

**Investigating the Relationship Between Social Media Use and Body Image Disturbance
in Breast Cancer Survivors: The Role of Self-Compassion**

Bachelor Thesis

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June 27, 2024

Table of Contents

<u>ABSTRACT</u>	3
<u>INTRODUCTION</u>	
BODY IMAGE DISTURBANCE	4
SOCIAL MEDIA USE	5
SELF-COMPASSION	6
<u>METHODS</u>	8
DESIGN AND PROCEDURE	8
PARTICIPANTS	8
MATERIALS	10
DATA ANALYSIS	11
<u>RESULTS</u>	12
SAMPLE CHARACTERISTICS AND DESCRIPTIVE STATISTICS	12
INFERENCEAL STATISTICS	14
<u>DISCUSSION</u>	16
STRENGTHS AND LIMITATIONS	19
PROPOSAL FOR FUTURE RESEARCH	20
CONCLUSION	21
<u>REFERENCES</u>	22
<u>APPENDICES</u>	27

Abstract

Purpose – This study aims to investigate the potentially moderating role of self-compassion on the relationship between social media use and body image disturbance in breast cancer survivors. Previous research has demonstrated the negative impact social media can have on body image, while self-compassion may have a protective effect. However, research on social media use and health outcomes, particularly in breast cancer survivors, is limited. Thus, this paper addresses this topic.

Methods – This cross-sectional survey study integrated 113 breast cancer survivors who completed standardized questionnaires, including the Body Image Scale (BIS), the Self-compassion Scale Short Form (SCS-SF), and self-formulated questions regarding social media use. Participants were recruited through convenience sampling on social media and snowball sampling.

Results – There was a significant negative relationship between self-compassion and body image disturbance ($\beta = -8.197, p < .001$), with an explained variance of 13.27%. Social media use was not significantly related to self-compassion ($\beta = 0.002, p = .912$) or body image disturbance ($\beta = 0.929, p = .071$). Self-compassion did not moderate the relationship between social media use and body image disturbance ($\beta_{Interaction} = -0.132, p = .936$). However, the overall model was significant ($p < .001$) and explained 16.31% of variability in body image disturbance.

Discussion/conclusion – Findings suggest that self-compassion is linked to body image disturbance in survivors, but social media use does not significantly impact this relationship. The collective significance of the model and explained variance reveals the need for further exploration of the variables and possible other predictors.

248 words.

Investigating the Relationship Between Social Media Use and Body Image Disturbance in Breast Cancer Survivors: The Role of Self-Compassion

The current study empirically examines whether self-compassion moderates the relationship between social media use and body image disturbance in breast cancer survivors. While many previous studies have investigated the relationship between body image and social media use in general (K. de Valle et al., 2021), research exploring the impact of social media use in individuals with breast cancer and the potential health outcomes remains limited (Falisi et al., 2017). The main purpose of this study is to add further insights to the growing body of research around this topic, and to understand the role of the three selected variables.

In 2020, breast cancer was responsible for 685000 deaths globally (Cuthrell & Tzenios, 2023). It is the most prevalent cancer among women, with 2.3 million diagnoses worldwide in 2022 (World Health Organization, 2024). The lifetime risk for a woman to develop the disease is at 13% (American Cancer Society, 2024), with being female as the strongest risk factor (World Health Organization, 2024). Although men can also develop this form of cancer, they represent a small number of cases with 0.5 to 1 percent (World Health Organization, 2024). Common treatments include for instance surgery, radiation therapy, hormone therapy, or chemotherapy. The surgical removal of cancer tissue is called lumpectomy, whereas the removal of the whole breast is a mastectomy (World Health Organization, 2024). Early detection, for example through regular screening, significantly improves survival rates (American Cancer Society, 2024). According to the National Cancer Institute (NCI), 90.8% of women with breast cancer survive for five years post-diagnosis (Seladi-Schulman, 2024). This shows that survival rates are relatively high in women with breast cancer, which is due to advances in treatments and early detection (Seladi-Schulman, 2024). Nevertheless, survival rates vary depending on different factors such as the type and stage of breast cancer (Seladi-Schulman, 2024).

Analyzing body image disturbance as a construct is of importance in the domain of breast cancer survivorship, since it significantly affects quality of life in people with breast cancer (Rodrigues et al., 2022).

Body Image Disturbance

Changes or alterations in body image are a common phenomenon in breast cancer patients and are caused by side effects from treatment (Brunet et al., 2022), for instance through chemotherapy or surgery (Thakur et al., 2022a). Appearance-related issues can be for instance the loss of the breast, scars, weight changes, and losing muscles (Brunet et al., 2022). Other consequences can be hair loss and damaged tissue of the body (Thakur et al., 2022a). Such

changes can have a strong negative impact on body image, in a way that they can reduce quality of life (Rodrigues et al., 2022). Body Image (BI) is a framework with multiple dimensions and refers to “people’s positive and negative perceptions, thoughts, behaviors, and attitudes about their body and appearance” (Burychka et al., 2021, p. 249). A disturbance in body image is reflected in an distorted mental image or perception of one’s appearance (American Psychological Association, 2018). Body image disturbance rates in studies with breast cancer survivors vary from 31% to 67% and are associated with psychological distress, anxiety, and depression (Thakur et al., 2022a). In a study with 165 female breast cancer survivors who had a mastectomy, 92% suffered from body image disturbances (Thakur et al., 2022b). Women tend to focus on evaluations related to body image, whereby a breast cancer diagnosis is likely to intensify this tendency. Body appearance can be altered and marked by a poor self-esteem, shame, or social distancing, with negative outcomes potentially lasting for years (Melissant et al., 2018). Changes in body image in women include feelings of reduced femininity, alteration and incompleteness (Rodrigues et al., 2022). Men diagnosed with breast cancer experience similar symptoms such as not feeling as masculine or social isolation (Pituskin et al., 2007). Body image disturbances often involve psychosocial hardship, with patients mentally preparing for changes.

Given the above stated challenges, the use of social media platforms can offer a sense of community and space to share experiences for individuals with breast cancer (Gandamihardja et al., 2023). Nevertheless, there are certain downsides of social media use, such as emotional triggers, comparison of looks, or competitiveness regarding the disease development in breast cancer patients online (Gandamihardja et al., 2023).

Social Media Use

Social media gained a steep increase of importance in terms of breast cancer awareness during the past years, by promoting public health knowledge (Xu et al., 2016) and the building of communities to share experiences (Gandamihardja et al., 2023). Nevertheless, research regarding the social media use in survivors is still in its’ initial phases (Falisi et al., 2017). It is proven that appearance ideals on social media images in general heavily influence body image and can have harmful effects on mental health (K. de Valle et al., 2021). Thereby, social comparison is common, next to the internalization of beauty standards (K. de Valle et al., 2021). The socio-cultural context imposes social beauty standards that exert pressure on women to meet specific appearance-related expectations (Rodrigues et al., 2022). This pressure potentially helps to explain certain negative consequences in women with breast cancer, such as social isolation or difficulties presenting oneself at social events (Rodrigues et

al., 2022). General social media use patterns in some studies have been categorized into low, moderate, and high (Zhang et al., 2023). Thereby, low social media use is defined as less than one hour per day, moderate use varies from one to three hours a day, and high use is above three hours (Zhang et al., 2023). Especially higher engagement with social media, including activities such as social comparison, have been found to be associated with more body dissatisfaction (Fardouly et al., 2014). Prevalent issues after losing a breast or both relate to the concept of femininity and self-esteem (Lahiri, 2016). In addition to that, “messages from the media, cosmetic industry and health care profession perpetuate the ‘beauty myth’ affecting the self-esteem of breast cancer patients” (Lahiri, 2016, p. 249). The intervention ‘Set Your Body Free’ by Lewis-Smith et al. (2018) targeted common risk factors for body dissatisfaction in women and appearance pressures from the socio-cultural context, such as media or family. These factors showed to similarly predict body image in women with breast cancer, including the internalization of ideals and the tendency for social comparison (Lewis-Smith et al., 2018). Next to that, in a study about self-compassion and social media use in healthy individuals, participants who scored higher on self-compassion spent less time online and reported more positive emotional responses in relation to their social media use (Phillips & Wisniewski, 2021).

Difficulties related to body image in breast cancer survivors can be diminished by the ability to be self-compassionate (Raque et al., 2023).

Self-compassion

Self-compassion as defined by Dr. Kristin Neff (2003) has three intertwined components that are used during difficult stages in life. The first component is self-kindness and understanding opposed to being critical about oneself. Second ingredient is viewing one’s suffering as part of human life. Lastly, the third component is being mindful and present with the painful feelings and thoughts, and not being judgmental or avoidant (Stanford University, 2012). Self-compassion is the ability to be kind to oneself during times of suffering (Przedziecki et al., 2013). Research has demonstrated the protective factor of self-compassion, revealing relations between self-compassion and less body image concerns (Raque et al., 2023), in both men and women with breast cancer (Zhu et al., 2023). Furthermore, lower levels of self-compassion can lead to higher psychological distress and disturbances in body image (Przedziecki et al., 2013). Another study showed a moderating function of self-compassion on social comparison related to the body (Raque et al., 2023). The ability to be self-compassionate increases mindfulness and lowers negative ways of thinking (Raque et al., 2023). People who struggle with their body image may experience

self-criticism and shame, where self-compassion can be most beneficial. It helps to reduce moments of objectification, surveillance, and anxiety. Self-compassion can serve as a buffer that diminishes negative outcomes and distress related to the body and can have protective effects on body image (Raque et al., 2023).

An understanding of the dynamics between social media use and body image disturbance in breast cancer survivors could inform future interventions and enhance the quality of life of survivors. Moreover, the role of self-compassion and whether it moderates the hypothesized relationship between social media use and body image is interesting to investigate. Therefore, the aim of this study is to answer the following research question:

“Is there a relationship between social media use and body image disturbance in breast cancer survivors, and is this relation moderated by self-compassion?”

Based on the previously stated literature, the subsequent hypotheses (see Figure 1) will be answered throughout this research:

H1: There is a positive relationship between social media use (time spent online) and body image disturbance.

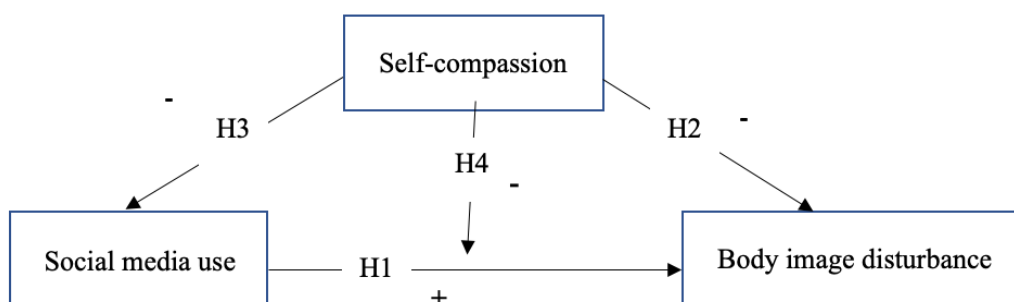
H2: There is a negative relationship between self-compassion and body image disturbance.

H3: There is a negative relationship between social media use (time spent online) and self-compassion.

H4: Self-compassion moderates the relationship between social media use (time spent online) and body image disturbance in breast cancer survivors, such that higher self-compassion weakens the relationship between social media use and body image disturbance.

Figure 1

Model of the hypothesized relationships.



Methods

Design and Procedure

This cross-sectional survey study was hosted in Qualtrics and included standardized self-report questionnaires. Individuals who have been diagnosed with breast cancer in their life have been gathered through convenience and snowball sampling techniques. The aim of this quantitative research was to determine whether there is a relationship between the independent variable social media use (time spent online) and the dependent variable body image disturbance, and whether this relation is moderated by self-compassion. Therefore, the main analysis included a linear regression analysis and a moderation analysis to answer this research question. When clicking on the survey link, participants were provided with detailed information about the study's aim, procedure, and potential risks. Informed consent was obtained before participation. The main ethical consideration stated was a potential risk for mental discomfort by answering personal questions. The right to withdraw at any time and information on data storage and confidentiality were highlighted. After that, general questions about demographic variables were asked, followed by the standardized questionnaires and self-formulated questions on social media use. The responses in Qualtrics were downloaded and stored in R-Studio, where they were analyzed. This research was approved by the BMS Ethics Committee of the University of Twente and is in accordance with the BMS guidelines.

Participants

The sample consisted of 113 individuals who have been diagnosed with breast cancer in the years between 1996 and 2024 ($M_{age} = 45.53$, $SD_{age} = 11.17$; 96,5% female, 2.6% male, and one person with unknown gender), who participated voluntarily. Ages ranged from 26 to 71 years old. Criteria for inclusion were a breast cancer diagnosis at some point in life, next to having undergone some form of treatment. Next to that, sufficient understanding of German or English language were required and a digital device to access the survey. Exclusion criteria were not having a breast cancer diagnosis and being under the age of 18. A total of 203 participants agreed on the informed consent in the beginning, whereby only 113 completed the survey, meaning that 90 people had to be excluded. One person's responses, who filled in everything except the questions about the demographic variables were kept, because they were still valuable and answered every other important question. Both research partners independently tried to reach as much participants as possible. Men and women with public social media accounts, who openly talk about their breast cancer diagnosis, were texted privately with all necessary information about the study. They received a link to the survey after expressing their willingness to take part in it. Next to that, Facebook groups and story

posts on different platforms such as Instagram and WhatsApp were used. Thereby a process of snowball sampling began, also through personal contacts and WhatsApp. Demographic Information and descriptive statistics are displayed in Table 1. It includes the data on gender, nationality, breast reconstruction, type of treatment, and the years that have passed since diagnosis. One person indicated multiple nationalities, namely Polish, Irish, Czechoslovakian, and Bohemian, that were categorized as ‘Other’. Treatment options that were reported in an additional open answer option, such as “antibody therapy”, were sorted to the given categories they belong to. For instance, antibody therapy is a form of immunotherapy. Furthermore, two of the participants indicated two different years of diagnosis each, whereby the oldest diagnoses were included in the dataset, assuming that body image and self-compassion have been affected since the first diagnosis.

Table 1

Demographic Information/ Sample Characteristics

Variable	Category	N	%
Gender	Female	109	96.5
	Male	3	2.6
	Unknown	1	0.9
Nationality	German	82	72.6
	Austria	11	9.7
	American	10	8.8
	Switzerland	4	3.5
	Dutch	2	1.8
	Belgium	1	0.9
	Greek	1	0.9
	Other	1	0.9
	Unknown	1	0.9
	Breast Reconstruction Surgery	Yes	29
No		12	10.6
Unknown		72	63.7
Types of Treatment	Radiotherapy	99	87.6
	Chemotherapy	84	74.3
	Hormone Therapy	71	62.8
	Lumpectomy or other breast-sparing surgery	64	56.6
	Mastectomy	41	36.3
	Targeted/ Immunotherapy	39	34.5
	Other	16	14.1
Time Since Diagnosis (in Years)	0-5 years	102	90.3
	6-10 years	4	3.5
	11-15 years	3	2.65
	16-28 years	3	2.65
	unknown	1	0.9

Materials

This quantitative study was part of a larger study with another researcher and included measures on self-worth, which responses were not used in the context of this paper. The total online survey consisted of demographic questions, three standardized scales, and self-formulated questions (see Appendix A). The measures included: the Self-compassion Scale Short Form (SCS-SF), the Body Image Scale (BIS), the Contingencies of Self-Worth Scale (CSWS), and self-formulated questions about participants' social media use. The mean duration for filling in the online survey was 19.27 minutes. The main outcome variables in this paper were social media use, self-compassion, and body image disturbance. To ensure comprehension, separate links for German-speaking and English-speaking participants were integrated, with questionnaires in both languages.

Self-compassion

The Self-Compassion Scale Short Form (SCS-SF) was used and contains 12 items with a 5-point Likert scale, ranging from “almost never” to “almost always” (see Appendix A). It entails six subscales, whereby each has two items. These subscales include the concepts self-kindness, common humanity, mindfulness (positive items), and self-judgement, isolation, and over-identification (negative items). The negative scale items had to be reverse scored before data analysis (The University of Texas at Austin, 2021). One example for a negative item is “I’m disapproving and judgmental about my own flaws and inadequacies” (see Appendix A). An example of a positive item is “I try to be understanding and patient towards those aspects of my personality I don’t like” (see Appendix A). To get a total score on self-compassion, the average of the six-subscale means is used. Scores from 1.0 to 2.49 are considered as low, between 2.5 and 3.5 are moderate scores, and between 3.51 and 5.0 are high scores (The University of Texas at Austin, 2021). The SCS-SF showed excellent internal consistency ($\alpha = .99$), with the same Cronbach’s alpha value for each of the subscales. For German participants, the standardized translated version by Hupfeld and Ruffieux (2011) was used (Universität Bern, n.d.).

Body Image Disturbance

The Body Image Scale (BIS) consists of 10 items and measures symptoms of body image that are behavioral, cognitive, and affective. Scores vary from 0 “not at all” to 3 “very much” on a 4-point Likert scale (Hopwood et al., 2001). An example of an item is “Have you been feeling less feminine/masculine as a result of your disease or treatment?” (see Appendix A). For interpretation, item scores need to be summed and range from 0 to 30. Thereby, higher scores indicate higher levels of disturbance in body image (Melissant et al., 2018).

Because there is no general cut-off point provided for the interpretation of BIS scores, a study with breast cancer survivors defined scores greater than the 70th percentile of the BIS score distribution as having poorer body image (Falk Dahl et al., 2010). This approach to interpreting scores in body image disturbance was also used in the context of this study. Therefore, BIS total scores below 8 were considered as better body image group. Scores above 8 indicated poorer body image, representing the top 30% of BIS scores (Falk Dahl et al., 2010). The internal consistency of the BIS scale is high with a Cronbach's alpha of .89. For German participants the translation of the BIS by Hartung et al. (2021) was used, which is a valid measure for body image disturbance.

Social Media Use

The main question related to the social media use of participants was about the time spent on image-based platforms in hours per day (see Appendix A). The other questions gave additional insights into demographic data, such as the most-used platforms and content consumed. Social media use patterns are categorized into low, moderate, and high (Zhang et al., 2023). Thereby, low social media use is defined as less than one hour per day, moderate use varies from one to three hours, and high use is above three hours (Zhang et al., 2023).

Data analysis

Data has been analyzed in R Studio. All parametric assumptions were met prior analysis, including multicollinearity, homogeneity of variances, normality of residuals, and linearity. A power analysis was performed to detect the required sample size for ensuring meaningful effects. It resulted in a minimum sample size of 67 participants (Cohen's $d = 0.05$) with a significance level of .05 and a desired power of 80%. After this, descriptive statistics were calculated, including means, standard deviations, frequencies and percentages of the sample characteristics. Next, participant group means, and standard deviations of the scales were calculated. Adding to that, descriptive statistics on social media use in different subgroups of the sample, e.g., in those mostly watching content on beauty surgeries, were compared in terms of their corresponding levels on body image disturbance and self-compassion. To answer the main research question, inferential statistics were performed. These included a correlation analysis and a linear regression analysis to examine bivariate relationships between the variables and their strengths. Lastly, a moderation analysis in line with Hayes and Rockwood (2017) was conducted to test the main research question. The potentially moderating role of the variable self-compassion on the relationship between social media use and the dependent variable body image was tested.

Results

Sample characteristics and descriptive statistics

All assumptions were tested prior data analysis and the data showed to be approximately normally distributed. Group means and standard deviations of participants from the sample on the three main variables were calculated and are displayed in Table 2. The group mean for scores on body image disturbance was 13.442 ($SD = 7.446$). This score is relatively high, indicating poorer body image. Thereby, 29.2% ($N = 33$) belong to the better body image group with mean total scores ranging from 0-8 (Falk Dahl et al., 2010). 70.8% ($N = 80$) belong to the poorer body image group with scores above 8. Further, the mean social media use was moderate at 2.72 hours per day on image-based platforms (Zhang et al., 2023). In addition, 22.2% ($N = 25$) had a social media use considered as high, so above 3 hours per day (see Table 3). 62.8% had moderate social media use times. The group mean of self-compassion was 3.074, indicating a moderate value (The University of Texas at Austin, 2021). Of those 41 participants who indicated that they had a mastectomy (see Table 1), the mean body image disturbance score was at 11.93, which belongs to the poor body image group. Thereby the mean self-compassion level is moderate at 3.13 (The University of Texas at Austin, 2021). Those who did not have a mastectomy showed higher scores on body image disturbance than those who had one, with mean body image disturbance at 14.31 and mean self-compassion scores at 3.04. Those who have undergone breast-reconstruction surgery had a mean body image disturbance score of 12.27 and mean self-compassion of 3.11. Highest body image disturbance scores occurred in participants who had radiotherapy and chemotherapy, compared to other treatment forms, with scores of 14.17 and 13.79, respectively, whereby self-compassion levels were lower but still moderate (3.04 and 3.06).

Table 2

Group means and standard deviations on the main variables within the sample.

Variable	Mean	SD
Body Image Disturbance [0-30]	13.422	7.446
Social Media Use [1-8]	2.725	1.364
Self-compassion [1.8-4.06]	3.074	0.386

Note. The score ranges on the main variables within the sample are displayed in brackets behind the variable name.

As shown in Table 3, most used platforms were Instagram with 55.8% ($N = 63$) and Facebook with 27.4% ($N = 31$), with mean body image disturbance rates of 12.9 and 13.13,

respectively. Thereby, the mean score on body image disturbance was highest in participants indicating TikTok as their most-used platform with 23.8 ($N = 5$). 82.3% of participants consumes content related to food (e.g., cooking, recipes). Self-development and educational content are viewed with 64.6%. Next to that, 12.4% reported mostly seeing content on beauty surgery, plastic surgery, or cosmetic treatments. Looking at the rankings in Table 6.2, food content was most often ranked as 1 (most viewed) and beauty surgeries were most often ranked as last place (least viewed content). Scores in body image disturbance were highest in the group that frequently watches content on beauty surgeries, plastic surgery, or cosmetic treatments, as well as in those frequently consuming fitness-related content, e.g., weight loss, weight gain, dieting, and exercising. These two groups show lower scores on self-compassion.

Table 3

Further information on social media use (time spent online, most-used platforms, content).

		N	%
Social media use (in hours per day) on image-based platforms	1	17	15.0
	2	41	36.3
	3	30	26.5
	4	13	11.5
	5	9	8.0
	6	1	0.9
	8	2	1.8
	Time spent on most-used platform per day	Less than 1 hour	18
1-2		60	53.1
2-4		31	27.4
4-6		4	3.5
Most-used platforms	Instagram	63	55.8
	Facebook	31	27.4
	YouTube	8	7.1
	TikTok	5	4.4
	Twitter	3	2.7
	Snapchat	2	1.8
	Other (not image-based)	1	0.9
Content	Food	93	82.3
	Travel	87	77.0
	Self-development and education	73	64.6
	Entertainment	72	63.7
	Fitness	68	60.2
	Art and design	60	53.1
	Cosmetics and clothes	55	48.7
	Sports	26	23.0
	Surgery	14	12.4

Table 3.1

Ranking of content in the sample and means on body image disturbance and self-compassion in the corresponding content group.

Category	Rank	Mean BID	Mean SC
Food	1	14.63	3.13
Entertainment	2	13.02	3.07
Self-development and education	3	14.04	3.10
Travel	4	12.30	3.14
Fitness	5	14.82	2.98
Art and design	6	13.05	3.21
Cosmetics and clothes	7	13.60	3.12
Sports	8	13.15	2.96
Surgery	9	20.00	2.90

Note. Rankings displayed in the table vary from most often ranked as 1 (most viewed content) to most often ranked as 9 (least viewed content). Mean scores on body image disturbance (BID) and self-compassion (SC) are displayed and relate to those participants who have rated the corresponding content categories as either first, second, or third place.

Inferential statistics

Results from the correlation analysis with the main variables can be found in Table 4.

Table 4

Pearson correlations between the three main variables.

Variable	1	2	3
1. Social Media Use	–	.17	.01
2. Body Image	.17	–	-.36*
3. Self-compassion	.01	-.36*	–

* $p < .05$.

According to the results in Table 4, the relationship between body image and self-compassion is negative and significant ($r = -.36$; $p < .05$). The other variables show no significant correlations ($p > .05$).

Within the scope of a linear regression analysis, a moderate, negative relationship ($r = -.36$) was found between self-compassion and body image disturbance, indicating that women higher in self-compassion reported lower body image disturbance ($\beta = -8.197$, $p < .001$). Thereby, 13.27% of the variance in body image can be explained by the model ($R^2 = 0.1327$). The overall model was statistically significant ($F(1, 111) = 16.99$, $p < .001$), suggesting that higher self-compassion significantly predicts less body image disturbance.

Social media use was not significantly related to self-compassion ($r = .01$), indicating no relationship between the two variables ($\beta = 0.002, p = .912$). The overall model was not significant ($F(1, 111) = 0.01, p > .05$).

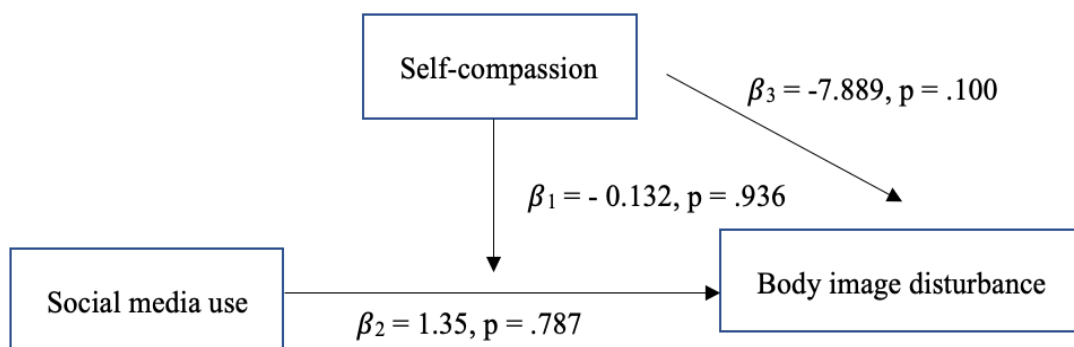
Furthermore, social media use showed no significant relationship with the dependent variable body image disturbance ($r = .17$), indicating that social media use does not predict levels of body image disturbance ($\beta = 0.929, p = .071$). The overall model was not statistically significant ($F(1, 111) = 3.313, p = .071$).

To investigate the potentially moderating role of self-compassion on the relationship between social media use and body image disturbance, a moderation analysis was done. Thereby, the dependent variable was body image disturbance, and the independent variables were social media use, self-compassion, and their interaction term 'Interact' (see Table 6).

Figure 2 illustrates the conceptual model with the path coefficients (beta-values) of the moderation analysis, indicating the strength and directions of the relationships between predictors and the outcome variable body image disturbance.

Figure 2

Moderation model with path coefficients (beta-values and corresponding p-values).



Note. Although none of the individual predictors were statistically significant and there was no moderating role of self-compassion, the overall model was statistically significant ($F(3, 109) = 7.081, p < .001$), β_1 represents the beta-value for the moderating role of self-compassion on the relationship between social media use and body image disturbance. β_2 indicates the beta-value for the relation between social media use and body image disturbance. And β_3 represents the beta-value for the relation between self-compassion and body image disturbance.

Table 6

Moderation analysis of the potential moderating role of self-compassion on the relationship between social media use and the dependent variable body image disturbance.

	Estimate	Std. Error	t	p
Intercept	34.897	14.477	2.441	.017*
Social Media Use	1.350	4.998	0.270	.787
Self-compassion	-7.889	4.764	-1.656	.100
Interact	-0.132	1.646	-0.080	.936

* $p < .05$.

As shown in table 6, the interaction term's coefficient between self-compassion and social media use is not significant ($\beta_{Interaction} = -0.132, p = .936$), indicating that self-compassion does not moderate the relationship between social media use and body image disturbance. None of the individual predictors, including the interaction term, are statistically significant on their own. The overall model is statistically significant ($F(3, 109) = 7.081, p < .001$), suggesting that the predictors collectively explain a significant, but limited amount of variance in body image disturbance. Thereby, 16.31% of the variance in body image disturbance is explained by the model ($R^2 = 0.1631$).

Discussion

In this paper, the role of social media use in relation to body image disturbance in breast cancer survivors was investigated. The aim was to analyze whether self-compassion moderates the relationship between social media use and the dependent variable body image disturbance.

Contrasting to previous expectations and literature, the relationship between social media use and body image disturbance was not significant. This suggests that higher social media use does not predict higher levels of body image disturbance in the sample. For this reason, the first hypothesis that there is a positive relationship between social media use (time spent online) and body image disturbance, was rejected. However, in previous literature, it becomes clear that social media use can indeed have a negative impact on body image, for instance via social comparison (K. de Valle et al., 2021). This lacking relationship might be because the mean social media time spent on image-based platforms per day was moderate within the sample. The majority had low or moderate social media use times ranging from less than one, to three hours per day. High social media use was only represented by a relatively small proportion of the sample. This could also have to do with age, since studies on social media use have showed that younger adults aged 18 to 29 generally spent more time

on social media platforms than populations above that age (Hruska & Maresova, 2020). The sample of this research paper only included few observations of participants within that age range. Furthermore, social media use decreases as age increases (Hruska & Maresova, 2020). Since especially higher engagement with social media is associated with more body dissatisfaction (Fardouly et al., 2014), a reason that there was no relation between social media use and body image disturbance might be the rather moderate social media use within the sample. This highlights the need for more research on social media use in individuals with breast cancer related to more factors. For example, participants who frequently watch content on beauty surgeries and professional cosmetic treatments exhibited highest levels on body image disturbance and lowest levels of self-compassion, compared to all other content categories within the sample. The same applied to fitness-related content focusing on weight loss, weight gain, dieting, and exercising, with second highest mean scores on body image disturbance compared to other categories. In contrast, those who watched more positively framed content, for instance about travelling, entertainment, or self-development, had lower mean scores on body image disturbance and slightly higher scores on self-compassion. This is in line with existing research. Positively framed online content, such as educational material, can increase self-compassion by inducing positive emotions and motivating self-improvement (Chen et al., 2022). This suggests that the content consumed in this sample might be more positively framed and beneficial in maintaining a more positive body image. Also, the platforms used play a role. In this sample, body image disturbance levels were highest in those indicating to use TikTok most often than other platforms. This is in line with research proposing that TikTok is related to more body dissatisfaction (Mink & Szymanski, 2022).

Future research could try to account for age-related differences in body image disturbance by exploring social media use patterns in younger and older adults with breast cancer. Adding to that, studies could try to include more high social media users to better understand the potential negative impacts on body image. The nature of the content consumed, and different media platforms could be further variables of investigation. Engagement with more positively framed content could be encouraged in interventions to promote self-compassion and a positive body image. Furthermore, support programs could be tailored to specifically high social media users to reduce negative consequences on health.

Moreover, a moderate negative relationship between self-compassion and body image was found, indicating that higher levels of self-compassion are associated with lower body image disturbance. Therefore, the second hypothesis that there is a negative relationship

between self-compassion and body image disturbance, is accepted. This aligns with previous research that has consistently shown the protective effects of self-compassion against negative body image (Raque et al., 2023), with moderate to strong correlations between the two variables (Przezdziecki et al., 2013). This relationship was expected to be stronger than in healthy populations with higher scores on body image disturbance, since research shows that individuals with psychopathology generally report more negative body image perceptions compared to healthy individuals (Hraboski et al., 2009). Self-compassion can help individuals to maintain a positive body image and foster a non-judgmental attitude towards themselves, while reducing the negative impact of societal pressure, social comparisons, and beauty ideals (K. de Valle et al., 2021). The mean self-compassion level within the sample of this research was moderate and as expected, which is in line with research in other studies on breast cancer (Pinto-Gouveia et al., 2014 ; Przezdziecki et al., 2013).

Scores on body image disturbance within the sample were relatively high, with most participants belonging to the poorer body image group, therefore showing higher body image disturbance. A possible explanation for the poorer body image could be age. The sample of this research includes mostly younger women compared to samples of other studies with breast cancer survivors (Paterson et al., 2016). Furthermore, studies have shown that particularly in younger age groups, body image disturbance tends to be higher and more frequent (Paterson et al., 2016). In addition, the recruitment of participants through convenience sampling happened mainly via social media platforms like Instagram and Facebook. This may have biased the sample by potentially addressing younger survivors, since literature suggests that social media use decreases with increasing age (Hruska & Maresova, 2020). Other influences on poorer body image could be differences in treatments (Thakur et al., 2022a). Most participants in the sample indicated that they had radiation therapy and chemotherapy, whereby highest mean body image disturbance rates were observed, compared to all other treatment options. In addition, these participants had slightly lower, though moderate, self-compassion levels. This is in line with existing research highlighting differing treatment methods (Thakur et al., 2022a). In the context of this research sample, those who had a mastectomy generally showed lower scores on body image disturbance and slightly higher mean scores on self-compassion. This is contrasting to literature suggesting that people who had a mastectomy have higher levels on body image disturbance (Thakur et al., 2022b). A possible explanation for that might be breast reconstruction. Most participants who had a mastectomy, also indicated that they had a breast reconstruction, which can improve body image in survivors (Fang et al., 2013). For future

research the application of more diverse recruitment methods is recommended, for example via health care institutions, in order to obtain a more representative sample across different age groups. Another possible domain of research would be the effects of various treatments, including the investigation of mastectomy and breast reconstruction on body image disturbance and self-compassion.

The third hypothesis that there is a negative relationship between social media use (time spent online) and self-compassion, was rejected. This is inconsistent with some studies that proposed a negative relationship between social media use and self-compassion because of the frequent exposure to idealized images and comparisons. One possible explanation for this might be the nature of the content consumed by participants in this sample, which might be more positively framed and therefore not influencing self-compassion levels (Chen et al., 2022). Future research could further investigate the role of online content in breast cancer survivors.

The fourth hypothesis that self-compassion moderates the relationship between social media use (time spent online) and body image disturbance in breast cancer survivors, such that higher self-compassion weakens the relationship between social media use and body image disturbance, was rejected. Because the model in general turned out to be significant, this suggests that there may be some relation between the predictors and the dependent variable, and that they collectively explain a limited amount of variance in body image disturbance. A possible explanation for this might be the presence of other confounding variables within the sample. This highlights the need for future research to investigate other possible predictors or confounding variables that may explain more variance in body image disturbance. For example, female participants in a study on positive social media usage possessed media literacy skills that helped them to reinterpret and filter certain messages conveyed by media (Thornton & Lewis-Smith, 2023). Being able to reframe these messages as unrealistic had a protective effect and hindered them from internalizing such ideals (Thornton & Lewis-Smith, 2023). In addition, participants expressed more body acceptance and appreciation (Thornton & Lewis-Smith, 2023). Therefore, the role of media literacy on self-compassion in breast cancer survivors would be an interesting topic to explore, especially with regards to future interventions.

Strengths and Limitations

Since cancer is generally seen as a disease developing because of aging, and research focuses more on the middle-aged to older breast cancer population because of the higher

prevalence at increasing age (Paterson et al., 2016), one strength of this study is the comparably younger age of survivors. This can provide valuable insights into the psychological challenges they face with regards to their body image. In addition, the mean year of diagnosis is not long ago (2021), which may support accuracy of reported levels on body image disturbance (Brunet et al., 2022). Another strength is the use of validated measurement tools with good psychometric properties.

One limitation of this research lies in the gathering of participants, whereby 88 had to be excluded due to agreeing on the informed consent and then stopping the survey. A possible reason might be time commitment, whereby individuals might perceive the survey as burdensome or time-consuming. Another reason for this could be privacy concerns or the sensitive nature of the questions that may cause mental discomfort. These are common reasons in the study of sensitive topics such as on breast cancer (Plutzer, 2019). Another limitation is the restricted ability to make conclusions on causal relationships, due to the cross-sectional design of the study. Adding to that, the presence of confounding variables may have influenced the results of this research. Possible confounders may be skills in media literacy, the specific content consumed online, and age differences. The sampling method of convenience sampling may have biased the recruitment of participants which was focused on social media platforms. This could have led to the relatively young age of breast cancer patients. Lastly, self-reporting of participants may be problematic, because it can possibly introduce biases such as the social desirability bias or lead to inaccurate self-assessments (Paulhus & Vazire, 2007). Ways to measure body image disturbance and self-compassion, while increasing the validity of results, would be for instance to combine self-reports with alternative methods such as behavioral observations or daily diaries (Paulhus & Vazire, 2007).

Proposal for future research

Survivors of breast cancer often encounter physical and psychological hardships which requires an understanding of the different factors related to their suffering, to improve survivorship and design effective future interventions. Despite the absence of a significant relationship between social media use and body image disturbance in this study, existing literature suggests that social media can negatively impact body image. This discrepancy may be due to the moderate social media use, age-related differences, or other confounding variables (e.g., media literacy skills and the nature of the content). Possible research questions for future studies include: How does the nature of social media content (positively framed versus negatively) impact body image disturbance and self-compassion in breast cancer

survivors? What role do age and media literacy skills play in potentially moderating the relationship between social media use and body image disturbance? How do different treatment types (e.g., mastectomy with or without reconstruction) influence levels of body image disturbance and self-compassion? Since the replicability of the current study is perhaps limited because of the relatively young sample, future interventions could include more diverse sampling techniques with survivors across different age groups, for instance recruited through healthcare institutions. Another interesting approach would be to include a mixed-method approach with quantitative and qualitative data to capture detailed insights into social media use patterns and content types. Measures could additionally include assessments for media literacy skills, next to validated scales and logs for social media use. To gain insight into contextual factors, e.g., from interviews, thematic analysis can be used. Thereby researchers would be expected to find answers to the stated research questions. The inclusion of media literacy campaigns would be another suggestion. This could help professionals to advise patients on managing social media use and improving self-compassion.

Conclusion

Overall, this study contributed to the existing body of knowledge demonstrating the complexity of the introduced model. Self-compassion appears to be a good predictor of body image disturbance, whereas social media use does not seem to be much related. A possibility is that there can be other influencing factors or sample differences which are not accounted for by the model, such as social media literacy, the framing of the content consumed, age differences, and differences in treatment. It is important to consider multiple factors and their complexity to understand the effects on psychological outcomes and improve the explanatory power of the model. Future studies could try to account for these factors, while also including more diverse sampling methods. Through this systematic research it was uncovered that literature about social media use and the potential negative consequences in breast cancer survivors is limited. This is also mentioned in other articles about breast cancer survivors (Falisi et al., 2017), highlighting the need to go deeper into this topic while considering different sample characteristics and potentially confounding variables.

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Appendices

Appendix A

Whole online survey with all questions that were introduced in Qualtrics. The Self-Worth Scale was not part of this paper, wherefore it was excluded here in the Appendix.

1) 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.

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Ethics committee University of Twente:

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

- Yes
- No

2) Demographics

2.0) How old are you? (in years)

2.1) What is your nationality?

2.2) Which gender do you identify with?

- Female
 - Male
 - Non-binary
 - Other
-

2.3) In which year did you receive the diagnosis of breast cancer? Example: 2021, 1974, ...

2.4) Which type of breast cancer treatment have you received?

- Lumpectomy or other breast-sparing surgery
- Mastectomy
- Radiotherapy

- Chemotherapy
- Hormone therapy
- Targeted/ Immunotherapy
- Other (major) treatment

2.5) Have you received breast reconstruction surgery?

- Yes
- No

3) Self-Compassion Scale Short Form (SCS-SF)

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

When I feel inadequate in some way, I try to remind myself that feelings of inadequacy are shared by most people.

I'm disapproving and judgmental about my own flaws and inadequacies.

I'm intolerant and impatient towards those aspects of my personality I don't like.

4) Body Image Scale (BIS)

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?				
Have you felt less physically attractive as a result of your disease or treatment?				
Have you been dissatisfied with your appearance when dressed?				
Have you been feeling less feminine/masculine as a result of your disease or treatment?				
Did you find it difficult to look at yourself naked?				
Have you been feeling less sexually attractive as a result of your disease or treatment?				
Did you avoid people because of the way you felt about your appearance?				
Have you been feeling the treatment has left your body less whole?				

Have you felt dissatisfied with your body?

Have you been dissatisfied with the appearance of your scar?

5) Social Media Use

5.0) Part 3.1

How much time do you spend on social media platforms **per day**? This question is solely related to **image-based social media platforms** such as Instagram, Snapchat, Facebook, and others.

Give an estimate or look at the social media screen time in the settings of your phone.

	1	2	3	4	5	6	7	8	9	10	11	12
Time in hours per day												

5.1) Part 3.2

Do you seek information on...?

	Yes	No
Cosmetics & clothes (e.g., skincare, hair, makeup)		
Fitness (e.g., weight loss, weight gain, dieting, exercising)		
Beauty surgery, plastic surgery, or professional cosmetic treatments		
Food (e.g., cooking, recipes, everything that is somewhat related to food in general)		
Travel (e.g., nature, landscapes, vacation)		
Sports (football, volleyball, basketball, motorsports, etc.)		
Entertainment (e.g., comedy, memes, music)		
Self-development & education (e.g., motivational content, quotes, political content)		
Art & Design (e.g., DIY crafts, interior/home design, paintings)		

5.2) Part 3.3

Order the categories according to what **type of content you see the most**. Content you see **the most should be ranked with 1**.

Fitness (e.g., dieting & exercising)	1
Food	2
Travel	3
Sports	4
Self-development & education	5
Entertainment (e.g., comedy, music)	6
Art & Design	7
Beauty/ plastic surgery/ professional cosmetic treatments	8
Cosmetics & Clothes	9

5.3) Part 3.4

Which social media platform do you use **the most**?

- Instagram
 - TikTok
 - Twitter
 - Facebook
 - Snapchat
 - Youtube
 - Other image-based platform:
-

5.4) Part 3.5

How much time do you spend on **this specific platform** per day? Give an estimate in **hours per day**.

- Less than 1 hour
- 1-2
- 2-4
- 4-6
- 6-8
- 8-10
- More than 10 hours per day

6) End of survey

We thank you for participating.

Your answers have been saved. If you have any questions or remarks, we would like to encourage you to contact one of the researchers of this study:

Melika Yeyrek (m.yeyrek@student.utwente.nl)
Alina vom Stein (a.vomstein@student.utwente.nl)

You can also contact the supervisor: Anneleen J. Klaassen (j.klaassen@utwente.nl)
or the Ethics committee of the University of Twente: (ethicscommittee-bms@utwente.nl)

Appendix B

Script from R-Studio.

```

install.packages("readxl")
library(readxl)
install.packages("tidyverse")
library(tidyverse)
##### opened the dataset from my downloads folder #####
View (BCallresults)
##### remove participants with non-responses/ insufficient responses #####
# remove rows where the specified column has missing values
specific_column <- "Column58"
clean_data <- BCallresults[!is.na(BCallresults[, specific_column]), ]

##### rename columns
colnames(clean_data) <- c("informedconsent", "age", "nationality", "gender",
"yeardiagnosis", "lump_orother_surg", "mast", "radioth", "chemo", "hormoneth",
"targ_immunoth", "otheryes", "otherwhich", "recons", "SCS_1", "SCS_2", "SCS_3",
"SCS_4", "SCS_5", "SCS_6", "SCS_7", "SCS_8", "SCS_9", "SCS_10",
"SCS_11", "SCS_12", "BIS_1", "BIS_2", "BIS_3", "BIS_4", "BIS_5", "BIS_6",
"BIS_7", "BIS_8", "BIS_9", "BIS_10", "SMtimeperday", "icosm_cloth", "ifitness",
"isurgery", "ifood", "itravel", "isports", "ientertain", "iselfd_edu", "iartdesig",
"rankfit", "rankfood", "ranktravel", "ranksports", "rankselfd_edu", "rankentertain",
"rankartdesig", "ranksurgery", "rankcosm_cloth", "mostusedplat",
"other_mostused", "mostusedplat_perday")

##### descriptive statistics #####
# remove first two rows which belong to the columns
clean_data <- clean_data[-c(1, 2), ]

###change age of one participant because she gave the birthyear instead of age in
numbers#####
clean_data[46, 2] <- 55
clean_data$age <- as.numeric(clean_data$age)
summary(clean_data$age)
mean(clean_data$age)
##### standard deviation and variance of age.
## change one NA in age to zero in order to get SD and var, person filled in everything except
demographics.
clean_data[4, 2] <- 0
sd(clean_data$age)
var(clean_data$age)

# female and male participants
summary(clean_data$gender)
gendercounts <- table(clean_data$gender)
print(gendercounts)

#year of diagnosis, additionally tool oldest diagnosis from those participants who indicated
more than 1.

```

```

clean_data$yeardiagnosis <- as.numeric(clean_data$yeardiagnosis)
clean_data[51, 5] <- 2017
clean_data[8, 5] <- 2009
summary(clean_data$yeardiagnosis)
modeyearofdiagnosis <- table(clean_data$yeardiagnosis)
print(modeyearofdiagnosis)

###Nationality
nationalitycounts <- table(clean_data$nationality)
print(nationalitycounts)

# types of treatment
lump_orothersurg <- table(clean_data$lump_orothersurg)
print(lump_orothersurg)
Mast <- table(clean_data$mast)
print(Mast)
radioth <- table(clean_data$radioth)
print(radioth)
chemo <- table(clean_data$chemo)
print(chemo)
hormoneth <- table(clean_data$hormoneth)
print(hormoneth)
targ_immunoth <- table(clean_data$targ_immunoth)
print(targ_immunoth)
otheryes <- table(clean_data$otheryes)
print(otheryes)
otherwhich <- table(clean_data$otherwhich)
print(otherwhich)
#who received breast reconstruction
recons <- table(clean_data$recons)
print(recons)

# power analysis
install.packages("pwr")
library(pwr)
effect_size <- 0.374
alpha <- 0.05
power <- 0.8
pwr.t.test(d = 0.374, sig.level = 0.05, power = 0.8)

#####
##### Analysis of Self-compassion data. Reverse scoring items of the self-
compassion scale #####
clean_data$SCS_1 <- as.numeric(clean_data$SCS_1)
clean_data$SCS_1 <- max(clean_data$SCS_1) + 1 - clean_data$SCS_1
clean_data$SCS_3 <- max(clean_data$SCS_3) + 1 - clean_data$SCS_3
clean_data$SCS_4 <- max(clean_data$SCS_4) + 1 - clean_data$SCS_4
clean_data$SCS_7 <- max(clean_data$SCS_7) + 1 - clean_data$SCS_7
clean_data$SCS_11 <- max(clean_data$SCS_11) + 1 - clean_data$SCS_11
clean_data$SCS_12 <- max(clean_data$SCS_12) + 1 - clean_data$SCS_12

```

```
# To compute a total self-compassion score, first reverse score the negative subscale items
# self- judgment, isolation, and over-identification. I did this above. Then take the mean of
each subscale,
```

```
#and compute a total mean (the average of the six subscale means).
```

```
#The Body Image Scale: The total score ranges from 0 to 30 and can be calculated by
summing up the 10 items.
```

```
#A higher score means a higher level of body image disturbance.
```

```
## creating a new variable combining the columns for self-compassion#####
selfcompassion <- data.frame(clean_data$SCS_1, clean_data$SCS_2, clean_data$SCS_3,
clean_data$SCS_4, clean_data$SCS_5, clean_data$SCS_6, clean_data$SCS_7,
clean_data$SCS_8, clean_data$SCS_9, clean_data$SCS_10, clean_data$SCS_11,
clean_data$SCS_12)
```

```
#checking for normality of data/ assumptions and calculating means
```

```
install.packages("ggplot2")
```

```
library(ggplot2)
```

```
install.packages("haven")
```

```
library(haven)
```

```
install.packages("janitor")
```

```
library(janitor)
```

```
# create the self-compassion subscales with the belonging items and create the row means per
subscale: gives 6 subscale means in the end.
```

```
selfcompassion$selfkindness <- data.frame(clean_data$SCS_2, clean_data$SCS_6)
```

```
selfkindness <- selfcompassion$selfkindness
```

```
selfkindness$means <- rowMeans(selfcompassion[, -1])
```

```
print(selfkindness)
```

```
selfcompassion$selfjudgement <- data.frame(clean_data$SCS_11, clean_data$SCS_12)
```

```
selfjudgement <- selfcompassion$selfjudgement
```

```
selfjudgement$means <- rowMeans(selfcompassion[, -1])
```

```
print(selfjudgement)
```

```
selfcompassion$commonhumanity <- data.frame(clean_data$SCS_5, clean_data$SCS_10)
```

```
commonhumanity <- selfcompassion$commonhumanity
```

```
commonhumanity$means <- rowMeans(selfcompassion[, -1])
```

```
print(commonhumanity)
```

```
selfcompassion$isolation <- data.frame(clean_data$SCS_4, clean_data$SCS_8)
```

```
isolation <- selfcompassion$isolation
```

```
isolation$means <- rowMeans(selfcompassion[, -1])
```

```
print(isolation)
```

```
selfcompassion$mindfulness <- data.frame(clean_data$SCS_3, clean_data$SCS_7)
```

```
mindfulness <- selfcompassion$mindfulness
```

```
mindfulness$means <- rowMeans(selfcompassion[, -1])
```

```
print(mindfulness)
```

```
selfcompassion$overidentification <- data.frame(clean_data$SCS_1, clean_data$SCS_9)
```

```

overidentification <- selfcompassion$overidentification
overidentification$means <- rowMeans(selfcompassion[, -1])
print(overidentification)

# checking assumptions: histograms of the SC subscales
hist(selfjudgement$means, main = "Self-judgement Subscale SC", xlab = "means", ylab =
"frequency")
hist(commonhumanity$means, main = "Common humanity Subscale SC", xlab = "means",
ylab = "frequency")
hist(isolation$means, main = "Isolation Subscale SC", xlab = "means", ylab = "frequency")
hist(mindfulness$means, main = "Mindfulness Subscale SC", xlab = "means", ylab =
"frequency")
hist(overidentification$means, main = "Over-identification Subscale SC", xlab = "means",
ylab = "frequency")
hist(selfkindness$means, main = "Selfkindness Subscale SC", xlab = "means", ylab =
"frequency")

# Compute a total mean: the average of the six subscale means
allmeansSCsubscales <- data.frame(selfkindness$means, selfjudgement$means,
commonhumanity$means,
isolation$means, mindfulness$means, overidentification$means)
allmeansSCsubscales$allmeansSC <- rowMeans(allmeansSCsubscales[, -1])
print(allmeansSCsubscales$allmeansSC)

# histogram of all means SC
hist(allmeansSCsubscales$allmeansSC, main = "Self-compassion Means of all Subscales",
xlab = "mean", ylab = "frequency")

# create boxplot to check for homogeneity of variance in SC means
boxplot(allmeansSCsubscales$allmeansSC,
main = "Boxplot of all SC Subscale Means",
ylab = allmeansSC)

# scatterplot for all SC Subscales with regression line
plot(allmeansSCsubscales$allmeansSC, main = "Scatterplot of combined SC Subscales ",
xlab = "allmeansSC", ylab = "allmeansSC")
abline(lm(allmeansSCsubscales$allmeansSC ~ allmeansSCsubscales$allmeansSC, data =
allmeansSCsubscales), col = "red")

# Analysis of body image data BIS_1 to BIS_10
# calculating participant means and summing participant scores per row

BIS_scores <- data.frame(clean_data$BIS_1, clean_data$BIS_2, clean_data$BIS_3,
clean_data$BIS_4, clean_data$BIS_5, clean_data$BIS_6, clean_data$BIS_7,
clean_data$BIS_8, clean_data$BIS_9, clean_data$BIS_10)
view(BIS_scores)
BIS_scores$clean_data.BIS_1 <- as.numeric(BIS_scores$clean_data.BIS_1)
BIS_scores$clean_data.BIS_2 <- as.numeric(BIS_scores$clean_data.BIS_2)
BIS_scores$clean_data.BIS_3 <- as.numeric(BIS_scores$clean_data.BIS_3)

```

```

BIS_scores$clean_data.BIS_4 <- as.numeric(BIS_scores$clean_data.BIS_4)
BIS_scores$clean_data.BIS_5 <- as.numeric(BIS_scores$clean_data.BIS_5)
BIS_scores$clean_data.BIS_6 <- as.numeric(BIS_scores$clean_data.BIS_6)
BIS_scores$clean_data.BIS_7 <- as.numeric(BIS_scores$clean_data.BIS_7)
BIS_scores$clean_data.BIS_8 <- as.numeric(BIS_scores$clean_data.BIS_8)
BIS_scores$clean_data.BIS_9 <- as.numeric(BIS_scores$clean_data.BIS_9)
BIS_scores$clean_data.BIS_10 <- as.numeric(BIS_scores$clean_data.BIS_10)

```

```
rowSums(BIS_scores)
```

```

BIS_sums <- c(17, 26, 16, 36, 20, 40, 16, 14, 25, 28, 11, 20, 22, 24, 13, 29, 37,
             11, 17, 22, 25, 13, 26, 20, 32, 20, 16, 10, 19, 24, 17, 30, 19, 26,
             28, 30, 32, 15, 29, 27, 32, 17, 17, 21, 28, 10, 18, 39, 32, 26, 26,
             14, 16, 15, 31, 35, 24, 22, 17, 16, 13, 26, 11, 16, 27, 22, 16, 27,
             30, 19, 24, 10, 36, 25, 34, 27, 29, 18, 22, 36, 22, 30, 27, 19, 13,
             30, 19, 18, 19, 31, 21, 26, 27, 25, 35, 21, 32, 39, 26, 25, 29, 20,
             33, 16, 31, 20, 25, 40, 25, 23, 28, 15, 13)

```

```
BIS_scoressums <- data.frame(BIS_sums)
```

```
# replace numbers in the BIS scores since I scored it wrong before
```

```

BIS_scores$clean_data.BIS_1[BIS_scores$clean_data.BIS_1 == 4] <- 3
BIS_scores$clean_data.BIS_2[BIS_scores$clean_data.BIS_2 == 4] <- 3
BIS_scores$clean_data.BIS_3[BIS_scores$clean_data.BIS_3 == 4] <- 3
BIS_scores$clean_data.BIS_4[BIS_scores$clean_data.BIS_4 == 4] <- 3
BIS_scores$clean_data.BIS_5[BIS_scores$clean_data.BIS_5 == 4] <- 3
BIS_scores$clean_data.BIS_6[BIS_scores$clean_data.BIS_6 == 4] <- 3
BIS_scores$clean_data.BIS_7[BIS_scores$clean_data.BIS_7 == 4] <- 3
BIS_scores$clean_data.BIS_8[BIS_scores$clean_data.BIS_8 == 4] <- 3
BIS_scores$clean_data.BIS_9[BIS_scores$clean_data.BIS_9 == 4] <- 3
BIS_scores$clean_data.BIS_10[BIS_scores$clean_data.BIS_10 == 4] <- 3

```

```
rowSums(BIS_scores)
```

```

BIS_sums <- c(7, 16, 6, 26, 10, 30, 6, 4, 15, 18, 1, 10, 12, 14, 3, 19, 27,
             1, 7, 12, 15, 3, 16, 10, 22, 10, 6, 0, 9, 14, 7, 20, 9, 16,
             18, 20, 22, 5, 19, 17, 22, 7, 7, 11, 18, 0, 8, 29, 22, 16, 16,
             4, 6, 5, 21, 25, 14, 12, 7, 6, 3, 16, 1, 6, 17, 12, 6, 17,
             20, 9, 14, 0, 26, 15, 24, 17, 19, 8, 12, 26, 12, 20, 17, 9, 3,
             20, 9, 8, 9, 21, 11, 16, 17, 15, 25, 11, 22, 29, 16, 15, 19, 10,
             23, 6, 21, 10, 15, 30, 15, 13, 18, 5, 3)

```

```
BIS_scoressums <- data.frame(BIS_sums)
```

```
#checking for normality and assumptions of the BIS_scoressums
```

```

hist(BIS_scoressums)
boxplot(BIS_scoressums$BIS_sums,
        main = "Boxplot of BIS Sum Scores",
        ylab = "Sum Scores")

```

```

# Scatterplot with regression line
plot(BIS_scoressums$BIS_sums,
     main = "Scatterplot of BIS Sum Scores",
     xlab = "ID", ylab = "Sum Scores")
library(ggplot2)
abline(lm(BIS_scoressums$BIS_sums ~ BIS_scoressums$BIS_sums, data =
BIS_scoressums), col = "red")
# Checking assumptions for all social media scores
# Column 37 time spent online and column 58 time on the most used platform

SMU <- data.frame(clean_data$SMtimeperday, clean_data$mostusedplat_perday)

#rename columns
colnames(SMU) <- c("timespentonline", "timeonspecificplatform")

# check for normality and assumptions
SMU$timespentonline <- as.numeric(SMU$timespentonline)
hist(SMU$timespentonline)
hist(SMU$timeonspecificplatform)

# changing one of the responses into english categorical
SMU$timeonspecificplatform[SMU$timeonspecificplatform == "Weniger als 1 Stunde"] <-
"Less than 1 hour"

# creating a barplot for timeonspecificplatform
barplot(table(SMU$timeonspecificplatform),
        main = "Bar Plot of Time Spent on a Specific Platform Per Day",
        xlab = "Categories",
        ylab = "Frequency",
        col = "skyblue",
        border = "black")

# group means and standard deviations
mean(BIS_scoressums$BIS_sums)
sd(BIS_scoressums$BIS_sums)
mean(allmeansSCsubscales$allmeansSC)
sd(allmeansSCsubscales$allmeansSC)
mean(SMU$timespentonline)
sd(SMU$timespentonline)

# Cronbach's alpha of the scales
install.packages("psych")
library(psych)
alpha(BIS_scores)
alpha(allmeansSCsubscales)

# decriptive variables and related BIS and SCS
edu_highranks <- subset(clean_data2, clean_data2$rankselfd_edu == 1 |
clean_data2$rankselfd_edu == 2)
mean(edu_highranks$BIS_sums)

```

```
mean(educ_highranks$finalSC)
```

```
cosm_highranks <- subset(clean_data2, clean_data2$rankcosm_cloth == 1 |
clean_data2$rankcosm_cloth == 2)
mean(cosm_highranks$BIS_sums)
mean(cosm_highranks$finalSC)
```

```
surgery_highranks <- subset(clean_data2, clean_data2$rank_surgery == 1 |
clean_data2$rank_surgery == 2)
mean(surgery_highranks$BIS_sums)
mean(surgery_highranks$finalSC)
```

```
food_highranks <- subset(clean_data2, clean_data2$rankselfd_edu == 1 |
clean_data2$rankselfd_edu == 2)
mean(food_highranks$BIS_sums)
mean(food_highranks$finalSC)
```

```
travel_highranks <- subset(clean_data2, clean_data2$ranktravel == 1 | clean_data2$ranktravel
== 2)
mean(travel_highranks$BIS_sums)
mean(travel_highranks$finalSC)
```

```
entertain_highranks <- subset(clean_data2, clean_data2$rankentertain == 1 |
clean_data2$rankentertain == 2)
mean(entertain_highranks$BIS_sums)
mean(entertain_highranks$finalSC)
```

```
fit_highranks <- subset(clean_data2, clean_data2$rankfit == 1 | clean_data2$rankfit == 2)
mean(fit_highranks$BIS_sums)
mean(fit_highranks$finalSC)
```

```
sport_highranks <- subset(clean_data2, clean_data2$rank_sports == 1 | clean_data2$rank_sports
== 2)
mean(sport_highranks$BIS_sums)
mean(sport_highranks$finalSC)
```

```
artdes_highranks <- subset(clean_data2, clean_data2$rankartdesig == 1 |
clean_data2$rankartdesig == 2)
mean(artdes_highranks$BIS_sums)
mean(artdes_highranks$finalSC)
```

```
mastectomy_effects <- subset(clean_data2, clean_data2$mast == "Yes")
View(mastectomy_effects)
mean(mastectomy_effects$BIS_sums)
mean(mastectomy_effects$finalSC)
mastectomy_effects <- subset(clean_data2, clean_data2$mast == "No")
View(mastectomy_effects)
mean(mastectomy_effects$BIS_sums)
mean(mastectomy_effects$finalSC)
```

```
lumorother_effects <- subset(clean_data2, clean_data2$lump_orother_surg == "Yes")
View(lumorother_effects)
mean(lumorother_effects$BIS_sums)
mean(lumorother_effects$finalSC)
```

```
reconstruction <- subset(clean_data2, clean_data2$recons == "Yes")
mean(reconstruction$BIS_sums)
mean(reconstruction$finalSC)
```

```
chemo <- subset(clean_data2, clean_data2$chemo == "Yes")
mean(chemo$BIS_sums)
mean(chemo$finalSC)
```

```
radio <- subset(clean_data2, clean_data2$radioth == "Yes")
mean(radio$BIS_sums)
mean(radio$finalSC)
```

```
mostusedpl <- subset(clean_data2, clean_data2$mostusedplat == "Snapchat")
mean(mostusedpl$BIS_sums)
```

```
mostusedpl <- subset(clean_data2, clean_data2$mostusedplat == "TikTok")
mean(mostusedpl$BIS_sums)
```

```
##### MAIN ANALYSIS #####
```

```
#correlation analysis
```

```
correlationmatrix <- cor.test(data_all_variables$timespent_online,
data_all_variables$sums_BIS, method = "pearson")
print(correlationmatrix)
```

```
# Fit a linear regression model and print the summary
```

```
data_all_variables <- data.frame(SMU$timespentonline, BIS_scoressums$BIS_sums,
allmeansSCsubscales$allmeansSC)
```

```
colnames(data_all_variables) <- c("timespent_online", "sums_BIS", "allmeans_SC")
```

```
summary(lm(data_all_variables$sums_BIS ~ data_all_variables$timespent_online, data =
data_all_variables))
```

```
summary(lm(data_all_variables$sums_BIS ~ data_all_variables$allmeans_SC, data =
data_all_variables))
```

```
summary(lm(data_all_variables$allmeans_SC ~ data_all_variables$timespent_online, data =
data_all_variables))
```

```
# Plot the data
```

```
# Time spent online on body image scores
```

```
plot(data_all_variables$sums_BIS ~ data_all_variables$timespent_online,
main = "Linear Regression Analysis SMU and Body Image Scores",
xlab = "Time Spent Online",
ylab = "Body Image Sums",
```



```

    pch = 19,
    col = "blue",
    xlim = c(0, 8),
    ylim = c(0, 30))
abline(lm(data_all_variables$sums_BIS ~ data_all_variables$timespent_online, data =
data_all_variables), col = "red")

# Selfcompassion on Body Image Scores
plot(data_all_variables$sums_BIS ~ data_all_variables$allmeans_SC,
    main = "Linear Regression Analysis Self-compassion and Body Image Scores",
    xlab = "Self-compassion",
    ylab = "Body Image Sums",
    pch = 19,
    col = "blue",
    xlim = c(1, 4),
    ylim = c(0, 30))
abline(lm(data_all_variables$sums_BIS ~ data_all_variables$allmeans_SC, data =
data_all_variables), col = "red")

# SMU on SC
plot(data_all_variables$allmeans_SC ~ data_all_variables$timespent_online,
    main = "Linear Regression Analysis Self-compassion and Time Spent Online",
    xlab = "Time Spent Online",
    ylab = "Self-compassion",
    pch = 19,
    col = "blue",
    xlim = c(1, 4),
    ylim = c(0, 8))
abline(lm(data_all_variables$allmeans_SC ~ data_all_variables$timespent_online, data =
data_all_variables), col = "red")

##### Moderation analysis #####
interact <- data_all_variables$timespent_online * data_all_variables$allmeans_SC
summary(lm(data_all_variables$sums_BIS ~ data_all_variables$timespent_online +
data_all_variables$allmeans_SC + interact))

```

End of Script