCS-LF better than a bifactor model.

Based on Phillips and Ferguson (2013) and Bratt and Fagerström (2019), which considered older adult samples, it was hypothesized that the 2-factor model solution would provide the best fit. This hypothesis was not confirmed. In general, no model showed adequate fit and the 2-factor model, in particular, provided only the third best factor solution. These results, however, aren't completely at odds with Bratt and Fagerström (2019), considering that, using the SCS-SF and conducting CFA to test results previously found with PCA, the authors did confirm that the 2-factor model had no adequate fit. It was also hypothesized that the 1-factor, 6-factor, and higher-order models would provide inadequate fit. This hypothesis was confirmed regarding the 1-factor and higher-order models. In fact, the present study showed that these models, respectively, had the worst and second worst fit indices. Regarding the 6-factor model, the hypothesis was partially confirmed and the present study's results are in line with Phillips and Ferguson (2013), in the sense that the 6-factor model only achieved adequate fit after modifications were introduced.

After those modifications were implemented, the 6-factor solution was the most parsimonious and theoretically and statistically valid way to assess self-compassion in the older adult population. Results supported the assessment of the self-compassion components using the SCS-LF and those components also achieved at least acceptable internal consistency values, though somewhat lower than what had been found for younger samples (e.g., Castilho & Pinto-Gouveia, 2011; Cunha et al., 2016; Neff et al., 2017). Nonetheless, it is essential to reiterate that, even after modifications, the

model was considered to have only acceptable, and not good, fit. Therefore, even in using the 6-factor solution to interpret research findings in older adults, caution is advised. Finally, the present study also demonstrated that, in older adults, the modified 6-factor structure of the SCS-LF showed invariance across sex at birth. This is in accordance with the evidence found in younger populations (Cunha et al., 2016; Petrocchi et al., 2014; Tóth-Király & Neff, 2021). Taken together, these results strengthen the conclusions that may be drawn by using the SCS-LF, while also highlighting the importance of, and need for, more future research.

## Limitations and Future Research

The present study is not without limitations. Test–retest reliability and convergent/divergent validity analyses were not conducted, which limits the conclusions regarding the psychometric properties of the SCS-LF in older adults. Likewise, the present study did not consider the short form of the SCS. Additionally, the present study's sample was only composed of White participants, therefore limiting the generalization of conclusions to older adults of different racial identity and ethnicity. However, an effort was made to recruit a sample that was diverse in education levels, ranging from participants with no formal education to participants with university education. Notwithstanding these limitations, this is one of the very few studies that investigated the factor structure of the SCS-LF specifically in older adults. Furthermore, it is the first study that tested the adjustment of factorial models that had never been studied in this population before (i.e., bifactor and two-tier models), and it is also the first study that tested invariance across sex at birth of the SCS-LF in this population.

More research is needed to investigate the factorial structure of the SCS (in both its long and short forms) in older adults, and to investigate if, indeed, this factorial structure differs between older and younger participants. Likewise, it will be important to explore if, and how, older adults' characteristics influence responses to the instrument. For example, future research in this population that tests the SCS-LF invariance across formal education levels, socioeconomic status, cultural background, and clinical condition will be useful. On the other hand, whereas the role of self-compassion in the psychological adjustment of older adults is fairly well demonstrated (e.g., Tavares et al., 2020), more research is needed that takes into consideration the individual impact of each of its six components. Specifically, it seems important to ascertain if previous evidence on the spillover effect of fostering each positive self-compassion component, particularly mindfulness, which has also been proposed as relevant to foster overall self-compassion (Dreisoerner et al., 2021), is applicable to older adults. Regarding the mindfulness component and mindfulness-based interventions for

older adults, in particular, additional future research with rigorous and robust designs is needed to clarify previous mixed findings (e.g., Kayser et al., 2023). Present findings suggest that the SCS-LF may be a useful instrument to achieve the aforementioned research objectives. Finally, qualitative research methodologies that go beyond using only self-report instruments to assess self-compassion may also contribute with important insights. For example, future studies may conduct interviews or focus groups with older adults to investigate what self-compassion truly means to these individuals and whether or not they understand it in the same way that the SCS intends to assess.

Self-compassion and its components remain important targets in psychological intervention, and may greatly benefit the well-being and mental health of older adults as they experience and adapt to normative events associated with the ageing process (Brown et al., 2019; Tavares et al., 2020). It is, therefore, essential that research continues to address how such constructs may be assessed in statistically reliable and valid ways for this population. The present study provided an important contribution by identifying an adequate, despite not ideal, factor solution of the SCS-LF with which to assess self-compassion in older adults. Additionally, the present study was the first to provide evidence of this instrument's invariance across sex at birth in this population.

**Supplementary Information** The online version contains supplementary material available at <https://doi.org/10.1007/s12671-024-02441-3>.

**Author Contributions** Lúcia Tavares was responsible for the manuscript writing, elaborating the study design, conducting data collection, and conducting data analysis and interpretation. Paula Vagos and Ana Xavier were responsible for supervising and collaborating with the processes of manuscript writing, elaboration of the study design, and data analysis, and were also responsible for reviewing and complementing the final draft of the paper. Marina Cunha was responsible for conducting data collection and also for reviewing and complementing the final draft of the paper.

**Funding** Open access funding provided by FCTIFCCN (b-on). This research has been supported by a grant received by the first author, Lúcia Tavares, (Grant Number: 2022.13539.BD), sponsored by the Portuguese Foundation for Science and Technology (FCT), the European Social Fund (ESF), and the Por\_Norte Program. The aforementioned funding sources had no involvement in the conduction of the research nor preparation of the present article.

**Data Availability** The data that support the findings of this study are available from the first author, Lúcia Tavares, upon reasonable request.

## Declarations

**Ethics Approval** Ethics approval was obtained from the Ethics Committee for Health of the Portuguese university hosting the present study, i.e., Universidade Portucalense Infante D. Henrique, with the reference CES-UPT-01/05/21.

**Competing Interest** The authors declare that there are no competing interests to report.

**Informed Consent** Participants were given an informed consent form containing information regarding the research project and their rights as participants (e.g., anonymity and confidentiality of the responses to the questionnaires, participation was entirely voluntary and it was possible to quit the study at any moment without any negative consequences). Some participants expressed difficulty reading and/or writing on their own, due to either a low level of literacy or poor eyesight. In these cases, one of the researchers read aloud the informed consent form. The researchers were also available to answer any questions and clear any doubts as needed.

**Use of Artificial Intelligence** The authors declare that no artificial intelligence tools were used in the conduction of this study, neither in the writing of the present article.

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