Examining the Relationship Between Self-Compassion and Body Image Disturbance in Breast Cancer Survivors: The mediating Role of Self-Worth

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Abstract

Background: Bodily changes from breast cancer often lead to increased body image concerns among survivors. Self-compassion encourages acceptance of perceived inadequacies, grounded in self-worth, which involves recognising one's own value. Especially self-worth contingent on appearance can significantly affect perceived body image.

Aim: The present study investigates the effect of self-compassion on body image disturbance in breast cancer survivors, and whether this relationship is mediated by self-worth.

Method: A cross-sectional study was conducted using self-report online questionnaires, using the Self-Compassion Scale Short Form (SCS-SF), the body image scale (BIS), and the Contingencies of Self-Worth Scale (CSWS). Through convenience and snowball sampling 113 breast cancer survivors were recruited. Linear regression analysis was applied.

Results: The research showed that self-compassion is significantly negatively associated with body image disturbance (b = -0.44, p < .001), and this relationship was significantly mediated by self-worth (b = -0.08, p < .05) and self-worth based on appearance (b = -0.09, p < .05). No significant association was found between self-worth and body image disturbance (p > .05). Further, self-compassion is significantly negatively associated with self-worth (b = -0.43, p < .001).

Conclusion and Recommendations: These findings recommend self-compassion to be a supporting skill to deal with body image disturbance and suggest further research on breast cancer survivors' contingencies of self-worth.

Keywords: self-compassion, body image disturbance, self-worth, mediation analysis, breast cancer survivors

Table of Contents

Introduction	4
Method	7
Design	7
Participants	7
Materials	8
Self-compassion	8
Body image disturbance	8
Self-worth	9
Procedure	10
Data analysis	10
Results	10
Description of the study group	10
Descriptive Statistics	12
Parametric Assumptions	13
Inferential Statistics	14
Discussion	16
Strengths and Limitations	19
Proposal for Future Directions	20
Conclusion	21
References	22
Appendix A: Recruitment Message, Informed Consent, Questionnaire	31
Appendix B: R Script	39

Examining the Relationship Between Self-Compassion and Body Image Disturbance in Breast Cancer Survivors: The mediating Role of Self-Worth

Breast cancer is one of the most frequently found cancers in females (Bray et al., 2024), as in 2022 alone, over 2.2 million new breast cancer incidences were reported (International Agency for Research on Cancer, 2024). Nonetheless, though there is a trend in increasing breast cancer cases, the survival rate for breast cancer is relatively high (Arnold et al. 2022; Soerjomataram et al., 2023). In 2016, the relative survival rate one year after diagnosis of breast cancer was 97.6% and five years after diagnosis 91% (Surveillance Research Program, National Cancer Institute, 2024). This highlights the likelihood of surviving breast cancer in those diagnosed. Further, numerous factors can contribute to the long-term survival of breast cancer, particularly significant are early detection of the disease, application of effective treatment and adopting of a healthy lifestyle (Soerjomataram et al., 2007).

While many people nowadays successfully survive the disease, the diagnosis may still evoke several psychological and physical responses. Besides an initial shock following the life-altering news of the diagnosis, part of the emotional hardships includes a state of feeling depressed, anxious, confused and out of control (Andersen et al., 1989; Thomas et al., 2002). Uncertainty of the future and regularly being fearful and sad may manifest itself as depression and other psychiatric disorders (İzci et al., 2016; Thomas et al., 2002). Moreover, patients with breast cancer often endure physical symptoms, which include insomnia, fatigue, and a general decline in physical health (Given et al., 2001; Stein et al., 2000; Stone et al., 2000).

The physical changes which accompany treating breast cancer include permanent alterations such as scars or the removal of body parts as well as reversible and delayed modifications such as hair loss (Hopwood et al., 2001). Due to these bodily alterations, survivors often feel more insecure, inhibiting them from living their usual lives (Hopwood et al., 2001). As a consequence of the physical changes, breast cancer survivors' perceptions of their bodies may change as well. Body image refers to "the mental picture one forms of one's body as a whole, including its physical characteristics [...] and one's attitudes toward these characteristics [...]" (APA Dictionary of Psychology, 2018). A disturbed body image entails "distortion in the subjective image or mental representation of one's own body appearance [...]" (APA Dictionary of Psychology, 2018). A lower body image is especially prone for breast cancer survivors who have undergone a mastectomy (Engel et al., 2004). A more

positive body image, on the other hand, can majorly contribute to increased happiness in breast cancer survivors, as positively perceiving one's appearance is associated with perceived self-worth (Castonguay et al., 2015; Stokes & Frederick-Recascino, 2003).

Body image concerns by breast cancer survivors can be protected through selfcompassion (Braun et al., 2016). Self-compassion is a constellation of "[...] being kind and understanding toward oneself rather than being self-critical [...]" as well as "[...] seeing one's fallibility as part of the larger human condition and experience rather than as isolating [...]" (Neff, 2003). Furthermore, it refers to "[...] holding one's painful thoughts and feelings in mindful awareness rather than avoiding or overidentifying with them" (Neff, 2003). Hereby, behaving self-compassionately entails accepting one's physical self, which enables better coping with uncontrollable life events (Neff & Knox, 2017; Wasylkiw et al., 2012). Higher self-compassion has been shown to be associated with less dissatisfaction, shame and worries related to one's body image, and overall decreasing self-degrading behaviour toward the body (Braun et al., 2016; Webb et al., 2016). Also, in breast cancer survivors who underwent a mastectomy, self-compassion has been shown to be associated with reduced negative impacts (Sherman et al., 2016).

The ability to be self-compassionate is dependent on one's appraisal of worthiness (Fraser et al., 2023). Self-worth comprises "an individual's evaluation of themselves as a valuable, capable human being deserving of respect and consideration" (APA Dictionary of Psychology, 2023). Valuing and respecting oneself is an important influence on one's quality of life (Berterö, 2002). Personal beliefs determine in which areas of life one seeks accomplishment to experience an increase of self-worth (Crocker & Wolfe, 2001; Overstreet & Quinn, 2012). People differ regarding their beliefs as to what makes them worthy (James, 1890, as cited in Li et al., 2020). Therefore, feeling self-worthy is dependent on the contingency of interests, which include domains such as physical appearance, but also approval of others, and academic competence (Li et al., 2020). Consequently, breast cancer survivors' self-compassion and their feelings of worthiness can fundamentally influence each other (Fraser et al., 2023).

A sense of worthiness can be based on one's appearance, which is peculiarly the case for women (Moreira et al., 2009). Oftentimes, externally validating domains of self-worth, such as self-worth based on appearance entails seeking outward affirmation (Crocker & Knight, 2005). Therefore, people whose self-worth is related to their appearance behave in accordance with meeting gender-appropriate roles imposed by societal pressures (Sanchez & Crocker, 2005; Vartanian, 2009). This includes conforming to internalised beauty standards, such as being thin for women and masculine for men, even though this means sacrificing life satisfaction and well-being (Grossbard et al., 2009; Sanchez & Crocker, 2005; Vartanian, 2009). Hereby, those relying on appearance as a source of self-worth are affected by the negative consequences of seeking external evaluation, which include reduced quality of life (Moreira et al., 2009; Vartanian, 2009). Breast cancer survivors are likely to be more vulnerable to the impact of the domain of self-worth based on appearance, as they are more sensitive to body image concerns than those without breast cancer (Kang et al., 2017).

In sum, breast cancer survivors often experience physical changes, accompanied by body image concerns. It is of great interest to identify whether breast cancer survivors perceived self-compassion is associated with their body image disturbance, and if this relationship is mediated by self-worth. This study aims to answer the following research question:

1. To what extent is self-compassion associated with body image disturbance in breast cancer survivors, and is this relationship mediated by self-worth?

In line with the literature, the subsequent hypotheses will guide the research:

H1: Self-compassion is significantly negatively associated with breast cancer survivors' body image disturbance.

H2: Self-compassion is significantly positively associated with breast cancer survivors' self-worth.

H3: Self-worth is significantly negatively associated with breast cancer survivors' body image disturbance.

H4: Self-worth mediates the relationship between self-compassion and body image disturbance.

H5: Self-worth based on appearance is most strongly associated with the relationship between self-compassion and body image disturbance as a subscale mediator.

Figure 1



Note. The figure illustrates the relationships with hypothesised directions between the variables self-compassion, body image disturbance and self-worth, indicated by the paths a, b, c, and c'.

Method

Design

A cross-sectional survey study design was employed. Data was collected using selfreport questionnaires. The collected data is part of a larger study assessing self-compassion, body image disturbance, self-worth, and social media use, however, responses to the measure of social media use were not used. This study investigates whether self-compassion predicts less body image disturbance and how the level of self-worth mediates this relationship between self-compassion and body image disturbance. The sample involves people who have been diagnosed with breast cancer in their lives, and who were recruited through techniques of convenience and snowball sampling.

Participants

Inclusion criteria for this study were having had a breast cancer diagnosis at some point in life, as well as having had some form of treatment for breast cancer. In addition, participants needed a sufficient understanding of English or German language and digital access to the online survey. Excluded were those under the age of 18. A power analysis was conducted to determine the required sample size for a linear regression model, with effect size (f2 = 0.15), significance level ($\alpha = 0.05$) and desired power of 80%. The analysis recommended a minimum of 67 participants. In this study, out of 203 people who have started filling out the questionnaire, 98 have failed to complete the questionnaire, as they have stopped answering the questions after having agreed to participants. Therefore, this results in a final total of N = 113 participants. In this sample, five participants had missing values across the main scales of self-compassion, body image disturbance and self-worth, totalling 12 missing values. Each participant had between one to five missing values, out of a total of 57 items in the survey. Out of the total sample, 15 answered the English version of the questionnaire, while 98 were filling out the German version.

Materials

The primary outcome measures were the levels of body image disturbance, selfcompassion, and self-worth. Further measures include demographic information, such as age, nationality, gender and received treatment for the participants' breast cancer. The survey was created using the software Qualtrics, April 2024, and is portrayed in detail in Appendix A.

Self-compassion

The Self-Compassion Scale Short Form (SCS-SF) was used to measure selfcompassion in those diagnosed with breast cancer (Raes et al., 2011). The scale is composed of 12 items. An example item of this scale is "I'm disapproving and judgmental about my own flaws and inadequacies.". Participants indicate their agreement on a 5-point Likert scale, which ranges from "almost never" to "almost always". The SCS-SF shows adequate reliability, with good Cronbach's alpha being .88 in the present study and the short form of the Self-Compassion Scale having a near-perfect correlation with the long version. The scale was also shown to have sufficient validity (Raes et al., 2011). A translated version in German was used as well (Hupfeld & Ruffieux, 2011).

Body image disturbance

The body image scale (BIS) was used to measure the body image disturbance of people who have been diagnosed with breast cancer (Aaronson et al., 1993; Hopwood et al., 2001). The scale is composed of 10 items. An example question of this scale is "Have you felt less physically attractive as a result of your disease or treatment?". The participants indicated their level of agreement on a 4-point scale, including "not at all", "a little", "quite a bit" and "very much". The BIS shows excellent reliability in the present study with Cronbach's alpha being 0.91 and good clinical validity (Hopwood et al., 2001). The EORTC scoring system categorises the body image items as part of the group of functional scales, therefore advising the same scoring convention of the EORTC QLQ-C30. This would result in higher scores referring to higher or healthier levels of functioning (Aaronson et al., 1993). In this paper, the scale is categorised as a symptom-based scale instead of a functional scale, which claims higher scores on the BIS mean more symptoms or more problematic levels and thus a more disturbed body image (Aaronson et al., 1993; Aquil et al., 2021; Hopwood et al., 2001; Melissant et al., 2018). A translated version in German was used as well (Hartung et al., 2021).

Self-worth

The Contingencies of Self-Worth Scale (CSWS) was used to measure the self-worth of people who have been diagnosed with breast cancer (Crocker et al., 2003). The inventory consists of 35 items, with 7 subscales each containing 5 items. These subscales are namely "others' approval", "appearance", "competition", "academic competence", "family support", "virtue" and "God's love". An example item of this scale is "I don't care if other people have a negative opinion about me." The participants indicated their level of agreement on a 7-point Likert scale, which ranges from "strongly disagree", to "neutral", and "strongly agree". The CSWS show good reliability with Cronbach's alpha being 0.88 in the present study and adequate validity (Crocker et al., 2003). The subscales' Cronbach's alphas range from 0.72 to 0.96, with self-worth based on appearance showing acceptable reliability with Cronbach's alpha of 0.72. A translated version in German was used as well with adjustments made for six items to make the scale more comparable with the original English version (Crocker et al., 2003; Schütz & Sellin, 2003). In the academic competence subscale, the term 'academic' was added to five statements since this specification was not mentioned in the German version. The description of family members was added to one item in the subscale about family support in the German version as well: "My self-worth is not influenced by the quality of my relationships with my family members". The adapted German academic competence subscale shows good internal consistency, with Cronbach's alpha being .84 respectively, as well as the family support subscale, with Cronbach's alpha being .81 respectively. Particularly, the Cronbach's alpha coefficient for the adapted item within the family support subscale is .83.

Procedure

Ethical approval from the University of Twente was obtained before respondents were recruited. Participants were recruited through convenience sampling and snowball sampling. Using convenience sampling, the invitation to participate (Appendix A) was distributed via social media posts and messages. Hereby, people who were openly advocating their breast cancer journey on social media or those following such platforms were contacted via story postings and direct messenger, as well as support groups of breast cancer patients and survivors who were approached via group postings. In addition, information on the study including a link to the Qualtrics questionnaire was shared with personal social networks, which was then spread through conversation and snowball sampling. All messages already informed potential participants shortly of the study and described the duration of approximately 20 minutes needed to complete the survey. Before the beginning of the study. This entails information on their rights, potential benefits and risks of participation and contact information of the researchers (Appendix A). On average, participants completed the questionnaire in 19.27 minutes.

Data analysis

For this study, the collected data was first entered into the statistical analysis package R. All parametric assumptions were inspected to be met. Furthermore, descriptive statistics were performed, including central tendency and dispersion. Lastly, inferential statistics were performed, in the form of a linear regression analysis and mediation analysis in line with Baron and Kenny (1986) to test the hypotheses. The significance threshold of p-values was set at .05. Therefore, a p-value of .05 or below indicates significant results. Missing values were imputed by the mean of items. Hereby, the missing values are replaced with the mean scores calculated from the sample's item scores of the variables.

Results

Description of the Study Group

The demographic statistics of the participants are presented in Table 1. One participant's demographic information was not reported. Furthermore, one participant named multiple nationalities, of which the first mentioned was included to represent that participant's nationality. Participants who indicated their nationality as "American", were summarised under "USA". Some participants indicated to had received other major treatment options. Not all of these were named, nevertheless, a few of the mentions specified are "antibody therapy", "PARP Inhibitor" or "approximating operation of the unaffected breast". Moreover, two participants had mentioned two years of diagnosis each, for which the first year of diagnosis was included. The mean age of the participants was 46 years, with a standard deviation of 10 years. Participants were on average diagnosed in 2021 with a standard deviation of approximately 4 years.

Table 1

Factor	Sample	Percentage (%)
Gender		
Female	109	97.32
Male	3	2.67
Nationality		
Germany	82	73.21
Austria	11	9.82
USA	10	8.92
Switzerland	4	3.57
Netherlands	2	1.78
Belgium	1	0.89
Poland	1	0.89
Greece	1	0.89
Treatment Options in Total		
Numbers		
Lumpectomy or other	62	54.87
breast-sparing surgery		
Mastectomy	41	36.28
Radiotherapy	86	76.11
Chemotherapy	84	74.34
Hormone Therapy	69	61.06
Targeted/ Immunotherapy	31	27.43
Breast Reconstruction	29	25.66
Surgery		
Other (major) treatment	15	13.27
Grouped Years since		
Diagnosis		
0-4 years	97	86.61
5-9 years	8	7.14
10-14 years	3	2.68
15-19 years	3	2.68
20-24 years	0	0
25-29 years	1	0.89

Demographic and treatment information of the study sample (N = 112)

Note. This table shows the descriptive statistics, namely gender, nationality, treatment options, and years of diagnosis of the sample of breast cancer survivors. 112 participants are mentioned in this table, as one participant's demographic information, except for the treatment options, is missing.

Descriptive Statistics

The descriptive statistics of the study variables self-compassion, body image disturbance, self-worth, and each subscale of self-worth, namely self-worth based on others' approval, self-worth based on appearance, self-worth based on competition, self-worth based on academic competence, self-worth based on virtue, self-worth based on family support, and self-worth based on God's love, can be found in Table 2. Furthermore, these variables' correlations are displayed in Table 3. The mean total score for participants on the body image scale was 13.5, with a standard deviation of 7.46.

Table 2

	М	Mdn	SD	Var	
Self-Compassion	3.12	3.17	0.73	0.53	
[1.42-4.67]					
Body Image Disturbance	1.35	1.4	0.75	0.56	
[0-3]					
Self-Worth	4.08	4.03	0.70	0.49	
[2.34-6.2]					
Self-Worth Approval	3.33	3.4	1.17	1.37	
[1-6.8]					
Self-Worth Appearance	4.73	4.8	1.07	1.13	
[1.8-7]					
Self-Worth Competition	3.89	4.2	1.40	1.96	
[1-7]					
Self-Worth Academic	3.60	3.6	1.31	1.72	
[1-7]					
Self-Worth Virtue	5.18	5.2	1.12	1.25	
[1-7]					
Self-Worth Family	5.24	5.4	1.45	1.13	
[1.6-7.0]					
Self-Worth God's Love	2.62	2.2	1.65	2.71	
[1-7]					

Descriptive statistics of the Variables (N = 113)

Note. This table displays numbers in brackets, which indicate the variables' ranges, such as

1.42-4.67 for self-compassion.

Table 3

	1	2	3	4	5	6	7	8	9	10
1. SC	-									
2. BID	51 ***	-								
3. SW	45 ***	.37 ***	-							
4. SWAL	46 ***	.33 ***	.61 ***	-						
5. SWAE	43 ***	.39 ***	.52 ***	.45 ***	-					
6. SWC	38 ***	.20 *	.71 ***	.33 ***	.22 *	-				
7. SWAC	24 **	.14	.61 ***	.25 **	.17	.46 ***	-			
8. SWV	02	.11	.38 ***	00 ^a	02	.20 *	.24 *	-		
9. SWFS	22 *	.25 **	.53 ***	.34 ***	.33 ***	.33 ***	.07	.01	-	
10. SWGL	05	.09	.49 ***	.10	.05	.16	.11	.11	.10	-

Correlations of the Variables (N = 113)

Note. SC = self-compassion; BID = body image disturbance; SW = self-worth; SWAL = selfworth based on others' approval; SWAE = self-worth based on appearance; SWC = selfworth based on competition; SWAC = self-worth based on academic competence; SWV = self-worth based on virtue; SWFS = self-worth based on family support; SWGL = self-worth based on God's love.

^a The correlation between self-worth based on virtue and self-worth based on approval is larger than -.001, reported as -.00 in the table.

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

Parametric Assumptions

Testing the parametric assumptions revealed that the assumptions of linear regression are all adequately met, which includes assuming linearity, homoscedasticity, normality of residuals, absence of influential outliers and multicollinearity.

Inferential Statistics

Firstly, the direct effect of the independent variable self-compassion on body image disturbance was evaluated. Hereby, a linear regression analysis was conducted, which showed that the overall model was significant (F(2,110) = 21.71, p < .001). The model showed that self-compassion significantly predicts less body image disturbance (b = -0.44, p < .001).

The direct effect of the independent variable self-compassion on self-worth as a mediator variable, and in this context as a dependent variable, was tested. A linear regression analysis was conducted and showed that self-compassion had a significant negative effect on self-worth (F(1,111) = 27.99, p < .001). This means that an increase in self-compassion predicts experiencing less self-worth (b = -0.43, p < .001).

The direct effect of the independent mediator variable self-worth on body image disturbance was investigated. Though the multiple linear regression model was overall significant (F(2,110) = 21.71, p < .001), the relationship between self-worth and body image disturbance was not significant (b = 0.19, p = .05052).

Furthermore, to test whether the relationship between self-compassion and body image disturbance is mediated by self-worth, a mediation analysis was conducted. The average causal mediation effect reveals that the indirect effect of self-compassion over self-worth on body image disturbance is significant (b = -0.08, p = .038). The average effect of self-compassion, when controlling for the effect of self-worth on body image disturbance is significant as well (b = -0.44, p < .001). The total effect, which is the addition of the direct and indirect effect of the mediation, demonstrates a significant effect too (b = -0.52, p < .001). Moreover, the percentage of the total effect that occurs through mediation in this model is 14.75%. Consequently, the hypothesis that the relationship between self-compassion and body image disturbance is significantly mediated by self-worth was accepted. People with higher self-compassion experience less body image disturbance, with self-worth partially carrying this effect.

Figure 2

Model of relationships with coefficients



Note. The figure illustrates the mediation model with coefficients for the variables selfcompassion, body image disturbance, and self-worth. Path a represents the association between self-compassion and self-worth. Path b represents the association between self-worth and body image disturbance. Path c represents the total effect of self-compassion on body image disturbance. Path c' represents the direct effect of self-compassion on body image disturbance after accounting for the mediator self-worth.

****p* < .001.

Moreover, the effect of each subscale of self-worth as mediators of the relationship of self-compassion on body image disturbance was tested. Before mediation analyses were applied, the linear regression between each subscale of self-worth and self-compassion was checked. This revealed significant effects of self-compassion on *self-worth based on others' approval, self-worth based on appearance, self-worth based on competition, self-worth based on academic competence* and *self-worth based on family support* (p < .05). Conversely, self-compassion did not show to significantly predict *self-worth based on virtue*, nor *self-worth based on God's love* (p > .001). Moreover, multiple linear regression models were applied to investigate the direct effect of the subscales of self-worth on body image disturbance. These showed that only *self-worth based on appearance* significantly affects body image disturbance (b = 0.15, p = .0201). All other six subscales did not significantly predict body image disturbance (p > .001). Accordingly, mediation analysis showed that only the subscale *self-worth based on appearance* significantly mediates the relationship between self-compassion and body image disturbance (b = -0.09, p = .012). Here, the total effect was

significant as well (b = -0.52, p < .001). The mediator *self-worth based on appearance* achieved 16.93% of the total effect.

Discussion

The purpose of this study was to examine the extent to which self-compassion is associated with body image disturbance in people who were diagnosed with breast cancer. Moreover, this study investigated to what extent individuals' levels of self-worth can explain this relationship, especially assessing self-worth which is based on appearance.

The first hypothesis predicting that self-compassion is significantly negatively associated with body image disturbance was accepted. This finding is in line with other studies, suggesting that self-compassion is effectively linked to reduced body image concerns (Todorov et al., 2019; Turk & Waller, 2020; Wasylkiw et al., 2012). This relationship is also consistent with findings in a similar sample, showing that breast cancer survivors who were more compassionate to the self were also found to be more sheltered from the risk of body image disturbance (Przezdziecki et al., 2012). The influence of self-compassion on body image disturbance is especially important for cancer survivors, as they are commonly troubled by dissatisfaction with the body due to the disease and treatment (DeFrank et al., 2007). Furthermore, those with breast cancer are significantly more disturbed by poorer body image in comparison to the general population (Kang et al., 2017).

The present sample reported approximately comparable self-compassion scores to other breast cancer survivors (Przezdziecki et al., 2012). Nevertheless, the sample's scores only indicate moderate levels of self-compassion (Neff, 2003), implying they can further improve their self-acceptance, especially for their changed bodies and acknowledging that living comes with hardships (Zhu et al., 2023). Recommended interventions focusing on increasing self-compassion to decrease body image disturbance are the 'My Changed Body psychological intervention' and the 'Mindful Self-Compassion program' (Neff & Germer, 2012; Papini et al., 2022; Sherman et al., 2018). The former entails writing exercises, applied in a sample of breast cancer patients (Sherman et al., 2018), whereas the latter includes meditation, which for example teaches dealing with difficult emotions (Neff & Germer, 2012).

The second hypothesis predicting that self-compassion is significantly positively associated with self-worth was rejected. Currently, there are inconsistencies found in the literature regarding the relationship between self-compassion and self-worth. Though a large body of studies suggest that being more self-compassionate predicts perceiving oneself as more self-worthy, some literature suggests the opposite (Donald et al., 2017; Matsuguma, 2013). The present findings are in line with a study by Neff (2011) who showed that self-compassion negatively predicted contingent self-worth when assessed globally as well as domain-specific. Contingent self-worth is bound to conditions, which can create instability when changed (Crocker & Knight, 2005). In comparison, self-compassion includes accepting human imperfections; therefore, it is purposefully more resilient than self-worth which is based on external factors (Neff, 2003). The findings imply that breast cancer survivors adopt self-compassion as a coping mechanism to navigate their perceived inadequacies, expressed in their self-worth (Ewert et al., 2021). One can practice self-compassion, while their self-worth simultaneously decreases due to the lack of receiving external contentment.

Several external factors may influence cancer patients' self-worth independent of selfcompassion (Hopwood et al., 2001). As contingent self-worth is highly connected to chasing validation, a breast cancer survivor's detrimentally transformed life can be the reason why their self-worth fluctuates (Crocker & Knight, 2005). This includes adjustments in employment (Blinder & Gany, 2020), changes in strength of faith (Thuné-Boyle et al., 2010), and interactions with one's social network (Hinzey et al., 2016; Mosher et al., 2013; Thomas et al., 2002). Nevertheless, it is possible to alter the contingencies in which one's self-worth is embedded, despite it being challenging and protracted (Wolfe & Crocker, 2003). Emphasising another domain of self-worth and disengaging from a reinforcing behaviour or environment of a contingency can promote a shift in what satisfies self-worth (Wolfe & Crocker, 2003). Hereby, breast cancer survivors with self-worth based on appearance could limit their exposure to appearance-focused media and focus on intrinsic contingencies such as family support, which are connected to greater well-being in comparison to extrinsic contingencies (Vonk & Smit, 2012).

The third hypothesis predicting that self-worth is significantly negatively associated with body image disturbance, was rejected. Literature indicates that positive body image is linked to high self-esteem, while higher body dissatisfaction is associated with lower self-worth (O'Dea, 2012). Nevertheless, this indication is majorly referring to global self-worth, not domain-specific. Whereas nearly all subscales of self-worth showed no significant association with body image disturbance, self-worth based on appearance was the only significantly positively associated one. Appearance-related self-worth is heavily based on continuously seeking validation from one's environment and is connected to being less

satisfied with the own appearance (Crocker & Knight, 2005; Overstreet & Quinn, 2012). This finding implies that body image disturbance might only significantly impact self-worth when the latter is heavily influenced by appearance concerns. Meanwhile, contingencies such as family support, God's love and academic competence are associated with greater satisfaction with one's appearance. Therefore, conflicting contingencies of self-worth, as the externally and internally validating ones taken together as self-worth, may explain the absence of a significant relationship between self-worth and body image disturbance in this study. Other influences on self-worth which determine its relationship to body image include cultural backgrounds (Menon & Pant, 2015).

The fourth hypothesis predicting that the relationship between self-compassion and body-image disturbance is mediated by self-worth was accepted. In accordance with the literature, being more self-compassionate decreases concerns about one's body image (Todorov et al., 2019; Turk & Waller, 2020; Wasylkiw et al., 2012). However, while Wasylkiw et al. (2012) found that only self-compassion uniquely accounted for the variance in body image concerns and not self-esteem, the present study shows that self-worth uniquely contributes to the relation between self-compassion and body image disturbance. Though there was no significant relationship between the mediator self-worth and body image disturbance, research suggests that this is not a necessity for a statistically significant mediation (Hayes, 2022). Furthermore, the findings imply a partial and complementary mediation, suggesting another mediator for the relationship (Baron & Kenny, 1986; Sidhu et al., 2021). Overall, the present research suggests that self-worth mediates the relationship between self-compassion and body image disturbance.

The fifth hypothesis, predicting that *self-worth based on appearance* has the most influence as a mediator on the relationship between self-compassion and body image disturbance, was accepted. Self-compassion significantly reduces body image disturbance directly and indirectly through its association with self-worth. The mediation of *self-worth based on appearance* is also partial and complementary (Baron & Kenny, 1986; Sidhu et al., 2021). In accordance with the literature, this indicates that external contingencies such as appearance-based self-worth decreases satisfaction with appearance, especially in women (Menon & Pant, 2015; Overstreet & Quinn, 2012). In the present study, the subscale *self-worth based on appearance* is the only significantly mediating contingent. The impact of each domain of self-worth can vary, with environmental cues influencing self-worth aligned with a person's valued contingent (Higgins, 1996). In the present study, breast cancer

survivors scored highest for self-worth based on family support, virtue, and appearance. Especially appearance contingent self-worth indicates how breast cancer survivors may be triggered by medical discussions about their symptomatology or seeing themselves naked after a mastectomy, which reinforces their self-worth to be contingent on appearance (Higgins, 1996). Uniformly, research shows that breast cancer survivors are generally more troubled by negatively perceived body image (Kang et al., 2017).

Strengths and Limitations

The findings of the present study can be influenced by several strengths and limitations. A strength comprises the well-validated questionnaires applied in this study. Studies on the CSWS, BIS, and SCS-SF all highlight good psychometric properties, indicating statistical strength in all scales (Hopwood et al., 2001; Perinelli et al., 2020; Raes et al., 2011). The present study also acknowledges the high internal consistency of the applied scales, ranging from good to excellent reliability. Moreover, the sample contains a wide range of years since diagnosis, between less than a year ago up to over two decades ago. This incorporates long-term and short-term survivors, as many of those diagnosed with breast cancer are still somehow affected by it years after (Koch et al., 2013). Nonetheless, the average participant was diagnosed with breast cancer around three years ago, which suggests more body image concerns shortly following diagnosis and treatment as less time has passed (Brunet et al., 2022; Engel et al., 2004). Therefore, the sample may authentically reflect the body image disturbances related to the disease.

A limitation of this study is that results may be biased due to the application of selfreports, which can offer access to individual experiences that are unmatched by no other measurement tool (Paulhus & Vazire, 2007). Though such reports can be beneficial, selfadministered information can also be impaired as people feel pressure to answer in socially acceptable ways, choose answers based on what they believe is most normal or rate their answers higher the first time being presented with certain questions (Beretvas et al., 2002; Brenner & DeLamater, 2016; Shrout et al., 2017). Especially upward bias, tending to exaggerate one's disclosures, is prone to be elevated in research about negative, internal states as found in the present study (Shrout et al., 2017). Furthermore, the findings are possibly limited by the application of the CSWS by Crocker et al. (2003), which was originally designed to measure self-worth in college students. The present study sample comprises breast cancer survivors, who are on average 46 years old, therefore the contingencies of the CSWS might not accurately reflect the sample's most important domains of self-worth (Crocker & Wolfe, 2001). In the context of identifying the overall effect of self-worth, applying the CSWS increased the ambiguity of the interpretation of results.

The average age at which breast cancer patients are diagnosed varies among cultures, approximately ranging between 50 to 62 years of age (Anderson et al., 2006; Chopra et al., 2014). In this study, breast cancer survivors were on average 46 years old, which indicates a relatively young sample of breast cancer survivors. This may be due to many participants being recruited through social media, which is predominantly used by younger adults (Perrin, 2015). While body dissatisfaction is generally stable as women age, appearance concerns decrease (Tiggemann, 2004), and younger women report more body image disturbances (Przezdziecki et al., 2012). In the present study, the participants scored on average a total of 13.5 on the body image scale, compared to 9.92 in a similar study with breast cancer survivors by Ettridge et al. (2022). Hereby, the higher body image disturbance scores may be influenced by the younger age of breast cancer survivors, cautioning against generalising the findings for breast cancer survivors to all age groups.

Proposal for Future Directions

The present study emphasises self-compassion as a proposition that mitigates the evoked negative appearance-related concerns for breast cancer survivors. Hereby, practices are recommended to apply interventions such as 'My Changed Body psychological intervention' and 'Mindful Self-Compassion program' (Neff & Germer, 2012; Papini et al., 2022; Sherman et al., 2018). Further, this study proposes looking into which contingencies of self-worth are most prominent for breast cancer survivors. The study findings indicate that self-worth based on family support, virtue, and appearance are especially important for breast cancer survivors. Moreover, it is of interest to apply other measurements in addition to the CSWS, offering insights into the global self-worth of breast cancer survivors, and identifying the impact this entails on the relationship between self-compassion and body image disturbance (Crocker et al., 2003). One recommendation to aid this further research would be the measurement tool 'Rosenberg's Self-Esteem Scale' (RSES) (Rosenberg, 1965). Besides, the partial mediation suggests that other factors contribute to the relationship, for example coping styles as a mediator between self-compassion and body image disturbance in breast cancer survivors (Zhu et al., 2023). The relatively young sample of breast cancer survivors was assumed to have impacted the relatively high-scored body image disturbance. Therefore,

it is suggested to conduct further research into the association between age and body image disturbances. Significant improvement in self-esteem and body image disturbance in breast cancer survivors can be promoted by group therapies with physical activity and beauty treatments, as well as psychological interventions (Morales-Sánchez et al., 2021).

Conclusion

Breast cancer survivors often battle hardships such as temporary and irreversible physical changes, which raise concerns and leave disturbance even after regaining physical health. Thus, it is important to understand how self-compassion and self-worth may function as propositions to reduce body image disturbances. This study established that being selfcompassionate is significantly negatively associated with body image disturbances. Against expectations, self-compassion is significantly positively associated with self-worth, along with self-worth and body image disturbance being not significantly associated. Nevertheless, the study found that self-worth is a significant mediator of the relationship between selfcompassion and body image disturbance, and more specifically self-worth based on appearance. Future research should focus on identifying primary domains of self-worth in breast cancer survivors and examining global self-worth in addition to the addressed domainspecific self-worth. Furthermore, interventions and other helping skills for breast cancer survivors are advocated to include practices of increasing self-compassion to reduce body image disturbances.

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Appendix A: Recruitment Message, Informed Consent, Questionnaire Recruitment Message

Hello, my name is Alina vom Stein, I am 21 years old and currently studying Psychology in the Netherlands at the University of Twente. I am not suffering from breast cancer and would like to express my sympathy for all affected.

I am currently working on my bachelor's thesis, which discusses breast cancer and those affected. More specifically, this is an online questionnaire that deals with the different effects of breast cancer on the well-being of those affected. I am looking for people who have been diagnosed with breast cancer at some point in their lives, have received any treatment for it, and would like to participate in my study.

Participation is completely voluntary and anonymous, and one can withdraw at any time. Filling out the questionnaire takes approximately 20 minutes. If there are any questions one can contact me at this email: a.vomstein@student.utwente. Otherwise, my study partner Melika Yeyrek can be reached here: m.yeyrek@student.utwente.nl. Moreover, here is the contact information of our supervisor Anneleen J. Klaassen: j.klaassen@utwente.nl or else the ethics committee of the University of Twente ethicscommittee-bms@utwente.nl. I would very much appreciate your support and would love to answer any questions. Thank you very much for reading!

Attached is a link to the questionnaire, which can be opened via laptop/PC/smartphone/tablet. Participation would be very much appreciated until around mid-April 2024.

https://qfreeaccountssjc1.az1.qualtrics.com/jfe/form/SV_d75hofVQKf4NIGy

Informed Consent

Informed consent Welcome to this study. You are invited to participate, because of your previous breast cancer diagnosis. We know that having breast cancer often has an impact on well-being and how one feels about themselves. We want to investigate this impact more deeply, to understand better what the impact entails and why people may differ in their experiences. For that reason, you are asked to partake in an online survey. To participate, certain criteria need to be met by you. Otherwise, you are not fit for this specific study. Therefore we ask you to read the criteria thoroughly. Please only confirm your participation if the following points are true for you.

I am 18 years or older.

I have been diagnosed with breast cancer.

I have received some type of treatment for my breast cancer diagnosis.

Advantages and disadvantages of participation

Participating in this study can evoke the potential for individuals who have experienced breast cancer to encounter mental discomfort. Nevertheless, participation in this study will contribute to a better understanding of the impact of breast cancer.

Personal information and privacy

All data will be handled confidentially and will not be shared. Your participation is completely anonymous and voluntary. The data acquired through this survey will only be used for research purposes. The original data will be stored for no more than five years and deleted after. The answers will be saved after completion and used within a scientific article about the topic.

Rights

You can withdraw your participation in the survey at any time without consequences.

Contact information

If you have any questions or remarks, you can contact one of the researchers of this study, as well as the supervisor guiding this study or the ethics committee of the University of Twente.

Researchers:

Melika Yeyrek (m.yeyrek@student.utwente.nl)

Alina vom Stein (a.vomstein@student.utwente.nl)

Supervisor:

Anneleen J. Klaassen (j.klaassen@utwente.nl)

Ethics committee University of Twente:

(ethicscommittee-bms@utwente.nl)

I have read and understood the terms and conditions of this study. I agree to participate.

o yes

o no

Questionnaire

Demographic Information

How old are you? (in years)

What is your nationality?

Which gender do you identify with?

o female

o male

o non-binary

o other

In which year did you receive the diagnosis of breast cancer?

Example: 2021, 1974, ...

Which type of breast cancer treatment have you received?

	I have received the following treatment(s) for
	breast cancer:
lumpectomy or other breast-sparing surgery	0
mastectomy	0
radiotherapy	0
chemotherapy	0
hormone therapy	0
targeted/ immunotherapy	0
other (major) treatment	0

Have you received breast reconstruction surgery?

o yes

o no

Self-compassion

Part 1

.

Please read the following statements thoroughly. All questions range from 1 = almost never to 5 = almost always. Please click which comes closest to your perception.

	almost				5 -
	never -	2	3	4	almost
	1				always
When I fail at something important to me I	0	0	0	0	0
become consumed by feelings of					
inadequacy.					
I try to be understanding and patient	0	0	0	0	0
towards those aspects of my personality I					
don't like.					
When something painful happens I try to	0	0	0	0	0
take a balanced view of the situation.					
When I'm feeling down, I tend to feel like	0	0	0	0	0
most other people are probably happier					
than I am.					
I try to see my failings as part of the	0	0	0	0	0
human condition.					
When I'm going through a very hard time,	0	0	0	0	0
I give myself the caring and tenderness I					
need.					
When something upsets me I try to keep	0	0	0	0	0
my emotions in balance.					
When I fail at something that's important	0	0	0	0	0
to me, I tend to feel alone in my failure.					
When I'm feeling down I tend to obsess	0	0	0	0	0
and fixate on everything that's wrong.					
When I feel inadequate in some way, I try	0	0	0	0	0
to remind myself that feelings of					
inadequacy are shared by most people.					
I'm disapproving and judgmental about	0	0	0	0	0
my own flaws and inadequacies.					
I'm intolerant and impatient towards those	0	0	0	0	0
aspects of my personality I don't like.					

Body image disturbance

Part 2

With the following questions you will be asked how you feel about your appearance, and about any changes that may have resulted from your disease or treatment. All questions range from 1 = not at all to 4 = very much. Please click which comes closest to the way you have been feeling about yourself, **during the past week**.

	not at all	a little	quite a bit	very much
Have you been feeling self-conscious about your appearance?	0	0	0	0
Have you felt less physically attractive as a result of your disease or treatment?	0	0	0	0
Have you been dissatisfied with your appearance when dressed?	0	0	0	0
Have you been feeling less feminine/masculine as a result of your disease or treatment?	0	0	0	0
Did you find it difficult to look at yourself naked?	0	0	0	0
Have you been feeling less sexually attractive as a result of your disease or treatment?	0	0	0	0
Did you avoid people because of the way you felt about your appearance?	0	0	0	0
Have you been feeling the treatment has left your body less whole?	0	0	0	0
Have you felt dissatisfied with your body?	0	0	0	0
Have you been dissatisfied with the appearance of your scar?	0	0	0	0

Part 3.1

Please read the following statements thoroughly. All questions range from 1 = strongly disagree to 7 = strongly agree. Select one option for each statement, which comes closest to your perception.

	strongly disagree - 1	2	3	neutral	5	6	strongly agree - 7
I don't care what other people think of	0	0	0	0	0	0	0
me.							
What others think of me has no effect	0	0	0	0	0	0	0
on what I think about myself.							
I don't care if other people have a	0	0	0	0	0	0	0
negative opinion about me.							
My self-esteem depends on the opinions	0	0	0	0	0	0	0
others hold of me.							
I can't respect myself if others don't	0	0	0	0	0	0	0
respect me.							
Da							

Part 3.2

Please read the following statements thoroughly. All questions range from 1 =strongly

disagree to 7 = strongly agree. Select one option for each statement, which comes closest to your perception.

	strongly disagree - 1	2	3	neutral	5	6	strongly agree - 7
My self-esteem does not depend on whether or not I feel attractive.	0	0	0	0	0	0	0
My self-esteem is influenced by how attractive I think my face or facial features are.	0	0	0	0	0	0	0
My sense of self-worth suffers whenever I think I don't look good.	0	0	0	0	0	0	0
My self-esteem is unrelated to how I feel about the way my body looks	0	0	0	0	0	0	0
When I think I look attractive, I feel good about myself.	0	0	0	0	0	0	0

Part 3.3

Please read the following statements thoroughly. All questions range from 1 = strongly disagree to 7 = strongly agree. Select one option for each statement, which comes closest to your perception.

	strongly disagree - 1	2	3	neutral	5	6	strongly agree - 7
Doing better than others gives me a	0	0	0	0	0	0	0
sense of self-respect.							
Knowing that I am better than others on	0	0	0	0	0	0	0
a task raises my self-esteem.							
My self-worth is affected by how well I	0	0	0	0	0	0	0
do when I am competing with others.							
My self-worth is influenced by how	0	0	0	0	0	0	0
well I do on competitive tasks.							
I feel worthwhile when I perform better	0	0	0	0	0	0	0
than others on a task or skill.							

Part 3.4

Please read the following statements thoroughly. All questions range from 1 = strongly disagree to 7 = strongly agree. Select one option for each statement, which comes closest to your perception.

	strongly disagree - 1	2	3	neutral	5	6	strongly agree - 7
My self-esteem is influenced by my	0	0	0	0	0	0	0
academic performance.							
I feel better about myself when I know I'm doing well academically	0	0	0	0	0	0	0
---	---	---	---	---	---	---	---
Doing well in school gives me a sense	0	0	0	0	0	0	0
I feel bad about myself whenever my	0	0	0	0	0	0	0
My opinion about myself isn't tied to	0	0	0	0	0	0	0
now well I do in school.							

Part 3.5

Please read the following statements thoroughly. All questions range from 1 = strongly disagree to 7 = strongly agree. Select one option for each statement, which comes closest to your perception.

	strongly disagree - 1	2	3	neutral	5	6	strongly agree - 7
My self-esteem depends on whether or	0	0	0	0	0	0	0
not I follow my moralethical principles.							
My self-esteem would suffer if I did	0	0	0	0	0	0	0
something unethical.							
I couldn't respect myself if I didn't live	0	0	0	0	0	0	0
up to a moral code.							
Whenever I follow my moral principles,	0	0	0	0	0	0	0
my sense of self-respect gets a boost.							
Doing something I know is wrong	0	0	0	0	0	0	0
makes me lose my self-respect.							

Part 3.6

Please read the following statements thoroughly. All questions range from 1 = strongly disagree to 7 = strongly agree. Select one option for each statement, which comes closest to your perception.

	strongly disagree - 1	2	3	neutral	5	6	strongly agree - 7
It is important to my self-respect that I	0	0	0	0	0	0	0
have a family that cares about me. When my family members are proud of me. my sense of self-worth increases	0	0	0	0	0	0	0
Knowing that my family members love me makes me feel good about myself.	0	0	0	0	0	0	0
When I don't feel loved by my family, my self-esteem goes down.	0	0	0	0	0	0	0

My self-worth is not influenced by the	0	0	0	0	0	0	0
quality of my relationships with my							
family members.							

Part 3.7

Please read the following statements thoroughly. All questions range from 1 = strongly disagree to 7 = strongly agree. Select one option for each statement, which comes closest to your perception.

	strongly disagree - 1	2	3	neutral	5	6	strongly agree - 7
My self-esteem goes up when I feel that	0	0	0	0	0	0	0
God loves me.							
I feel worthwhile when I have God's	0	0	0	0	0	0	0
love.							
My self-esteem would suffer if I didn't	0	0	0	0	0	0	0
have God's love.							
My self-worth is based on God's love.	0	0	0	0	0	0	0
When I think that I'm disobeying God, I	0	0	0	0	0	0	0
feel bad about myself.							

Appendix B: R Script

#set directory and load necessary packages

setwd("C:/Users/Alina/OneDrive - University of Twente/Documents/R")

getwd()

library(janitor)

library(tidyverse)

library(foreign)

library(broom)

library(haven)

library(stats)

library(modelr)

library(lme4)

library(readxl)

library(apaTables)

library(dplyr)

library(car)

library(emmeans)

library(lmerTest)

library(CTT)

#english data set

specify the file path to your excel file

excel_file <- "C:/Users/Alina/OneDrive - University of Twente/Documents/R/bachelor thesis - self-compassion and body image after breast cancer_29 April 2024_07.02.xlsx"

read the excel file into R

excel_data <- read_excel("C:/Users/Alina/OneDrive - University of Twente/Documents/R/bachelor thesis - self-compassion and body image after breast cancer_29 April 2024_07.02.xlsx")

work with the 'excel_data' object which contains the excel file data

```
thesisdataeng <- read_excel("bachelor thesis - self-compassion and body image after breast cancer_29 April 2024_07.02.xlsx")
```

View(thesisdataeng)

#make a new dataset

mydataeng <- thesisdataeng %>%

select("UserLanguage","Finished","1.1","2.0","2.1","2.2","2.3","2.4_1","2.4_2","2.4_3","2.4 _4","2.4_5","2.4_6","2.4_7","2.4_7_TEXT","2.5","3.0_1","3.0_2","3.0_3","3.0_4","3.0_5"," 3.0_6","3.0_7","3.0_8","3.0_9","3.0_10","3.0_11","3.0_12","4.0_1","4.0_2","4.0_3","4.0_4", "4.0_5","4.0_6","4.0_7","4.0_8","4.0_9","4.0_10","5.0_1","5.0_2","5.0_3","5.0_4","5.0_5"," 5.1_1","5.1_2","5.1_3","5.1_4","5.1_5","5.2_1","5.2_2","5.2_3","5.2_4","5.2_5","5.3_1","5. 3_2","5.3_3","5.3_4","5.3_5","5.4_1","5.4_2","5.4_3","5.4_4","5.4_5","5.5_1","5.5_2","5.5_ 3","5.5_4","5.5_5","5.6_1","5.6_2","5.6_4","5.6_5")

#filter the data

mydataeng_filtered <- mydataeng %>%

filter(Finished == 'True')

View(mydataeng_filtered)

delete test participant (13)

mydataeng_filtered <- mydataeng_filtered[-c(13),]

rename variables

dataeng <- mydataeng_filtered %>%

rename(

CONSENT = `1.1`, AGE = `2.0`, NATION = `2.1`, GENDER = `2.2`, YEAR = `2.3`, T1 = `2.4_1`, T2 = `2.4_2`, T3 = `2.4_3`, T4 = `2.4_4`, T5 = `2.4_5`, T6 = `2.4_6`, T7 = `2.4_7`, TOTHER = `2.4_7_TEXT`, BRS = `2.5`, SC1 = `3.0_1`, SC2 = `3.0_2`, SC3 = `3.0_3`, SC4 = `3.0_4`, SC5 = `3.0_5`, SC6 = `3.0_6`, SC7 = `3.0_7`, SC8 = `3.0_8`, SC9 = `3.0_9`, SC10 = `3.0_10`, SC11 = `3.0_11`, SC12 = `3.0_12`, BI1 = `4.0_1`, BI2 = `4.0_2`, BI3 = `4.0_3`, BI4 = `4.0_4`, BI5 = `4.0_5`, BI6 = `4.0_6`, BI7 = `4.0_7`, BI8 = `4.0_8`, BI9 = `4.0_9`, BI10 = `4.0_10`, SW1.1 = `5.0_1`, SW1.2 = `5.0_2`, SW1.3 = `5.0_3`, SW1.4 = `5.0_4`, SW2.5 = `5.1_5`, SW2.1 = `5.1_1`, SW2.2 = `5.1_2`, SW2.3 = `5.1_3`, SW2.4 = `5.1_4`, SW2.5 = `5.2_5`, SW4.1 = `5.2_1`, SW3.2 = `5.2_2`, SW3.3 = `5.2_3`, SW3.4 = `5.2_4`, SW3.5 = `5.2_5`, SW5.1 = `5.4_1`, SW5.2 = `5.4_2`, SW5.3 = `5.4_3`, SW5.4 = `5.4_4`, SW5.5 = `5.4_5`, SW6.1 = `5.5_1`, SW7.2 = `5.6_2`, SW7.3 = `5.6_3`, SW7.4 = `5.6_4`, SW7.5 = `5.6_5`)

view(dataeng)

replacement rule for text to numeric values for variable self-compassion

replacement_rules_group1 <- list(</pre>

```
"almost never - 1" = 1,
"2" = 2,
"3" = 3,
"4" = 4,
"5 - almost always" = 5
```

applying replacement for SC

```
dataeng$sc1 <- replacement_rules_group1[dataeng$SC1]
dataeng$sc2 <- replacement_rules_group1[dataeng$SC2]
dataeng$sc3 <- replacement_rules_group1[dataeng$SC3]
dataeng$sc4 <- replacement_rules_group1[dataeng$SC4]
dataeng$sc5 <- replacement_rules_group1[dataeng$SC5]
dataeng$sc6 <- replacement_rules_group1[dataeng$SC6]
dataeng$sc7 <- replacement_rules_group1[dataeng$SC7]
dataeng$sc8 <- replacement_rules_group1[dataeng$SC8]
dataeng$sc9 <- replacement_rules_group1[dataeng$SC9]
dataeng$sc10 <- replacement_rules_group1[dataeng$SC10]
dataeng$sc11 <- replacement_rules_group1[dataeng$SC10]
dataeng$sc12 <- replacement_rules_group1[dataeng$SC12]
# replacement rule for text to numeric values for variable body image
replacement_rules_group2 <- list(
```

"not at all" = 0,

"a little" = 1,

```
"quite a bit" = 2,
```

```
"very much" = 3
```

```
)
```

```
# applying replacement for BI
```

```
dataeng$bi1 <- replacement_rules_group2[dataeng$BI1]
dataeng$bi2 <- replacement_rules_group2[dataeng$BI2]
dataeng$bi3 <- replacement_rules_group2[dataeng$BI3]
dataeng$bi4 <- replacement_rules_group2[dataeng$BI4]
dataeng$bi5 <- replacement_rules_group2[dataeng$BI5]
dataeng$bi6 <- replacement_rules_group2[dataeng$BI6]
dataeng$bi7 <- replacement_rules_group2[dataeng$BI7]
dataeng$bi8 <- replacement_rules_group2[dataeng$BI8]
dataeng$bi9 <- replacement_rules_group2[dataeng$BI8]
dataeng$bi9 <- replacement_rules_group2[dataeng$BI9]
dataeng$bi10 <- replacement_rules_group2[dataeng$BI10]
# replacement rule for text to numeric values for variable self-worth
```

```
replacement_rules_group3 <- list(
```

```
"strongly disagree - 1" = 1,

"2" = 2,

"3" = 3,

"neutral" = 4,

"5" = 5,

"6" = 6,

"strongly agree - 7" = 7
```

```
)
```

applying replacement for SW

dataeng\$sw1.1 <- replacement_rules_group3[dataeng\$SW1.1] dataeng\$sw1.2 <- replacement_rules_group3[dataeng\$SW1.2] dataeng\$sw1.3 <- replacement_rules_group3[dataeng\$SW1.3] dataeng\$sw1.4 <- replacement_rules_group3[dataeng\$SW1.4] dataeng\$sw1.5 <- replacement_rules_group3[dataeng\$SW1.5] dataeng\$sw2.1 <- replacement_rules_group3[dataeng\$SW2.1] dataeng\$sw2.2 <- replacement_rules_group3[dataeng\$SW2.2] dataeng\$sw2.3 <- replacement_rules_group3[dataeng\$SW2.3] dataeng\$sw2.4 <- replacement_rules_group3[dataeng\$SW2.4] dataeng\$sw2.5 <- replacement_rules_group3[dataeng\$SW2.5]</pre> dataeng\$sw3.1 <- replacement rules group3[dataeng\$SW3.1] dataeng\$sw3.2 <- replacement_rules_group3[dataeng\$SW3.2]</pre> dataeng\$sw3.3 <- replacement_rules_group3[dataeng\$SW3.3] dataeng\$sw3.4 <- replacement_rules_group3[dataeng\$SW3.4] dataeng\$sw3.5 <- replacement_rules_group3[dataeng\$SW3.5]</pre> dataeng\$sw4.1 <- replacement_rules_group3[dataeng\$SW4.1] dataeng\$sw4.2 <- replacement_rules_group3[dataeng\$SW4.2] dataeng\$sw4.3 <- replacement_rules_group3[dataeng\$SW4.3] dataeng\$sw4.4 <- replacement_rules_group3[dataeng\$SW4.4] dataeng\$sw4.5 <- replacement_rules_group3[dataeng\$SW4.5] dataeng\$sw5.1 <- replacement_rules_group3[dataeng\$SW5.1] dataeng\$sw5.2 <- replacement_rules_group3[dataeng\$SW5.2]

dataeng\$sw5.3 <- replacement_rules_group3[dataeng\$SW5.3]

dataeng\$sw5.4 <- replacement_rules_group3[dataeng\$SW5.4]

dataeng\$sw5.5 <- replacement_rules_group3[dataeng\$SW5.5]

dataeng\$sw6.1 <- replacement_rules_group3[dataeng\$SW6.1]

dataeng\$sw6.2 <- replacement_rules_group3[dataeng\$SW6.2]

dataeng\$sw6.3 <- replacement_rules_group3[dataeng\$SW6.3]

dataeng\$sw6.4 <- replacement_rules_group3[dataeng\$SW6.4]

 $data eng \$sw 6.5 <- replacement_rules_group 3 [data eng \$SW 6.5]$

dataeng\$sw7.1 <- replacement_rules_group3[dataeng\$SW7.1]

 $data eng\$sw7.2 <- replacement_rules_group3[data eng\$SW7.2]$

dataeng\$sw7.3 <- replacement_rules_group3[dataeng\$SW7.3]

dataeng\$sw7.4 <- replacement_rules_group3[dataeng\$SW7.4]

dataeng\$sw7.5 <- replacement_rules_group3[dataeng\$SW7.5]

specify column names to delete

columns_to_delete <- c("SC1", "SC2", "SC3", "SC4", "SC5", "SC6", "SC7", "SC8", "SC9", "SC10", "SC11", "SC12", "BI1", "BI2", "BI3", "BI4", "BI5", "BI6", "BI7", "BI8", "BI9", "BI10", "SW1.1", "SW1.2", "SW1.3", "SW1.4", "SW1.5", "SW2.1", "SW2.2", "SW2.3", "SW2.4", "SW2.5", "SW3.1", "SW3.2", "SW3.3", "SW3.4", "SW3.5", "SW4.1", "SW4.2", "SW4.3", "SW4.4", "SW4.5", "SW5.1", "SW5.2", "SW5.3", "SW5.4", "SW5.5", "SW6.1", "SW6.2", "SW6.3", "SW6.4", "SW6.5", "SW7.1", "SW7.2", "SW7.3", "SW7.4", "SW7.5")

delete specified columns from the dataframe

dataeng <- dataeng[, !(names(dataeng) %in% columns_to_delete)]</pre>

dealing with missing values - instead of deleting participant 10

Convert 'sw7.1' column to numeric

dataeng\$sw7.1 <- as.numeric(as.character(dataeng\$sw7.1))

Calculate the mean of 'sw7.1' excluding NA values, round to one decimal only

mean_sw7.1 <- round(mean(dataeng\$sw7.1, na.rm = TRUE))</pre>

Replace NA values in 'sw7.1' with the calculated mean

dataeng\$sw7.1[is.na(dataeng\$sw7.1)] <- mean_sw7.1

Convert 'sw7.2' column to numeric

dataeng\$sw7.2 <- as.numeric(as.character(dataeng\$sw7.2))</pre>

Calculate the mean of 'sw7.2' excluding NA values, round to one decimal only

mean_sw7.2 <- round(mean(dataeng\$sw7.2, na.rm = TRUE))</pre>

Replace NA values in 'sw7.2' with the calculated mean

- dataeng\$sw7.2[is.na(dataeng\$sw7.2)] <- mean_sw7.2
- # Convert 'sw7.3' column to numeric
- dataeng\$sw7.3 <- as.numeric(as.character(dataeng\$sw7.3))
- # Calculate the mean of 'sw7.3' excluding NA values, round to one decimal only
- mean_sw7.3 <- round(mean(dataeng\$sw7.3, na.rm = TRUE))</pre>
- # Replace NA values in 'sw7.3' with the calculated mean
- dataeng\$sw7.3[is.na(dataeng\$sw7.3)] <- mean_sw7.3
- # Convert 'sw7.4' column to numeric
- dataeng\$sw7.4 <- as.numeric(as.character(dataeng\$sw7.4))
- # Calculate the mean of 'sw7.4' excluding NA values, round to one decimal only
- mean_sw7.4 <- round(mean(dataeng\$sw7.4, na.rm = TRUE))
- # Replace NA values in 'sw7.4' with the calculated mean
- dataeng\$sw7.4[is.na(dataeng\$sw7.4)] <- mean_sw7.4
- # Convert 'sw7.5' column to numeric
- dataeng\$sw7.5 <- as.numeric(as.character(dataeng\$sw7.5))
- # Calculate the mean of 'sw7.5' excluding NA values, round to one decimal only
- mean_sw7.5 <- round(mean(dataeng\$sw7.5, na.rm = TRUE))</pre>
- # Replace NA values in 'sw7.5' with the calculated mean

dataeng\$sw7.5[is.na(dataeng\$sw7.5)] <- mean_sw7.5

define a vector of column names to convert to numeric

```
columns_to_convert <- c(
```

- paste0("sc", 1:12),
- paste0("bi", 1:10),
- paste0("sw1.", 1:5),
- paste0("sw2.", 1:5),
- paste0("sw3.", 1:5),
- paste0("sw4.", 1:5),
- paste0("sw5.", 1:5),
- paste0("sw6.", 1:5),
- paste0("sw7.", 1:5)

)

loop through each column name and convert to numeric

```
for (col in columns_to_convert) {
 dataeng[[col]] <- as.numeric(dataeng[[col]]) # Convert column to numeric type
}
#reverse scores
dataeng <- dataeng %>%
 mutate(sc1 = max(sc1) + 1 - sc1)
dataeng <- dataeng %>%
 mutate(sc4 = max(sc4) + 1 - sc4)
dataeng <- dataeng %>%
 mutate(sc8 = max(sc8) + 1 - sc8)
dataeng <- dataeng %>%
 mutate(sc9 = max(sc9) + 1 - sc9)
dataeng <- dataeng %>%
 mutate(sc11 = max(sc11) + 1 - sc11)
dataeng <- dataeng %>%
 mutate(sc12 = max(sc12) + 1 - sc12)
dataeng <- dataeng %>%
 mutate(sw1.1 = max(sw1.1) + 1 - sw1.1)
dataeng <- dataeng %>%
 mutate(sw1.2 = max(sw1.2) + 1 - sw1.2)
dataeng <- dataeng %>%
 mutate(sw1.3 = max(sw1.3) + 1 - sw1.3)
dataeng <- dataeng %>%
 mutate(sw2.1 = max(sw2.1) + 1 - sw2.1)
dataeng <- dataeng %>%
 mutate(sw2.4 = max(sw2.4) + 1 - sw2.4)
dataeng <- dataeng %>%
 mutate(sw4.5 = max(sw4.5) + 1 - sw4.5)
dataeng <- dataeng %>%
 mutate(sw6.5 = max(sw6.5) + 1 - sw6.5)
#make new variable
```

#self-compassion

45

```
dataeng<- dataeng %>%
 mutate(self\_compassion\_total = sc1 + sc2 + sc3 + sc4 + sc5 + sc6 + sc7 + sc8 + sc9 + sc10
+ sc11 + sc12)
#body image
dataeng<- dataeng %>%
 mutate(body\_image\_total = bi1 + bi2 + bi3 + bi4 + bi5 + bi6 + bi7 + bi8 + bi9 + bi10)
#self-worth
dataeng<- dataeng %>%
 mutate(self_worth_approval_total = sw1.1 + sw1.2 + sw1.3 + sw1.4 + sw1.5)
dataeng<- dataeng %>%
 mutate(self_worth_appearance_total = sw2.1 + sw2.2 + sw2.3 + sw2.4 + sw2.5)
dataeng<- dataeng %>%
 mutate(self_worth_competition_total = sw3.1 + sw3.2 + sw3.3 + sw3.4 + sw3.5)
dataeng<- dataeng %>%
 mutate(self\_worth\_academic\_total = sw4.1 + sw4.2 + sw4.3 + sw4.4 + sw4.5)
dataeng<- dataeng %>%
 mutate(self_worth_virtue_total = sw5.1 + sw5.2 + sw5.3 + sw5.4 + sw5.5)
dataeng<- dataeng %>%
 mutate(self\_worth\_family\_total = sw6.1 + sw6.2 + sw6.3 + sw6.4 + sw6.5)
dataeng<- dataeng %>%
 mutate(self\_worth\_god\_total = sw7.1 + sw7.2 + sw7.3 + sw7.4 + sw7.5)
#exploring the data
#gender
gender_count <- table(dataeng$GENDER)</pre>
gender_percentage <- prop.table(gender_count) * 100
view(gender_count)
View(gender_percentage)
#nationality
```

replace white american and other named nationalities in nationality column by apply multiple replacements using case_when()

```
dataeng <- dataeng %>%
```

```
mutate(NATION = case_when(
```

NATION %in% c("White American", "American", "US", "United States - North American") ~ "USA",

NATION == "Dutch" ~ "Netherlands",

NATION == "Polish, Irish, Czechoslovakian, Bohemian" ~ "Poland",

TRUE ~ NATION # Keep other values unchanged

))

```
nationality_count <- table(dataeng$NATION)</pre>
```

nationality_percentage <- prop.table(nationality_count) * 100

View(nationality_count)

View(nationality_percentage)

#age

```
age_count <- table(dataeng$AGE)</pre>
```

```
age_percentage <- prop.table(age_count) * 100
```

view(age_count)

View(age_percentage)

filter out rows with NA values in the AGE column

dataeng_no_na <- dataeng[!is.na(dataeng\$AGE),]</pre>

convert AGE column to numeric (handle non-numeric values)

dataeng_no_na\$AGE <- as.numeric(dataeng_no_na\$AGE)</pre>

mean age of non-NA values

```
mean_age <- mean(dataeng_no_na$AGE)</pre>
```

print(mean_age)

combine treatment variables into one treatment variable

replace written text with 1

dataeng <- dataeng %>%

mutate(T1 = case_when(

T1 == "I have received the following treatment(s) for breast cancer:" ~ "1",

TRUE ~ T1 # Keep other values unchanged

```
))
```

dataeng <- dataeng %>%

mutate(T2 = case_when(

T2 == "I have received the following treatment(s) for breast cancer:" ~ "1",

```
TRUE ~ T2 # Keep other values unchanged
 ))
dataeng <- dataeng %>%
 mutate(T3 = case_when(
  T3 == "I have received the following treatment(s) for breast cancer:" ~ "1",
  TRUE ~ T3 # Keep other values unchanged
 ))
dataeng <- dataeng %>%
 mutate(T4 = case_when(
  T4 == "I have received the following treatment(s) for breast cancer:" ~ "1",
  TRUE ~ T4 # Keep other values unchanged
 ))
dataeng <- dataeng %>%
 mutate(T5 = case\_when(
  T5 == "I have received the following treatment(s) for breast cancer:" ~ "1",
  TRUE ~ T5 # Keep other values unchanged
 ))
dataeng <- dataeng %>%
 mutate(T6 = case\_when(
  T6 == "I have received the following treatment(s) for breast cancer:" ~ "1",
  TRUE ~ T6 # Keep other values unchanged
 ))
dataeng <- dataeng %>%
 mutate(T7 = case_when(
  T7 == "I have received the following treatment(s) for breast cancer:" ~ "1",
  TRUE ~ T7 # Keep other values unchanged
 ))
# replace NA with 0 for treatment variables using replace()
```

dataeng <- dataeng %>%

mutate(T1 = replace(T1, is.na(T1), 0))

dataeng <- dataeng %>%

mutate(T2 = replace(T2, is.na(T2), 0))

dataeng <- dataeng %>%

```
mutate(T3 = replace(T3, is.na(T3), 0))
```

dataeng <- dataeng %>%

mutate(T4 = replace(T4, is.na(T4), 0))

dataeng <- dataeng %>%

mutate(T5 = replace(T5, is.na(T5), 0))

dataeng <- dataeng %>%

```
mutate(T6 = replace(T6, is.na(T6), 0))
```

```
dataeng <- dataeng %>%
```

mutate(T7 = replace(T7, is.na(T7), 0))

convert treatment columns to numeric (handle non-numeric values)

```
dataeng$T1 <- as.numeric(dataeng$T1)</pre>
```

```
dataeng$T2 <- as.numeric(dataeng$T2)</pre>
```

dataeng\$T3 <- as.numeric(dataeng\$T3)</pre>

dataeng\$T4 <- as.numeric(dataeng\$T4)</pre>

dataeng\$T5 <- as.numeric(dataeng\$T5)</pre>

dataeng\$T6 <- as.numeric(dataeng\$T6)

```
dataeng$T7 <- as.numeric(dataeng$T7)</pre>
```

#year of diagnosis

replace one participants multiple diagnosis years with the latest diagnosis year

```
dataeng <- dataeng %>%
```

mutate(YEAR = case_when(

YEAR == "2009, 2023" ~ "2009",

TRUE ~ YEAR # Keep other values unchanged

```
))
```

convert year of diagnosis to numeric

dataeng\$YEAR <- as.numeric(dataeng\$YEAR)</pre>

year_count <- table(dataeng\$YEAR)</pre>

year_percentage <- prop.table(year_count) * 100</pre>

view(year_count)

View(year_percentage)

filter out rows with NA values in the YEAR column

dataeng_no_na <- dataeng[!is.na(dataeng\$YEAR),]</pre>

mean year of non-NA values

mean_year <- mean(dataeng_no_na\$YEAR)</pre>

print(mean_year)

correlations

correlation self-worth 4

item_correlation_eng_sw.4 <- cor(dataeng[, c("sw4.1", "sw4.2", "sw4.3", "sw4.4", "sw4.5")])

print(item_correlation_eng_sw.4)

correlation self-worth 6

item_correlation_eng_sw.6 <- cor(dataeng[, c("sw6.1", "sw6.2", "sw6.3", "sw6.4", "sw6.5")])

print(item_correlation_eng_sw.6)

german data set

specify the file path to your excel file

excel_file <- "C:/Users/Alina/OneDrive - University of Twente/Documents/R/Bachelorarbeit - Selbstmitgefühl und Körperbild nach Brustkrebs_2 May 2024_14.55.xlsx"

read the excel file into R

excel_data <- read_excel("C:/Users/Alina/OneDrive - University of Twente/Documents/R/Bachelorarbeit - Selbstmitgefühl und Körperbild nach Brustkrebs_2 May 2024_14.55.xlsx")

work with the 'excel_data' object which contains the excel file data

thesisdatager <- read_excel("Bachelorarbeit - Selbstmitgefühl und Körperbild nach Brustkrebs_2 May 2024_14.55.xlsx")

View(thesisdatager)

#make a new dataset

mydatager <- thesisdatager %>%

select("UserLanguage","Finished","1.1","2.0","2.1","2.2","2.3","2.4_1","2.4_2","2.4_3","2.4 _4","2.4_5","2.4_6","2.4_7","2.4_7_TEXT","2.5","3.0_1","3.0_2","3.0_3","3.0_4","3.0_5"," 3.0_6","3.0_7","3.0_8","3.0_9","3.0_10","3.0_11","3.0_12","4.0_1","4.0_2","4.0_3","4.0_4", "4.0_5","4.0_6","4.0_7","4.0_8","4.0_9","4.0_10","5.0_1","5.0_2","5.0_3","5.0_4","5.0_5"," 5.1_1","5.1_2","5.1_3","5.1_4","5.1_5","5.2_1","5.2_2","5.2_3","5.2_4","5.2_5","5.3_1","5. 3_2","5.3_3","5.3_4","5.3_5","5.4_1","5.4_2","5.4_3","5.4_4","5.4_5","5.5_1","5.5_2","5.5_ 3","5.5_4","5.5_5","5.6_1","5.6_2","5.6_4","5.6_5")

#filter the data

mydatager_filtered <- mydatager %>%

filter(Finished == 'True')

View(mydatager_filtered)

rename variables

datager <- mydatager_filtered %>%

rename(

CONSENT = `1.1`, AGE = `2.0`, NATION = `2.1`, GENDER = `2.2`, YEAR = `2.3`, T1 = `2.4_1`, T2 = `2.4_2`, T3 = `2.4_3`, T4 = `2.4_4`, T5 = `2.4_5`, T6 = `2.4_6`, T7 = `2.4_7`, TOTHER = `2.4_7_TEXT`, BRS = `2.5`, SC1 = `3.0_1`, SC2 = `3.0_2`, SC3 = `3.0_3`, SC4 = `3.0_4`, SC5 = `3.0_5`, SC6 = `3.0_6`, SC7 = `3.0_7`, SC8 = `3.0_8`, SC9 = `3.0_9`, SC10 = `3.0_10`, SC11 = `3.0_11`, SC12 = `3.0_12`, BI1 = `4.0_1`, BI2 = `4.0_2`, BI3 = `4.0_3`, BI4 = `4.0_4`, BI5 = `4.0_5`, BI6 = `4.0_6`, BI7 = `4.0_7`, BI8 = `4.0_8`, BI9 = `4.0_9`, BI10 = `4.0_10`, SW1.1 = `5.0_1`, SW1.2 = `5.0_2`, SW1.3 = `5.0_3`, SW1.4 = `5.0_4`, SW2.5 = `5.1_5`, SW2.1 = `5.1_1`, SW2.2 = `5.1_2`, SW2.3 = `5.1_3`, SW2.4 = `5.1_4`, SW2.5 = `5.2_5`, SW4.1 = `5.3_1`, SW4.2 = `5.3_2`, SW4.3 = `5.3_3`, SW4.4 = `5.3_4`, SW4.5 = `5.3_5`, SW5.1 = `5.4_1`, SW5.2 = `5.4_2`, SW5.3 = `5.4_3`, SW5.4 = `5.4_4`, SW5.5 = `5.4_5`, SW6.1 = `5.5_1`, SW7.2 = `5.6_2`, SW7.3 = `5.6_3`, SW7.4 = `5.6_4`, SW7.5 = `5.6_5`)

view(datager)

replacement rule for text to numeric values for variable self-compassion

```
replacement_rules_group1.ger <- list(</pre>
```

```
"fast nie - 1" = 1,
"2" = 2,
"3" = 3,
"4" = 4,
"5 - fast immer" = 5
)
# applying replacement for SC
```

```
datager$sc1 <- replacement_rules_group1.ger[datager$SC1]
datager$sc2 <- replacement_rules_group1.ger[datager$SC2]
datager$sc3 <- replacement_rules_group1.ger[datager$SC3]
datager$sc4 <- replacement_rules_group1.ger[datager$SC4]
datager$sc5 <- replacement_rules_group1.ger[datager$SC5]
datager$sc6 <- replacement_rules_group1.ger[datager$SC6]
datager$sc7 <- replacement_rules_group1.ger[datager$SC7]
datager$sc8 <- replacement_rules_group1.ger[datager$SC8]
datager$sc8 <- replacement_rules_group1.ger[datager$SC8]
datager$sc9 <- replacement_rules_group1.ger[datager$SC9]
datager$sc10 <- replacement_rules_group1.ger[datager$SC10]
```

```
datager$sc11 <- replacement_rules_group1.ger[datager$SC11]
datager$sc12 <- replacement_rules_group1.ger[datager$SC12]
# replacement rule for text to numeric values for variable body image
replacement_rules_group2.ger <- list(</pre>
```

```
"gar nicht" = 0,
"ein bisschen" = 1,
"ziemlich viel" = 2,
```

```
"sehr viel" = 3
```

```
)
```

applying replacement for BI

datager\$bi1 <- replacement_rules_group2.ger[datager\$BI1] datager\$bi2 <- replacement_rules_group2.ger[datager\$BI2] datager\$bi3 <- replacement_rules_group2.ger[datager\$BI3] datager\$bi4 <- replacement_rules_group2.ger[datager\$BI4] datager\$bi5 <- replacement_rules_group2.ger[datager\$BI5] datager\$bi6 <- replacement_rules_group2.ger[datager\$BI6] datager\$bi7 <- replacement_rules_group2.ger[datager\$BI7] datager\$bi8 <- replacement_rules_group2.ger[datager\$BI8] datager\$bi9 <- replacement_rules_group2.ger[datager\$BI9] datager\$bi9 <- replacement_rules_group2.ger[datager\$BI9] datager\$bi9 <- replacement_rules_group2.ger[datager\$BI9] datager\$bi9 <- replacement_rules_group2.ger[datager\$BI9] datager\$bi9 <- replacement_rules_group2.ger[datager\$BI9] datager\$bi9 <- replacement_rules_group2.ger[datager\$BI9] datager\$bi9 <- replacement_rules_group2.ger[datager\$BI9]

```
"stark widersprechen - 1" = 1,

"2" = 2,

"3" = 3,

"neutral" = 4,

"5" = 5,

"6" = 6,

"stark zustimmen - 7" = 7

)
```

applying replacement for SW

 $datager\$sw1.1 <- replacement_rules_group3.ger[datager\$SW1.1]$

datager\$sw1.2 <- replacement_rules_group3.ger[datager\$SW1.2] datager\$sw1.3 <- replacement_rules_group3.ger[datager\$SW1.3] datager\$sw1.4 <- replacement_rules_group3.ger[datager\$SW1.4] datager\$sw1.5 <- replacement_rules_group3.ger[datager\$SW1.5] datager\$sw2.1 <- replacement_rules_group3.ger[datager\$SW2.1] datager\$sw2.2 <- replacement_rules_group3.ger[datager\$SW2.2] datager\$sw2.3 <- replacement_rules_group3.ger[datager\$SW2.3] datager\$sw2.4 <- replacement rules group3.ger[datager\$SW2.4] datager\$sw2.5 <- replacement_rules_group3.ger[datager\$SW2.5] datager\$sw3.1 <- replacement_rules_group3.ger[datager\$SW3.1] datager\$sw3.2 <- replacement_rules_group3.ger[datager\$SW3.2] datager\$sw3.3 <- replacement_rules_group3.ger[datager\$SW3.3] datager\$sw3.4 <- replacement_rules_group3.ger[datager\$SW3.4] datager\$sw3.5 <- replacement_rules_group3.ger[datager\$SW3.5] datager\$sw4.1 <- replacement_rules_group3.ger[datager\$SW4.1] datager\$sw4.2 <- replacement_rules_group3.ger[datager\$SW4.2] datager\$sw4.3 <- replacement_rules_group3.ger[datager\$SW4.3] datager\$sw4.4 <- replacement_rules_group3.ger[datager\$SW4.4] datager\$sw4.5 <- replacement_rules_group3.ger[datager\$SW4.5] datager\$sw5.1 <- replacement_rules_group3.ger[datager\$SW5.1] datager\$sw5.2 <- replacement_rules_group3.ger[datager\$SW5.2] datager\$sw5.3 <- replacement_rules_group3.ger[datager\$SW5.3] datager\$sw5.4 <- replacement_rules_group3.ger[datager\$SW5.4] datager\$sw5.5 <- replacement_rules_group3.ger[datager\$SW5.5] datager\$sw6.1 <- replacement_rules_group3.ger[datager\$SW6.1] datager\$sw6.2 <- replacement_rules_group3.ger[datager\$SW6.2] datager\$sw6.3 <- replacement_rules_group3.ger[datager\$SW6.3] datager\$sw6.4 <- replacement_rules_group3.ger[datager\$SW6.4] datager\$sw6.5 <- replacement_rules_group3.ger[datager\$SW6.5] datager\$sw7.1 <- replacement_rules_group3.ger[datager\$SW7.1] datager\$sw7.2 <- replacement_rules_group3.ger[datager\$SW7.2] datager\$sw7.3 <- replacement_rules_group3.ger[datager\$SW7.3] datager\$sw7.4 <- replacement_rules_group3.ger[datager\$SW7.4]

datager\$sw7.5 <- replacement_rules_group3.ger[datager\$SW7.5]

specify column names to delete

columns_to_delete <- c("SC1", "SC2", "SC3", "SC4", "SC5", "SC6", "SC7", "SC8", "SC9", "SC10", "SC11", "SC12", "BI1", "BI2", "BI3", "BI4", "BI5", "BI6", "BI7", "BI8", "BI9", "BI10", "SW1.1", "SW1.2", "SW1.3", "SW1.4", "SW1.5", "SW2.1", "SW2.2", "SW2.3", "SW2.4", "SW2.5", "SW3.1", "SW3.2", "SW3.3", "SW3.4", "SW3.5", "SW4.1", "SW4.2", "SW4.3", "SW4.4", "SW4.5", "SW5.1", "SW5.2", "SW5.3", "SW5.4", "SW5.5", "SW6.1", "SW6.2", "SW6.3", "SW6.4", "SW6.5", "SW7.1", "SW7.2", "SW7.3", "SW7.4", "SW7.5")

- # delete specified columns from the dataframe
- datager <- datager[, !(names(datager) %in% columns_to_delete)]</pre>
- # dealing with missing values instead of deleting participants 2, 8, 12, 15
- datager\$sw1.2 <- as.numeric(as.character(datager\$sw1.2))</pre>
- mean_sw1.2 <- round(mean(datager\$sw1.2, na.rm = TRUE))</pre>

datager\$sw1.2[is.na(datager\$sw1.2)] <- mean_sw1.2

- datager\$sw1.3 <- as.numeric(as.character(datager\$sw1.3))</pre>
- mean_sw1.3 <- round(mean(datager\$sw1.3, na.rm = TRUE))</pre>
- datager\$sw1.3[is.na(datager\$sw1.3)] <- mean_sw1.3
- datager\$sw1.4 <- as.numeric(as.character(datager\$sw1.4))</pre>
- mean_sw1.4 <- round(mean(datager\$sw1.4, na.rm = TRUE))</pre>
- datager\$sw1.4[is.na(datager\$sw1.4)] <- mean_sw1.4
- datager\$sw1.5 <- as.numeric(as.character(datager\$sw1.5))</pre>
- mean_sw1.5 <- round(mean(datager\$sw1.5, na.rm = TRUE))</pre>
- datager\$sw1.5[is.na(datager\$sw1.5)] <- mean_sw1.5
- datager\$sw2.4 <- as.numeric(as.character(datager\$sw2.4))</pre>
- mean_sw2.4 <- round(mean(datager\$sw2.4, na.rm = TRUE))</pre>
- datager\$sw2.4[is.na(datager\$sw2.4)] <- mean_sw2.4
- datager\$sw3.5 <- as.numeric(as.character(datager\$sw3.5))
- mean_sw3.5 <- round(mean(datager\$sw3.5, na.rm = TRUE))</pre>
- datager\$sw3.5[is.na(datager\$sw3.5)] <- mean_sw3.5
- datager\$sw7.5 <- as.numeric(as.character(datager\$sw7.5))
- mean.ger_sw7.5 <- round(mean(datager\$sw7.5, na.rm = TRUE))</pre>
- datager\$sw7.5[is.na(datager\$sw7.5)] <- mean.ger_sw7.5
- # define a vector of column names to convert to numeric

```
columns_to_convert <- c(
paste0("sc", 1:12),
paste0("bi", 1:10),
paste0("sw1.", 1:5),
paste0("sw2.", 1:5),
paste0("sw3.", 1:5),
paste0("sw4.", 1:5),
paste0("sw5.", 1:5),
paste0("sw6.", 1:5),
paste0("sw7.", 1:5)
```

)

loop through each column name and convert to numeric

```
for (col in columns_to_convert) {
```

```
datager[[col]] <- as.numeric(datager[[col]]) # Convert column to numeric type
```

```
}
```

```
#reverse scores
datager <- datager %>%
 mutate(sc1 = max(sc1) + 1 - sc1)
datager <- datager %>%
 mutate(sc4 = max(sc4) + 1 - sc4)
datager <- datager %>%
 mutate(sc8 = max(sc8) + 1 - sc8)
datager <- datager %>%
 mutate(sc9 = max(sc9) + 1 - sc9)
datager <- datager %>%
 mutate(sc11 = max(sc11) + 1 - sc11)
datager <- datager %>%
 mutate(sc12 = max(sc12) + 1 - sc12)
datager <- datager %>%
 mutate(sw1.1 = max(sw1.1) + 1 - sw1.1)
datager <- datager %>%
 mutate(sw1.2 = max(sw1.2) + 1 - sw1.2)
```

datager <- datager %>% mutate(sw1.3 = max(sw1.3) + 1 - sw1.3)datager <- datager %>% mutate(sw2.1 = max(sw2.1) + 1 - sw2.1)datager <- datager %>% mutate(sw2.4 = max(sw2.4) + 1 - sw2.4)datager <- datager %>% mutate(sw4.5 = max(sw4.5) + 1 - sw4.5)datager <- datager %>% mutate(sw6.5 = max(sw6.5) + 1 - sw6.5)#make new variable #self-compassion datager<- datager %>% $mutate(self_compassion_total = sc1 + sc2 + sc3 + sc4 + sc5 + sc6 + sc7 + sc8 + sc9 + sc10$ + sc11 + sc12) #body image datager<- datager %>% $mutate(body_image_total = bi1 + bi2 + bi3 + bi4 + bi5 + bi6 + bi7 + bi8 + bi9 + bi10)$ #self-worth datager<- datager %>% $mutate(self_worth_approval_total = sw1.1 + sw1.2 + sw1.3 + sw1.4 + sw1.5)$ datager<- datager %>% $mutate(self_worth_appearance_total = sw2.1 + sw2.2 + sw2.3 + sw2.4 + sw2.5)$ datager<- datager %>% $mutate(self_worth_competition_total = sw3.1 + sw3.2 + sw3.3 + sw3.4 + sw3.5)$ datager<- datager %>% $mutate(self_worth_academic_total = sw4.1 + sw4.2 + sw4.3 + sw4.4 + sw4.5)$ datager<- datager %>% $mutate(self_worth_virtue_total = sw5.1 + sw5.2 + sw5.3 + sw5.4 + sw5.5)$ datager<- datager %>% $mutate(self_worth_family_total = sw6.1 + sw6.2 + sw6.3 + sw6.4 + sw6.5)$ datager<- datager %>%

```
mutate(self\_worth\_god\_total = sw7.1 + sw7.2 + sw7.3 + sw7.4 + sw7.5)
```

#exploring the data

#gender

translate weiblich to female

datager <- datager %>%

mutate(GENDER = case_when(

GENDER %in% c("Weiblich") ~ "female",

TRUE ~ GENDER # Keep other values unchanged

))

gender_count.ger <- table(datager\$GENDER)</pre>

gender_percentage.ger <- prop.table(gender_count.ger) * 100

view(gender_count.ger)

View(gender_percentage.ger)

#nationality

replace other named nationalities in nationality column by apply multiple replacements
using case_when()

Corrected mutate() with case_when() syntax

datager <- datager %>%

mutate(NATION = case_when(

NATION %in% c("D", "deutsch", "Deutsch", "Deutschland") ~ "Germany",

NATION %in% c("CH", "Schweiz") ~ "Switzerland",

NATION %in% c("Österreich", "Österreicherin") ~ "Austria",

NATION == "Griechisch" ~ "Greece",

TRUE ~ NATION # Keep other values unchanged

))

nationality_count.ger <- table(datager\$NATION)</pre>

nationality_percentage.ger <- prop.table(nationality_count.ger) * 100

View(nationality_count.ger)

View(nationality_percentage.ger)

#age

adjust birth year to age for 1969 to 55 years old

datager <- datager %>%

```
mutate(AGE = case_when(
```

AGE %in% c("1969") ~ "55",

TRUE ~ AGE # Keep other values unchanged

))

```
age_count.ger <- table(datager$AGE)</pre>
```

age_percentage.ger <- prop.table(age_count.ger) * 100

view(age_count.ger)

View(age_percentage.ger)

convert AGE column to numeric (handle non-numeric values)

datager\$AGE <- as.numeric(datager\$AGE)</pre>

mean(datager\$AGE)

combine treatment variables into one treatment variable

replace written text with 1

datager <- datager %>%

mutate(T1 = case_when(

T1 == "Ich habe die folgende(n) Behandlung(en) bezüglich meines Brustkrebs erhalten:" ~ "1",

TRUE ~ T1 # Keep other values unchanged

))

```
datager <- datager %>%
```

 $mutate(T2 = case_when($

T2 == "Ich habe die folgende(n) Behandlung(en) bezüglich meines Brustkrebs erhalten:" ~ "1",

TRUE ~ T2 # Keep other values unchanged

))

datager <- datager %>%

mutate(T3 = case_when(

T3 == "Ich habe die folgende(n) Behandlung(en) bezüglich meines Brustkrebs erhalten:" ~ "1",

TRUE ~ T3 # Keep other values unchanged

))

datager <- datager %>%

 $mutate(T4 = case_when($

T4 == "Ich habe die folgende(n) Behandlung(en) bezüglich meines Brustkrebs erhalten:" ~ "1",

TRUE ~ T4 # Keep other values unchanged

))

datager <- datager %>%

mutate(T5 = case_when(

T5 == "Ich habe die folgende(n) Behandlung(en) bezüglich meines Brustkrebs erhalten:" ~ "1",

TRUE ~ T5 # Keep other values unchanged

))

datager <- datager %>%

 $mutate(T6 = case_when($

T6 == "Ich habe die folgende(n) Behandlung(en) bezüglich meines Brustkrebs erhalten:" ~ "1",

TRUE ~ T6 # Keep other values unchanged

```
))
```

```
datager <- datager %>%
```

 $mutate(T7 = case_when($

T7 == "Ich habe die folgende(n) Behandlung(en) bezüglich meines Brustkrebs erhalten:" ~ "1",

TRUE ~ T7 # Keep other values unchanged

))

replace NA with 0 for treatment variables using replace()

datager <- datager %>%

mutate(T1 = replace(T1, is.na(T1), 0))

datager <- datager %>%

mutate(T2 = replace(T2, is.na(T2), 0))

datager <- datager %>%

```
mutate(T3 = replace(T3, is.na(T3), 0))
```

datager <- datager %>%

mutate(T4 = replace(T4, is.na(T4), 0))

datager <- datager %>%

mutate(T5 = replace(T5, is.na(T5), 0))

datager <- datager %>%

```
mutate(T6 = replace(T6, is.na(T6), 0))
```

datager <- datager %>%

mutate(T7 = replace(T7, is.na(T7), 0))

convert treatment columns to numeric (handle non-numeric values)

```
datager$T1 <- as.numeric(datager$T1)</pre>
```

datager\$T2 <- as.numeric(datager\$T2)</pre>

datager\$T3 <- as.numeric(datager\$T3)</pre>

datager\$T4 <- as.numeric(datager\$T4)</pre>

datager\$T5 <- as.numeric(datager\$T5)</pre>

datager\$T6 <- as.numeric(datager\$T6)

datager\$T7 <- as.numeric(datager\$T7)</pre>

#year of diagnosis

replace one participants multiple diagnosis years with the latest diagnosis year

```
datager <- datager %>%
```

mutate(YEAR = case_when(

YEAR == "2017 und 2023" ~ "2017",

TRUE ~ YEAR # Keep other values unchanged

```
))
```

convert year of diagnosis to numeric

datager\$YEAR <- as.numeric(datager\$YEAR)</pre>

```
year_count.ger <- table(datager$YEAR)</pre>
```

year_percentage.ger <- prop.table(year_count.ger) * 100

view(year_count.ger)

View(year_percentage.ger)

mean(datager\$YEAR)

estimating reliability of german dataset

correlation self-compassion

```
item_correlation_ger_sc <- cor(datager[, c("sc1", "sc2", "sc3", "sc4", "sc5", "sc6", "sc7", "sc8", "sc9", "sc10", "sc11", "sc12")])
```

print(item_correlation_ger_sc)

Cronbach's alpha self-compassion

alpha_ger_sc <- psych::alpha(datager[, c("sc1", "sc2", "sc3", "sc4", "sc5", "sc6", "sc7", "sc8", "sc9", "sc10", "sc11", "sc12")]) print(alpha_ger_sc) # correlation body image item_correlation_ger_bi <- cor(datager[, c("bi1", "bi2", "bi3", "bi4", "bi5", "bi6", "bi7", "bi8", "bi9", "bi10")]) print(item_correlation_ger_bi) # Cronbach's alpha body image alpha_ger_bi <- psych::alpha(datager[, c("bi1", "bi2", "bi3", "bi4", "bi5", "bi6", "bi7", "bi8", "bi9", "bi10")]) print(alpha_ger_bi) # correlation self-worth 1 item_correlation_ger_sw.1 <- cor(datager[, c("sw1.1", "sw1.2", "sw1.3", "sw1.4", "sw1.5")]) print(item_correlation_ger_sw.1) # Cronbach's alpha self-worth 1 alpha_ger_sw.1 <- psych::alpha(datager[, c("sw1.1", "sw1.2", "sw1.3", "sw1.4", "sw1.5")]) print(alpha_ger_sw.1) # correlation self-worth 2 item_correlation_ger_sw.2 <- cor(datager[, c("sw2.1", "sw2.2", "sw2.3", "sw2.4", "sw2.5")]) print(item_correlation_ger_sw.2) # Cronbach's alpha self-worth 2 alpha_ger_sw.2 <- psych::alpha(datager[, c("sw2.1", "sw2.2", "sw2.3", "sw2.4", "sw2.5")]) print(alpha ger sw.2) # correlation self-worth 3 item_correlation_ger_sw.3 <- cor(datager[, c("sw3.1", "sw3.2", "sw3.3", "sw3.4", "sw3.5")]) print(item_correlation_ger_sw.3) # Cronbach's alpha self-worth 3 alpha_ger_sw.3 <- psych::alpha(datager[, c("sw3.1", "sw3.2", "sw3.3", "sw3.4", "sw3.5")]) print(alpha_ger_sw.3) # correlation self-worth 4 item_correlation_ger_sw.4 <- cor(datager[, c("sw4.1", "sw4.2", "sw4.3", "sw4.4", "sw4.5")])

print(item_correlation_ger_sw.4)

Cronbach's alpha self-worth 4

alpha_ger_sw.4 <- psych::alpha(datager[, c("sw4.1", "sw4.2", "sw4.3", "sw4.4", "sw4.5")]) print(alpha_ger_sw.4)

correlation self-worth 5

item_correlation_ger_sw.5 <- cor(datager[, c("sw5.1", "sw5.2", "sw5.3", "sw5.4", "sw5.5")])
print(item_correlation_ger_sw.5)</pre>

Cronbach's alpha self-worth 5

alpha_ger_sw.5 <- psych::alpha(datager[, c("sw5.1", "sw5.2", "sw5.3", "sw5.4", "sw5.5")])

- print(alpha_ger_sw.5)
- # correlation self-worth 6

item_correlation_ger_sw.6 <- cor(datager[, c("sw6.1", "sw6.2", "sw6.3", "sw6.4", "sw6.5")])

print(item_correlation_ger_sw.6)

Cronbach's alpha self-worth 6

alpha_ger_sw.6 <- psych::alpha(datager[, c("sw6.1", "sw6.2", "sw6.3", "sw6.4", "sw6.5")])

print(alpha_ger_sw.6)

correlation self-worth 7

item_correlation_ger_sw.7 <- cor(datager[, c("sw7.1", "sw7.2", "sw7.3", "sw7.4", "sw7.5")])

print(item_correlation_ger_sw.7)

Cronbach's alpha self-worth 7

```
alpha_ger_sw.7 <- psych::alpha(datager[, c("sw7.1", "sw7.2", "sw7.3", "sw7.4", "sw7.5")])
```

```
print(alpha_ger_sw.7)
```

combining the english and german datasets into one dataset

```
combidata <- rbind(dataeng, datager)</pre>
```

View(combidata)

create mean score for self-compassion

```
combidata <- combidata %>%
```

mutate(self_compassion = rowMeans(select(., sc1:sc12), na.rm = TRUE))

view(combidata)

combine separate self-worth categories to create one

```
combidata<- combidata %>%
```

mutate(self_worth_total = self_worth_approval_total + self_worth_appearance_total +
self_worth_competition_total + self_worth_academic_total + self_worth_total +
self_worth_family_total + self_worth_god_total)

create mean score for overall self-worth

combidata <- combidata %>%

mutate(self_worth = rowMeans(select(.,

sw1.1, sw1.2, sw1.3, sw1.4, sw1.5, sw2.1, sw2.2, sw2.3, sw2.4, sw2.5, sw3.1, sw3.2, sw3.3, sw3.4, sw3.5, sw4.1, sw4.2, sw4.3, sw4.4, sw4.5, sw5.1, sw5.2, sw5.3, sw5.4, sw5.5, sw6.1, sw6.2, sw6.3, sw6.4, sw6.5, sw7.1, sw7.2, sw7.3, sw7.4, sw7.5), na.rm = TRUE))

create mean score variable for body image

combidata <- combidata %>%

mutate(body_image = rowMeans(select(., bi1:bi10), na.rm = TRUE))

view(combidata)

internal consistency aka reliability tested for the combined data

correlation self-compassion

item_cor_combi_sc <- cor(combidata[, c("sc1", "sc2", "sc3", "sc4", "sc5", "sc6", "sc7", "sc8", "sc9", "sc10", "sc11", "sc12")])

print(item_cor_combi_sc)

Cronbach's alpha self-compassion

alpha_combi_sc <- psych::alpha(combidata[, c("sc1", "sc2", "sc3", "sc4", "sc5", "sc6", "sc7", "sc8", "sc9", "sc10", "sc11", "sc12")])

print(alpha_combi_sc)

correlation body image

item_cor_combi_bi <- cor(combidata[, c("bi1", "bi2", "bi3", "bi4", "bi5", "bi6", "bi7", "bi8", "bi9", "bi10")])

print(item_cor_combi_bi)

Cronbach's alpha body image

alpha_combi_bi <- psych::alpha(combidata[, c("bi1", "bi2", "bi3", "bi4", "bi5", "bi6", "bi7", "bi8", "bi9", "bi9", "bi10")])

print(alpha_combi_bi)

correlation self-worth (overall)

item_cor_combi_sw <- cor(combidata[, c("sw1.1", "sw1.2", "sw1.3", "sw1.4", "sw1.5", "sw2.1", "sw2.2", "sw2.3", "sw2.4", "sw2.5", "sw3.1", "sw3.2", "sw3.3", "sw3.4", "sw3.5",

"sw4.1", "sw4.2", "sw4.3", "sw4.4", "sw4.5", "sw5.1", "sw5.2", "sw5.3", "sw5.4", "sw5.5", "sw6.1", "sw6.2", "sw6.3", "sw6.4", "sw6.5", "sw7.1", "sw7.2", "sw7.3", "sw7.4", "sw7.5")])

print(item_cor_combi_sw)

Cronbach's alpha self-worth (overall)

```
alpha_combi_sw <- psych::alpha(combidata[, c("sw1.1", "sw1.2", "sw1.3", "sw1.4", "sw1.5",
"sw2.1", "sw2.2", "sw2.3", "sw2.4", "sw2.5", "sw3.1", "sw3.2", "sw3.3", "sw3.4", "sw3.5",
"sw4.1", "sw4.2", "sw4.3", "sw4.4", "sw4.5", "sw5.1", "sw5.2", "sw5.3", "sw5.4", "sw5.5",
"sw6.1", "sw6.2", "sw6.3", "sw6.4", "sw6.5", "sw7.1", "sw7.2", "sw7.3", "sw7.4", "sw7.5")])
print(alpha_combi_sw)
# create dataset with sc, bi and sw so than compute correlation matrix
matrixdata <- combidata %>%
 select(self_compassion, body_image, self_worth) %>%
 na.omit() # Remove rows with NA values if necessary
# computed correlation matrix
correlation_matrix <- cor(matrixdata)
summary(correlation_matrix)
# correlation self-worth 1
cor_sw1 <- cor(combidata[, c("sw1.1", "sw1.2", "sw1.3", "sw1.4", "sw1.5")])
print(cor_sw1)
# correlation self-worth 2
cor_sw2 <- cor(combidata[, c("sw2.1", "sw2.2", "sw2.3", "sw2.4", "sw2.5")])
print(cor_sw2)
# correlation self-worth 3
cor_sw3 <- cor(combidata[, c("sw3.1", "sw3.2", "sw3.3", "sw3.4", "sw3.5")])
print(cor_sw3)
# correlation self-worth 4
cor_sw4 <- cor(combidata[, c("sw4.1", "sw4.2", "sw4.3", "sw4.4", "sw4.5")])
print(cor_sw4)
# correlation self-worth 5
cor_sw5 <- cor(combidata[, c("sw5.1", "sw5.2", "sw5.3", "sw5.4", "sw5.5")])
print(cor sw5)
# correlation self-worth 6
cor_sw6 <- cor(combidata[, c("sw6.1", "sw6.2", "sw6.3", "sw6.4", "sw6.5")])
```

print(cor_sw6)

correlation self-worth 7

cor_sw7 <- cor(combidata[, c("sw7.1", "sw7.2", "sw7.3", "sw7.4", "sw7.5")])

print(cor_sw7)

direct effect of self-compassion on self-worth

path_a<-lm(self_worth~self_compassion,combidata)

summary(path_a)

direct effect of self-compassion on body image and effect of self-worth on body image

path_b_c<-lm(body_image~self_compassion+self_worth, combidata)</pre>

summary(path_b_c)

#mediator analysis

Install and load the mediation package

install.packages("mediation")

library(mediation)

variables X (independent), M (mediator), and Y (dependent)

Step 1: Fit the mediation model

```
mediation_model <- lm(self_worth ~ self_compassion, data = combidata) # Mediator model (M regressed on X)
```

outcome_model <- lm(body_image ~ self_worth + self_compassion, data = combidata) # Outcome model (Y regressed on M and X)

Step 2: Conduct the mediation analysis

```
mediation_analysis <- mediate(mediation_model, outcome_model, treat =
"self_compassion", mediator = "self_worth")</pre>
```

Step 3: Inspect the mediation results

summary(mediation_analysis)

#assumption check

par(mfrow=c(2,2))

plot(path_b_c)

vif(path_b_c)

power analysis

install.packages("pwr")

library(pwr)

Numerator degrees of freedom is the number of predictor variables (3)

Output will be denominator degrees of freedom rather than sample size; will need to round up and add the total number of variables (4)

pwr.f2.test(u=2, f2=0.15, sig.level=0.05, power=0.80) #denominator df to sample size round(64.31932,0)+3 #descriptive statistics summary(combidata) # mean mean(combidata\$self_compassion) mean(combidata\$body_image) mean(combidata\$self_worth) # median median(combidata\$self_compassion) median(combidata\$body_image) median(combidata\$self_worth) # standard deviation sd(combidata\$self_compassion) sd(combidata\$body_image) sd(combidata\$self_worth) # variance var(combidata\$self_compassion) var(combidata\$body_image) var(combidata\$self_worth) # gender gender <- table(combidata\$GENDER)</pre> gender_per <- prop.table(gender) * 100 view(gender) View(gender_per) # nationality nationality <- table(combidata\$NATION) nationality_per <- prop.table(nationality) * 100 View(nationality)

```
View(nationality_per)
#age
age <- table(combidata$AGE)
age_per <- prop.table(age) * 100
view(age)
View(age_per)
# filter out rows with NA values in the AGE column
combidata_no_na <- combidata[!is.na(combidata$AGE), ]</pre>
# convert AGE column to numeric (handle non-numeric values)
combidata_no_na$AGE <- as.numeric(combidata_no_na$AGE)
# mean age of non-NA values
age.mean <- mean(combidata_no_na$AGE)</pre>
print(age.mean)
age.median <- median(combidata_no_na$AGE)
print(age.median)
# standard deviation age
age_sd <- sd(combidata_no_na$AGE, na.rm = TRUE)
print(age_sd)
# Function to calculate mode
calculate_mode <- function(x) {</pre>
 value_counts <- table(x)
 max_frequency <- max(value_counts)</pre>
 mode_values <- as.numeric(names(value_counts[value_counts == max_frequency]))</pre>
 return(mode_values)
}
age_values <- combidata_no_na$AGE
age_mode <- calculate_mode(age_values)</pre>
# Print the mode(s) of AGE
print(age_mode)
# change T1 for this person from 0 to 1, as they have written the treatment option 1 in
treatment other
```

target_row <- 111 # Row index of the target person

variable_of_interest <- "T1" # Variable name to update

Define the new value

new_value <- 1 # New value to assign

Update the specific variable for the target person

combidata[target_row, variable_of_interest] <- new_value

view(combidata)

treatment

replace NA with 0 for treatment variables using replace()

Replace NA values with 0 for columns T1 to T7 in combidata

combidata <- combidata %>%

mutate(T1 = replace(T1, is.na(T1), 0),

T2 = replace(T2, is.na(T2), 0),

T3 = replace(T3, is.na(T3), 0),

T4 = replace(T4, is.na(T4), 0),

T5 = replace(T5, is.na(T5), 0),

T6 = replace(T6, is.na(T6), 0),

T7 = replace(T7, is.na(T7), 0))

convert treatment columns to numeric (handle non-numeric values)

combidata\$T1 <- as.numeric(combidata\$T1)</pre>

combidata\$T2 <- as.numeric(combidata\$T2)</pre>

combidata\$T3 <- as.numeric(combidata\$T3)</pre>

combidata\$T4 <- as.numeric(combidata\$T4)

combidata\$T5 <- as.numeric(combidata\$T5)</pre>

combidata\$T6 <- as.numeric(combidata\$T6)</pre>

combidata\$T7 <- as.numeric(combidata\$T7)</pre>

total_T1 <- sum(combidata\$T1, na.rm = TRUE)

print(total_T1)

total_T2 <- sum(combidata\$T2, na.rm = TRUE)

print(total_T2)

total_T3 <- sum(combidata\$T3, na.rm = TRUE)

print(total_T3)

total_T4 <- sum(combidata\$T4, na.rm = TRUE)

```
print(total_T4)
total_T5 <- sum(combidata$T5, na.rm = TRUE)
print(total_T5)
total_T6 <- sum(combidata$T6, na.rm = TRUE)
print(total_T6)
# actually not 10 but 15 (see T7 + TOTHER)
total_T7 <- sum(combidata$T7, na.rm = TRUE)
print(total_T7)
#year of diagnosis
# convert year of diagnosis to numeric
combidata$YEAR <- as.numeric(combidata$YEAR)
year <- table(combidata$YEAR)</pre>
year_per <- prop.table(year) * 100</pre>
view(year)
View(year_per)
# filter out rows with NA values in the YEAR column
data_no_na <- combidata[!is.na(combidata$YEAR), ]</pre>
# mean year
year.mean <- mean(combidata_no_na$YEAR)</pre>
print(year.mean)
#median year
year.median <- median(combidata_no_na$YEAR)</pre>
print(year.median)
# Function to calculate mode
calculate_mode <- function(x) {</pre>
 value_counts <- table(x)</pre>
 max_frequency <- max(value_counts)</pre>
 mode_values <- as.numeric(names(value_counts[value_counts == max_frequency]))</pre>
 return(mode_values)
}
year_values <- combidata_no_na$YEAR
year_mode <- calculate_mode(year_values)</pre>
```

```
# Print the mode(s) of AGE
print(year_mode)
#BRS
# replace na's with 0
combidata <- combidata %>%
 mutate(BRS = replace(BRS, is.na(BRS), 0))
# replace written text with 1
combidata <- combidata %>%
 mutate(BRS = case_when(
  BRS %in% c("Ja", "yes") ~ "1",
  TRUE ~ BRS
 ))
# replace written text with 0
combidata <- combidata %>%
 mutate(BRS = case_when(
  BRS %in% c("Nein", "no") ~ "0",
  TRUE ~ BRS
 ))
combidata$BRS <- as.numeric(combidata$BRS)</pre>
total_BRS <- sum(combidata$BRS, na.rm = TRUE)
print(total_BRS)
# create mean for self-worth variables
combidata$self_worth_approval <- combidata$self_worth_approval_total/5
combidata$self_worth_appearance <- combidata$self_worth_appearance_total/5
combidata$self_worth_competition <- combidata$self_worth_competition_total/5
combidata$self_worth_academic <- combidata$self_worth_academic_total/5
combidata$self_worth_virtue <- combidata$self_worth_virtue_total/5
combidata$self_worth_family <- combidata$self_worth_family_total/5
combidata$self_worth_god <- combidata$self_worth_god_total/5
# direct effect of self-compassion on self-worth approval from others - 1
path_a.1<-lm(self_worth_approval~self_compassion,combidata)
summary(path_a.1)
```

direct effect of self-compassion on body image and effect of self-worth on body image

 $path_b_c.1 <-lm(body_image~self_compassion+self_worth_approval, combidata)$

summary(path_b_c.1)

#mediator analysis

library(mediation)

Step 1: Fit the mediation model

mediation_model.1 <- lm(self_worth_approval ~ self_compassion, data = combidata) # Mediator model (M regressed on X)

outcome_model.1 <- lm(body_image ~ self_worth_approval + self_compassion, data = combidata) # Outcome model (Y regressed on M and X)

Step 2: Conduct the mediation analysis

mediation_analysis.1 <- mediate(mediation_model.1, outcome_model.1, treat =
"self_compassion", mediator = "self_worth_approval")</pre>

Step 3: Inspect the mediation results

summary(mediation_analysis.1)

direct effect of self-compassion on self-worth appearance - 2

path_a.2<-lm(self_worth_appearance~self_compassion,combidata)

summary(path_a.2)

direct effect of self-compassion on body image and effect of self-worth on body image

path_b_c.2<-lm(body_image~self_compassion+self_worth_appearance, combidata)

summary(path_b_c.2)

Step 1: Fit the mediation model

mediation_model.2 <- lm(self_worth_appearance ~ self_compassion, data = combidata) # Mediator model (M regressed on X)

outcome_model.2 <- lm(body_image ~ self_worth_appearance + self_compassion, data = combidata) # Outcome model (Y regressed on M and X)

Step 2: Conduct the mediation analysis

mediation_analysis.2 <- mediate(mediation_model.2, outcome_model.2, treat =
"self_compassion", mediator = "self_worth_appearance")</pre>

Step 3: Inspect the mediation results

summary(mediation_analysis.2)

direct effect of self-compassion on self-worth competition - 3

path_a.3<-lm(self_worth_competition~self_compassion,combidata)

summary(path_a.3)

direct effect of self-compassion on body image and effect of self-worth on body image

 $path_b_c.3{<-lm(body_image~self_compassion+self_worth_competition, \ combidata)}$

summary(path_b_c.3)

Step 1: Fit the mediation model

mediation_model.3 <- lm(self_worth_competition ~ self_compassion, data = combidata) # Mediator model (M regressed on X)

outcome_model.3 <- lm(body_image ~ self_worth_competition + self_compassion, data = combidata) # Outcome model (Y regressed on M and X)

Step 2: Conduct the mediation analysis

mediation_analysis.3 <- mediate(mediation_model.3, outcome_model.3, treat =
"self_compassion", mediator = "self_worth_competition")</pre>

Step 3: Inspect the mediation results

summary(mediation_analysis.3)

direct effect of self-compassion on self-worth academic - 4

path_a.4<-lm(self_worth_academic~self_compassion,combidata)

summary(path_a.4)

direct effect of self-compassion on body image and effect of self-worth on body image

path_b_c.4<-lm(body_image~self_compassion+self_worth_academic, combidata)

summary(path_b_c.4)

Step 1: Fit the mediation model

mediation_model.4 <- lm(self_worth_academic ~ self_compassion, data = combidata) # Mediator model (M regressed on X)

```
outcome_model.4 <- lm(body_image ~ self_worth_academic + self_compassion, data = combidata) # Outcome model (Y regressed on M and X)
```

Step 2: Conduct the mediation analysis

mediation_analysis.4 <- mediate(mediation_model.4, outcome_model.4, treat =
"self_compassion", mediator = "self_worth_academic")</pre>

Step 3: Inspect the mediation results

summary(mediation_analysis.4)

direct effect of self-compassion on self-worth virtue - 5

path_a.5<-lm(self_worth_virtue~self_compassion,combidata)

summary(path_a.5)

direct effect of self-compassion on body image and effect of self-worth on body image

 $path_b_c.5{<-lm(body_image~self_compassion+self_worth_virtue, \ combidata)}$
summary(path_b_c.5)

Step 1: Fit the mediation model

mediation_model.5 <- lm(self_worth_virtue ~ self_compassion, data = combidata) # Mediator model (M regressed on X)

outcome_model.5 <- lm(body_image ~ self_worth_virtue + self_compassion, data = combidata) # Outcome model (Y regressed on M and X)

Step 2: Conduct the mediation analysis

mediation_analysis.5 <- mediate(mediation_model.5, outcome_model.5, treat =
"self_compassion", mediator = "self_worth_virtue")</pre>

Step 3: Inspect the mediation results

summary(mediation_analysis.5)

direct effect of self-compassion on self-worth family - 6

path_a.6<-lm(self_worth_family~self_compassion,combidata)

summary(path_a.6)

direct effect of self-compassion on body image and effect of self-worth on body image

path_b_c.6<-lm(body_image~self_compassion+self_worth_family, combidata)

summary(path_b_c.6)

Step 1: Fit the mediation model

mediation_model.6 <- lm(self_worth_family ~ self_compassion, data = combidata) # Mediator model (M regressed on X)

outcome_model.6 <- lm(body_image ~ self_worth_family + self_compassion, data = combidata) # Outcome model (Y regressed on M and X)

Step 2: Conduct the mediation analysis

mediation_analysis.6 <- mediate(mediation_model.6, outcome_model.6, treat =
"self_compassion", mediator = "self_worth_family")</pre>

Step 3: Inspect the mediation results

summary(mediation_analysis.6)

direct effect of self-compassion on self-worth god - 7

path_a.7<-lm(self_worth_god~self_compassion,combidata)

summary(path_a.7)

direct effect of self-compassion on body image and effect of self-worth on body image

path_b_c.7<-lm(body_image~self_compassion+self_worth_god, combidata)

summary(path_b_c.7)

Step 1: Fit the mediation model

mediation_model.7 <- $lm(self_worth_god \sim self_compassion, data = combidata) # Mediator model (M regressed on X)$

outcome_model.7 <- lm(body_image ~ self_worth_god + self_compassion, data = combidata) # Outcome model (Y regressed on M and X)

Step 2: Conduct the mediation analysis

mediation_analysis.7 <- mediate(mediation_model.7, outcome_model.7, treat =
"self_compassion", mediator = "self_worth_god")</pre>

Step 3: Inspect the mediation results

summary(mediation_analysis.7)