The Relationship Between Compassion and Well-Being: The Mediating Role of Connectedness

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Bachelor's Thesis

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APA 7th edition

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Bachelor Psychology, Positive Clinical Psychology and Technology

June, 24th 2024

AI-Statement

During the preparation of this work, the author used DeepL to translate and optimize the English language as English is not the native language of the author. Additional use of AI during the writing process incorporated Grammarly and the Word Spelling function to correct spelling and grammar mistakes. Moreover, chatGBT was used to optimize some formulations and solve R-Studio problems. Scribbr was used for APA7 citations. Consensus was used as a research aid (but not exclusively!). After using these tools/services, the author reviewed and edited the content as needed and takes full responsibility for the content of the work.

Abstract

This study examines whether connectedness to the self, to others, and to the world mediates the relationship between compassion and well-being. Well-being is of great importance, given the decline in mental health worldwide and the consequences of mental health problems. Previous studies separately examined the effects of compassion and connectedness on well-being and found positive effects. This study examined the relationship between these variables and considered the subdimensions of connectedness. **Method.** The study sample (N = 103) comprised predominantly German, highly educated women. Participants completed online surveys measuring compassion, connectedness, and well-being. The study employed a cross-sectional design. Causal mediation analyses with non-parametric bootstrap confidence intervals were conducted due to unmet assumptions in the linear regression models. Despite the presence of unmeasured confounding variables, sensitivity analysis indicated that the results were robust to small amounts of unmeasured confounding. **Results.** Results revealed that the average causal mediation effect (ACME) was significant for connectedness to the self (b = .33, p < .001, *95% CI* [.16, .54]), for connectedness to others (b = .48, p < .001, *95% CI* [.27, .74]), and for connectedness to the world (b = .40, p < .001, *95% CI* [.20, .65]). All hypotheses were accepted, indicating that compassion enhances well-being through increasing connectedness to the self, others, and the world. **Conclusion.** The findings suggest that compassion-based interventions (CBIs) can be used to improve well-being. Further research on interventions that increase compassion, connectedness, or both is recommended, preferably using experimental and longitudinal study designs.

1. Introduction

''If you want others to be happy, practice compassion. If you want to be happy, practice compassion." – Dalai Lama

Mental health is declining worldwide (Mental Health Million Project & Sapien Labs, 2023; World Health Organization: WHO, 2022). There is a progressive global increase in those distressed or struggling with significant mental health challenges, especially among younger generations (Mental Health Million Project & Sapien Labs, 2023). One in eight people worldwide suffers from a mental disorder (World Health Organization: WHO, 2022). Mental health problems cause severe distress and functional impairments for individuals putting a burden on their families and social- and work-related environments (Trautmann et al., 2016). They cause more economic and treatment costs than chronic somatic diseases such as cancer or diabetes (Trautmann et al., 2016). Viewing mental health problems as a burden, however, reflects the values of an individualistic, fast-paced society which ironically often causes such problems. It exerts unhealthy pressure on the individual and sees the individual as the problem instead of questioning the social system (Bernasek & Perry, 2023). This is something to keep in mind. However, mental health is decreasing and most people with mental health problems do not have access to existing care (World Health Organization: WHO, 2022). Compassion is seen as an antidote, as research has shown that it can improve mental health while it prioritises an individual's well-being (Neff et al., 2007). Therefore, this study investigates whether compassion increases mental health, by increasing the feeling of connectedness to the self, others, and the world.

Compassion

Compassion is a fundamental principle of Buddhist philosophy (Ricard, 2011). Furthermore, it plays a central role in all the world's main religions, ranging from Christianity to Confucianism as well as in Western psychological perspectives (Goetz et al., 2010; Strauss et al., 2016). Compassion finds its roots in the Latin term 'passio,' which means suffering, combined with the prefix 'com,' meaning together – thus, to suffer together (Lilius et al., 2011). Compassion focuses on caring for others' well-being and initiates pro-social behaviour that reduces this suffering. Compassion differs from empathy because it involves a willingness to act without emotional contagion, whereas empathy is more about passively sharing the feelings of others (Lilius et al., 2003; Yaden et al., 2024). Empathy reflects itself in self-focused and negative language leading to negative health outcomes. Compassionate language on the other hand enhances social connections and positivity, leading to positive

health outcomes (Yaden et al., 2024). Compassion can be directed towards others and towards the self (Neff, 2003; Neff 2005; Strauss et al., 2016). Strauss et al. (2016) synthesised existing conceptualizations, from Buddhist to Western psychological perspectives, and identified five components of compassion. Accordingly, to Strauss et al. (2016), compassion is 'a cognitive, affective, and behavioural process consisting of … 1) Recognizing suffering; 2) Understanding the universality of suffering in human experience; 3) Feeling empathy for the person suffering and connecting with the distress (emotional resonance); 4) Tolerating and accepting uncomfortable feelings aroused in response to the suffering person (e.g. distress, anger, fear) so remaining open to and accepting of the person suffering; and 5) Motivation to act/acting to alleviate suffering' (p.19).

Well-being

Well-being is one dimension of mental health, while psychopathology is the other dimension. Thus, mental health is more than the mere absence of psychopathology. An individual with psychopathology does not necessarily experience poor well-being and the absence of psychopathology does not automatically mean good well-being (Keyes, 2007). Well-being is becoming more central to research and practice (Taylor et al., 2017). It increases resilience and quality of life, thus going beyond the symptoms of psychopathology and closing the gap left by traditional approaches (Taylor et al., 2017).

Compassion towards others and the self increases well-being (Lee et al., 2021; Neff et al., 2007). It is a predictor of well-being and decreases loneliness (Lee et al., 2021). Compassion benefits well-being through multiple mechanisms. According to Neff et al. (2003) compassion toward the self includes mindfully approaching one's emotions, so that they are fully experienced without losing perspective. Instead of self-criticism and trivialising pain, individuals can encounter themselves with warmth, and non-judgmental understanding (Neff et al. 2003). Additionally, individuals realise that being imperfect, making mistakes, and having life difficulties is nothing that happens to them alone but is part of the shared human experience (Neff et al. 2003). In both studies conducted by Neff et al. (2003) students who exhibited self-compassion disclosed more adaptive ways of coping, which are central to well-being (Meyer, 2001; Neff et al., 2007). Beyond that, Gilbert (2005) suggests that compassion contributes to individuals' well-being as it makes them feel cared for, emotionally calm, and connected.

Connectedness

Another mechanism by which compassion might enhance well-being is that it strengthens a feeling of connectedness. Connectedness encompasses various dimensions (Townsend & McWhirter, 2005). Watts et al. (2022) argue that connectedness has three dimensions and defines it as a 'state of feeling connected to self, others, and the wider world' (p.3462). Connectedness to the self is understood as an embodied experience in which individuals prioritize their senses, body, and emotions over being distracted by cognition or communication. During this experience, they are deeply in tune with their emotions and accept them (Watts et al., 2022). In other words, it consists of self-alignment, self-acceptance, and self-awareness (Klussman et al., 2021; Klussman et al., 2022). Connectedness to others refers to actual social networks and to the subjective feeling of how socially connected or disconnected one is (Watts et al., 2022). Watts et al. (2022) conceptualised connectedness to the world as self-transcendence which describes the capacity to transcend self-boundaries. This can occur on an interpersonal and transpersonal level. The interpersonal level refers to 'opening up one's sense of self to include other beings' and transpersonal refers to 'connecting with nature and a spiritual principle' (Watts et al., 2022, p. 3475).

Compassion might increase self-connectedness and thereby might increase well-being. Compassion might demand individuals to take the perspective of others which they can best do after successfully identifying and classifying their inner parts (Böckler et al., 2017). Self-report assessment of interoceptive awareness of patients with depression showed that a brief mindfulness training mediated reduction in depressive symptoms, as it significantly increased regulatory and belief-related aspects of interoceptive awareness (Fißler et al., 2016). Consequently, increased self-awareness might foster individuals to perceive their senses, body, and emotions and might indirectly foster them to be in tune with their inner lives. This state of self-connectedness might be comparable to a state of mindfulness which predicts self-regulated behaviour and positive emotional states (Brown & Ryan, 2003). Klussman et al. (2020) deliver qualitative evidence that times of self-disconnection, on the other hand, are associated with psychological distress. Self-alienation was related to more intense PTSD symptoms and lower levels of hope in children and mental distress (Wood et al., 2008). Decreased self-acceptance can be another component of self-disconnection, which, according to Klussman et al. (2020), comes near self-hatred. Beyond that, lacking self-awareness can also be an aspect of self-disconnection and it decreases the ability for introspection so that individuals feel detached from their inner life (Klussman et al., 2020). Moreover, Klussman et al. (2022) found that self-connection was associated with various indicators of well-being, such as meaning in life or life satisfaction. Moreover, they found that self-connection might

predict well-being better than self-compassion (Klussman et al., 2022). Therefore, compassion might be associated with self-connectedness, and might therefore influence well-being.

Compassion might also foster a feeling of connectedness to others and thereby might increase well-being. Research has shown that increases in compassion predicted social support, trust, and the feeling of closeness and connectedness (Crocker & Canevello 2008). According to Rosenberg and Chopra (2015), compassion leads to an understanding of the needs, behaviour, and feelings of others, which enables a genuine connection. Moreover, compassion motivates support-giving, as it enables us to recognize and do something against the suffering of others (Cosley et al., 2010; Crocker & Canevello, 2008). Individuals who exhibit compassion perceive that others have greater compassion for them. Consequently, they recognize the social support offered to them and receive it, which might also strengthen their subjective feeling of being socially connected (Cosley et al., 2010; Crocker & Canevello, 2008; Watts et al., 2022). Feeling connected to others is often referred to in the literature as social support and belonging, which is a fundamental human motivation (Klussman et al. 2020). There are consistent results that social support improves well-being among children and adolescents, with an increasing effect with increased age (Chu et al., 2010). Social support and connectedness to others have in common that they help people cope with physical and emotional stress by bonding with others (Cohen, 2004; Watts et al., 2022). Taylor et al. (2020) associate a diminished sense of social connection with reduced life satisfaction and experiencing fewer positive and more negative feelings in individuals with clinically impairing anxiety or depression. Neuroimaging research has demonstrated that experiencing social exclusion activates the same regions activated while experiencing physical pain (Eisenberger, 2012). Social isolation had the largest negative impact on mental health in adolescents, adults, and seniors (Levula et al., 2015). Sun et al. (2020) suggest that according to self-reports and observer reports, more frequent and deep social interactions positively influence well-being. Thus, evidence suggests that social isolation decreases well-being, while social connectedness increases it.

It has not yet been examined whether compassion increases connectedness to the world. However, research suggests that feeling connected to the world might contribute to well-being. Capaldi et al. (2014) show in their meta-analysis that being connected to nature is most strongly associated with vitality, followed by life satisfaction, and positive affect. Feeling connected to nature, however, is only one aspect of feeling connected to the world as defined by Watts et al. (2022). Watts et al. (2022) also include global humanity, and a purpose

and meaning in life as well as higher spiritual principles. A purpose in life is associated with lower stress levels, greater life satisfaction, creates more psychological flexibility, greater efficiency in resource allocation, and personal meaning (McKnight & Kashdan, 2009). Among other variables, purpose potentially explains how a person can become resilient (McKnight & Kashdan, 2009). Higher spiritual principles such as shared intelligence beyond individuals' minds, awareness, and mindfulness show a significant positive relationship with well-being, flow experience, mindful acceptance, and mindful attention (Kelley et al., 2016). In a sample of undergraduate students, spiritual meaning had inverse relationships with depression and anxiety, while it had a positive relationship with hope (Mascaro et al., 2004).

The Current Study

Compassion was shown to increase well-being. Given the importance of well-being, it is highly relevant to investigate this relationship. It is supposed that compassion increases a feeling of connectedness to self, others, and the world, thereby increasing well-being. Therefore, this cross-sectional study aims to investigate the following three hypotheses. First, connectedness to the self mediates the relationship between compassion and well-being. Second, connectedness to others mediates the relationship between compassion and well-being. Third, connectedness to the world mediates the relationship between compassion and well-being.

2. Method

2.1 Participants

Table 1 shows the sociodemographic characteristics of the final sample. It comprised 103 participants between the ages of 18 and 61 (M=24.37, SD=8.11). There were more women than men (female = 68.9%; male = 26.2%). The average age of women was M = 23.42, SD = 7.33 and the average age of men was M=27.60, SD = 9.94. 24.3% of the participants were Dutch, 60.2% were German, and 15.5% were from another nationality. 36.9% of the participants had a high school diploma, 18.4% had a college education, 32.0% had a bachelor's degree, and 10.7% had a master's degree. To determine a satisfactory sample size for the research study, the a priori data analysis G*Power was utilized. A power level of .80, a significance level alpha of .05, and an effect size of .30 were entered into G*Power (Faul et al., 2009). The minimum sample size required to achieve good statistical power was 82.

Table 1

Sociodemographic Characteristics of Participants in the Final Sample

	Sample	
Baseline Characteristic	*n*	%
Gender		
Male	27	26.2
Female	71	68.9
Diverse	2	1.9
Other	1	1.0
Prefer not to say	2	1.9
Nationality		
German	62	60.2
Dutch	25	24.3
Other	16	15.5
Education level		
High school	38	36.9
College education	19	18.4
Bachelor's degree	33	32.0
Master's degree	11	10.7
Ph.D. or higher qualification	1	1.0

Prefer not to say	1	1.0

Note. $N = 103$.

2.2 Materials

This research was part of a bigger study, only the relevant questionnaires will be utilised (see Appendix A; see Appendix B; see Appendix C). At the end of the survey participants were asked about their age, gender, nationality, and level of education (see Appendix D).

Compassion

Compassion was measured using the Relational Compassion Scale (RCS) (Hacker, 2008). It consists of 16 items and four subscales. The first subscale measures compassion from the self to the self (SS) and contains three items (e.g. 'When I am upset, I try to be warm, sensitive and sympathetic to myself'). The second subscale measures compassion from the self to others (SO) and contains six items (e.g. 'I like to listen to other peoples' experiences'). The third subscale measures compassion from other to other (OO) and contains four items (e.g. 'Other people tend to be understanding'). Lastly, the fourth subscale measures compassion from other to self (OS) and contains four items (e.g. 'Other people I know tend to be sensitive to my well-being'). Participants were asked to rate how much they agreed with each statement. There were four options: 1*=do not agree, 2=do slightly agree, 3=agree moderately, and 4=agree strongly*. Negative items were reversed. To evaluate the level of compassion for each participant, the sum score was calculated. In the original study, Cronbach's alpha for the subscales ranged from .74 to .84, indicating acceptable to good reliability (Hacker, 2008). Factor analysis and correlation analysis confirmed acceptable internal validity, while convergent and discriminant validity demonstrated acceptable to good overall validity (Hacker, 2008). In the present sample, the total scale represented sufficient reliability with Cronbach's alpha $\alpha = .69$.

Connectedness

Connectedness was measured using the Watts Connectedness Scale (WSC) (Watts et al., 2022)**.** It consists of 19 items and incorporates three dimensions, namely connectedness to the self, connectedness to others, and connectedness to the world. Connectedness to the self is measured by six items (e.g. 'I have felt connected to a range of emotions'). Connectedness to others is also measured by six items (e.g. I have felt unwelcome amongst others') while

connectedness to the world is measured by seven items (e.g. 'I have felt connected to a source of universal love'). Participants were asked to drag an indicator on a visual analogue scale (VAS) between *0=not at all* and *100=entirely* to show how much they agree or disagree with an item. Negative items were reversed. The sum scores of each subscale and the total WCS scale were calculated per participant In the original study, the total WSC showed high internal reliability (α = .86) (Watts et al., 2022). Convergent validity was good and postdictive validity was excellent. Discriminant validity was established for all subscales except the connectedness-to-others scale (Watts et al., 2022). In the present sample, the total scale represented good reliability with Cronbach's alpha α = .87 and the subscales also presented sufficient to good reliability with a Cronbach's alpha α = .71–.82.

Well-being

The Mental Health Continuum Short Form (MHC-SF) was used to assess well-being (Keyes et al., 2008). It consists of 14 items and measures three dimensions of well-being: Emotional well-being, psychological well-being, and social well-being. Emotional well-being is measured by three items (e.g. 'How often during the past month did you feel happy?'). Psychological well-being is measured by six items (e.g. 'How often during the past month did you feel that you liked most parts of your personality?) and social well-being by five items (e.g. 'How often during the past month did you feel that you had something important to contribute to society?'). Participants were asked to rate their according experience on a 6-point Likert scale ranging from *0= never* to *5= everyday*. Sum scores were calculated. As shown in previous studies, internal reliability for the total MHC-SF was high (α=.89) (Lamers et al., 2010). The convergent validity was good, and the discriminant validity could also be confirmed (Lamers et al., 2010). In this sample, the total scale represented good reliability with Cronbach's alpha α = .88.

2.3 Procedure

The study employed a cross-sectional design. The participants needed a device with internet access. The online survey was conducted via Qualtrics. To access the survey, participants were provided with a link or were directed via the Sona system. At the beginning of the survey, they were informed about the purpose of the study, that they needed to understand English and be at least 18 or older. They were informed about voluntary participation, duration, use of the data, and potential risks. Contact details of the researchers were provided. Participants gave informed consent before taking part in the study (see

Appendix E). When they gave consent to participate, they were directed to the questionnaires. It took them about 20 minutes to fill in the online survey. Before each questionnaire instructions were given on how to answer the respective questionnaire. Afterward, the participants were asked to indicate their age, gender, nationality, and level of education (see Appendix D). After completing all questionnaires, they were thanked for their participation. Participants could withdraw at any time without fearing consequences. The study was approved by the Behavioural Management and Social Sciences Ethics Committee.

2.4 Data Analysis

The collected data was prepared in Excel. Participants who did not finish the questionnaires were removed. Additionally, one participant was removed who always gave the same answer option, also for the reversed items. The data was then imported into the statistical software RStudio for analysis (RStudio Cloud) (see Appendix F). The packages readxl, tidyr, dplyr, psych, mediation, dagitty, and multilevel were used. Descriptive statistics and the correlations of the variables compassion, connectedness, and well-being were calculated.

After that, linear regression models were created. For the first model, the predictor variable was compassion, and the dependent variable was well-being. Next, two linear regression models per hypothesis were created. For the first hypothesis, the one model had compassion as the predictor variable and connectedness to the self as the dependent variable. The other model had compassion and connectedness to the self as predictor variables and well-being as the dependent variable. For the second hypothesis, one model had compassion as the predictor variable and connectedness to others as the dependent variable. The other model had compassion and connectedness to others as predictor variables and well-being as the dependent variable. For the third hypothesis, one model had compassion as the predictor variable and connectedness to the world as the dependent variable. The other model had compassion and connectedness to others as predictor variables and well-being as the dependent variable.

Before conducting linear regression analyses the assumptions of the linear regression models were checked. Linearity was checked by plotting the relationships between the predictor and dependent variables using scatter plots revealing a linear trend. The scatter plots revealed a non-linear trend for all models. The normality of residuals was checked using histograms that should show a bell-shaped curve indicating that residuals follow a normal distribution. All models displayed a bell-shaped curve, instead of the model that displayed

compassion and connectedness to others as predictor variables and well-being as the dependent variable. Homoscedasticity was checked by plotting residuals against fitted values. Residuals should be spread around the horizontal lines, if they show a trend of increase or decrease, it indicates heteroscedasticity. For all models, residuals did not spread around the horizontal line. The independence of residuals was checked by plotting residuals against the order of observations. Residuals should not show a clear pattern, indicating independence. However, the residuals displayed clear patterns for all models. Therefore, the assumptions were violated.

To ensure the validity and reliability of the results, causal mediation analyses with non-parametric Bootstrap intervals were conducted. For the bootstrap confidence intervals, 5000 samples were drawn for each analysis. Causal Mediation Analysis (CMA) is a method used to understand how the independent variable (X) influences the dependent variable (Y), through one or more mediators (M) (Rijnhart et al., 2021). In this CMA the independent variable was compassion, and the dependent variable was well-being, and depending on the hypothesis, the mediator was either connectedness to the self, connectedness to others, or connectedness to the world. The Average Causal Mediation Effect (ACME) refers to the indirect effect of X on Y through M. The Average Direct Effect (ADE) refers to the direct effect of X on Y, controlling for M. The total effect combines the direct and indirect effect of X on Y. So, it is the sum of ACME and ADE (Rijnhart et al., 2021). The Proportion mediated is the ratio of the indirect effect to the total effect. It therefore indicates the extent to which the relationship between compassion and well-being is explained by either connectedness to self, connectedness to others, or connectedness to the world.

One critical assumption for CMA is that there should be no unmeasured confounders affecting the relationship between X, Y, and M. Therefore, Directed Acyclic Graphs (DAGs) were constructed to reveal potential confounders. As confounding variables were present in each mediation analysis, sensitivity analyses were performed and sensitivity analysis plots were created. Sensitivity analyses measure the robustness of mediation effects to potential unmeasured confounding. They apply a correlation parameter (ρ) ranging from -1 to 1. Using the plots, robustness is evaluated based on whether or not the ACME remains significant for increasing p-values. For all plots, ACME remained significant with small ρ parameters. Therefore, ACME was robust to small amounts of unmeasured confounding. Connectedness to the self showed the highest robustness while connectedness to others showed the lowest robustness.

Results

Descriptive Statistics

Table 2 shows the descriptive statistics and Pearson correlations of the variables compassion, connectedness, and well-being. It includes the subdimensions of connectedness.

Table 2

Descriptive Statistics and Correlations of the Variables Compassion, Connectedness, and Well-Being (N=103)

Variable		Mean	SD	Com.	Con.	CS	CO	CW	WB
Compassion		43.98	6.20	1					
Connect.		1061	306.58	.48	1				
	To self	380.20	101.84	.38	.72	1			
	To others	355.40	134.45	.40	.80	.41	1		
	To the world	325.70	150.81	.38	.83	.43	.45	1	
Well-being		40.36	11.40	.40	.82	.56	.71	.65	1

Note. Com. = compassion; Connect. or Con. = connectedness; CS = connectedness to the self; CO = connectedness to others; CW= connectedness to the world; WB = well-being.

Hypothesis 1: Connectedness to the Self Mediates the Relationship Between Compassion and Well-Being

Table 3 shows the outcome of the Causal Mediation Analysis with connectedness to the self as mediator. The results show that compassion has a positive effect on well-being. Connectedness to the self is indeed a mediator. Therefore, the first hypothesis is accepted.

Table 3

Causal Mediation Analysis Results with Nonparametric Bootstrap Confidence Intervals, and Connectedness to the Self as Mediator

Estimate	Estimate	95% CI		*p*
		LL	*UL*	
ACME	.33	.16	.54	< .001
ADE	.41	.17	.65	< .01
Total effect	.74	.45	1.05	< .001
Proportion mediated	.45	.25	.70	< .001

Note. CI = Confidence interval; LL = lower limit; UL = upper limit; ACME = Average Causal Mediation Effect; ADE = Average Direct Effect; Prop. Mediated = Mediated Proportion; Simulations = 5000

Hypothesis 2: Connectedness to Others Mediates the Relationship Between Compassion and Well-Being

Table 4 shows the outcome of the Causal Mediation Analysis with connectedness to others as mediator. The results show that compassion has a positive effect on well-being, while connectedness to others accounts as mediator. Therefore, the second hypothesis is accepted.

Table 4

Causal Mediation Analysis Results with Nonparametric Bootstrap Confidence Intervals, and Connectedness to Others as Mediator

Estimate	Estimate	95% CI		*p*
		LL	*UL*	
ACME	.48	.27	.74	< .001
ADE	.26	.04	.48	< .05
Total effect	.74	.45	1.06	< .001
Proportion mediated	.65	.43	.93	< .001

Note. CI = Confidence interval; LL = lower limit; UL = upper limit; ACME = Average Causal Mediation Effect; ADE = Average Direct Effect; Prop. Mediated = Mediated Proportion; Simulations = 5000

Hypothesis 3: Connectedness to the World Mediates the Relationship Between Compassion and Well-Being

Table 5 shows the outcome of the Causal Mediation Analysis with connectedness to the world as mediator. The results show that compassion positively affects well-being, while connectedness to the world mediates this relationship. Therefore, the third hypothesis is accepted.

Table 5

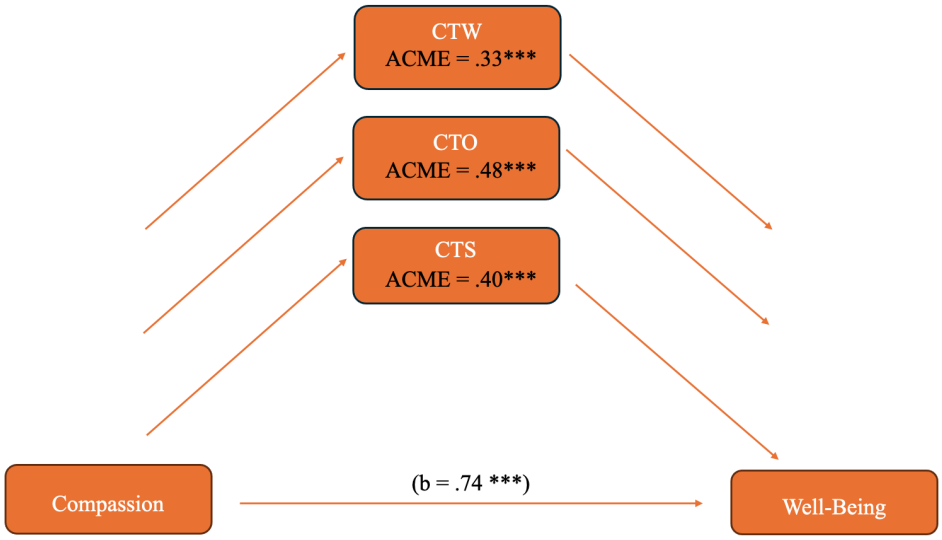
Causal Mediation Analysis Results with Nonparametric Bootstrap Confidence Intervals, and Connectedness to the World as Mediator

Estimate	Estimate	95% CI		*p*
		LL	*UL*	
ACME	.40	.20	.65	< .001
ADE	.33	.07	.61	< .05
Total effect	.74	.45	1.05	< .001
Proportion mediated	.55	.31	.88	< .001

Note. CI = Confidence interval; LL = lower limit; UL = upper limit; ACME = Average Causal Mediation Effect; ADE = Average Direct Effect; Prop. Mediated = Mediated Proportion; Simulations = 5000

Figure 1

Model Representing the Effect of Connectedness to the Self, Connectedness to Others, and Connectedness to the World on the Relationship Between Compassion and Well-Being



Note. b = coefficient representing the effect size; () = total effect; CTS = connectedness to the self; CTO = connectedness to others; CTW = connectedness to the world; ACME = average causal mediation effect; *p<.05, **p<.01, ***p<.001

Discussion

This study aimed to investigate three hypotheses. The first hypothesis was that connectedness to the self mediates the relationship between compassion and well-being. The second hypothesis was that connectedness to others mediates the relationship between compassion and well-being. The third hypothesis was that connectedness to the world mediates the relationship between compassion and well-being. The data supported all hypotheses. Compassion leads to higher levels of connectedness to self, to others, and to the world. These lead to higher levels of well-being. Previous studies have separately established that both compassion and connectedness can enhance well-being. This study built up on this, investigated the relationship between these varaibels, and demonstrated that connectedness to the self, others, and the world mediates the relationship between compassion and well-being.

The positive effect of compassion on connectedness to the self builds upon previous research. Even though no previous research has focused on this particular relationship, its effect might be explained by compassion leading to greater awareness (Al-Awabdeh, 2015). Awareness of one's inner parts includes the awareness of one's affective patterns and bodily and cognitive states (Böckler et al., 2017). This might reveal parallels with Watts et al. (2022) conceptualisation of self-connection in which individuals are attuned to their senses, body, and emotions. Connectedness to the self, on the other hand, seems to significantly predict higher levels of well-being. This aligns with existing research. While the opposite was found that self-disconnection is associated with psychological distress, self-connection was associated with various indicators of well-being (Brown & Ryan, 2003; Klussman et al., 2022). Moreover, one could assume that self-connection and mindfulness, although they are different concepts, display similarities. While Watts et al. (2022) see self-connection as being attuned to one's inner life, Klussman et al. (2020) consider self-awareness, self-acceptance, and self-alignment as part of it. Mindfulness, on the other hand, involves being fully present and mindfully perceiving one's sensations while taking in a non-judgemental attitude (Schuman-Olivier et al., 2020). One could argue that mindfully perceiving oneself is in line with being attuned to one's inner life, while it might be in line with heightened self-awareness as well as self-alignment. The non-judgemental attitude might be in line with self-acceptance. A state of mindfulness, on the other hand, was shown to predict self-regulated behaviour and positive emotional states (Brown & Ryan, 2003).

Besides that, a positive association between compassion and connectedness to others aligns with previous research. Previous research did not investigate this particular relationship, yet one might argue that compassion might benefit connectedness to others by

improving social intelligence, which enhances social skills and social interactions (Böckler et al., 2017). Additionally, it might lead to better perspective-taking which was shown to facilitate understanding of others and enhance good relationships (Rosenberg & Chopra, 2015). This is critical, considering that the quality of relationships opposed to their quantity establishes a subjective feeling of being socially connected (Sun et al., 2020; Townsend & McWhirter, 2005). Furthermore, compassion motivates support-giving and accepting the social support offered (Cosley et al., 2010; Crocker & Canevello, 2008). This might also enhance one's subjective feeling of being socially connected, while it might also enhance one's social networks. The positive effect of connectedness to others on well-being aligns with earlier studies. Previous research particularly focused on social connectedness. While it was shown that social disconnection decreases well-being, social connection was shown to increase it. Social support and belonging are a fundamental human motivation (Klussman et al. 2020). While the consequences of social isolation or social exclusion are tragically negative for well-being, frequent and deep social interactions positively influence it (Levula et al., 2015; Sun et al., 2020; Taylor et al., 2020).

The findings also suggest that compassion leads to a higher feeling of connectedness to the world, yet no research exists that particularly investigates this association (Watts et al., 2022). However, one possible explanation of how compassion leads to an increased feeling of connectedness to the world is that after recognizing and empathizing with the suffering of a wide range of individuals, one feels compelled to act against it (Strauss et al., 2016). As the causes of suffering are multifaceted and range from internal factors like illnesses to external ones such as economic, political, and environmental issues, individuals may choose to focus on some particular factor(s) (Wilkinson & Kleinman, 2016; Smith, 2011). The intention to reduce suffering itself or the focus on alleviating particular causes could create a sense of purpose and meaning, driving individuals to transcend self-boundaries and act for humanity (Watts et al., 2022). Yet, this assumption needs to be investigated further. Lastly, the results revealed that connectedness to the world leads to better well-being. Previous research has shown connectedness to nature, spirituality, and global humanity increases the levels of well-being (Capaldi et al., 2014; Kelley et al., 2016; Mascaro et al., 2004; McKnight & Kashdan, 2009). These are all part of the dimension that Watts et al. (2022) describe as connectedness to the world. To conclude, compassion increases well-being via connectedness on all its subdimensions.

Strengths and Limitations

One strength of this study is, that it included a conceptualisation of connectedness that incorporated all dimensions existing in literature: connectedness to self, others, and the world (Watts et al., 2022). Another strength is that this study focused on compassion, which can be used as a practical tool to improve mental health in several populations.

One limitation is that the Relational Compassion Scale (RCS) only provides sufficient reliability, Cronbach's alpha $\alpha = .69$, which might lead to less reliable results. A further limitation of this study is generalisability. The sample used in this study does not accurately represent the world's population. This sample is largely made up of Western Educated Industrialised Rich Democratic (WEIRD) people, particularly highly educated, German women. WEIRD people often make up the majority of the research objects, yet they do not represent the majority of the world's population. This is often not taken into consideration, as they do not provide a generalisable representation of human behaviour and emotions in psychology (Klein et al., 2021). Another limitation is that this cross-sectional study cannot establish causality or temporal precedence because it simply identifies the associations between compassion, connectedness, and well-being. Thus, it cannot infer a causal relationship or be sure that one variable occurs before another.

Implications and Future Research

The findings suggest that compassion-based interventions (CBIs) can be particularly effective in promoting well-being by fostering a sense of connectedness to the self, others, and the world. Moreover, the findings suggest that connectedness-based interventions can enhance well-being. CBIs could target vulnerable groups, such as patients with chronic illnesses or chronic pain, or individuals who are undergoing major life transitions, such as migrants and refugees, or retirees. Moreover, they could target groups that experience loneliness and social isolation, such as the elderly or urban dwellers. They could also benefit individuals in high-stress environments, such as healthcare workers or military personnel. Additionally, they could benefit individuals who are striving for flourishing. As the study sample did not include patients with diagnosed mental disorders it can only be recommended with caution to individuals who display psychopathology. Yet, compassion-based interventions (CBIs) are receiving increasing attention in mental health care (Hofmann, Grossman, & Hinton, 2011; Leaviss & Uttley, 2015). Moreover, CBIs are already well-established. Meta-analytical techniques were performed on 21 randomized control trials (RCT) to investigate the effects of compassion-based interventions and results suggested significant moderate effects (Kirby et al., 2017). One concrete example is compassion-

cultivating training (CCT), which lasts 8 weeks and includes weekly 2-hour classes in which skills that foster compassion are taught. It achieved significant improvements in well-being (Jazaieri et al., 2012). Psychedelic therapies are an example of connectedness interventions. However, they are applied primarily in clinical settings to treat depression, anxiety, PTSD, or addiction, often when traditional treatments have been ineffective (Watts et al., 2022).

Moreover, adapting compassion as a trainable, psychological concept means taking it out of a traditional cultural context. This approach can be seen as a very Western, and individualistic view of compassion, and reflects the values of Western Educated Industrialised Rich Democratic (WEIRD) societies. This raises the question of whether compassion should be re-contextualised within its traditional framework to fully appreciate its depth. This would take into account different cultural perspectives that are often overlooked in Western societies or given less consideration in research that is often dominated by a WERID approach.

Future research could either explore, validate, or further develop interventions that aim to enhance compassion, connectedness, or both in clinical and non-clinical trials. For example, psychedelic interventions or CBIs. Besides that, future research should investigate whether the results are replicable, as the type of sample does not account sufficiently for generalisability. The sample should better represent the world's population. To draw causal conclusions, experimental designs that manipulate variables or longitudinal studies that track changes over time are recommended. Another point, that might be interesting to investigate is, how compassion increases connectedness to the world in particular.

Furthermore, research that suggests that compassion increases well-being could be analysed in light of whether compassion might, in reality, increase connectedness. For example, Gilbert (2005) suggests that compassion contributes to individuals' well-being by making an individual feel cared for, emotionally calm, and connected. It could be investigated rather these findings can be interpreted as an increased feeling of connectedness. Another example is that Neff et al. (2003) suggest that compassion toward the self includes mindfully approaching one's emotions so that they are fully experienced without losing perspective. This might be comparable to what Watts et al. (2022) conceptualise as connectedness to the self.

Conclusion

The current study results indicate that practicing compassion can promote well-being. The results suggest that connectedness to self, others, and the world mediate this relationship. Thus, compassion increases well-being via connectedness to the self, to others, and to the

world. The findings suggest that compassion-based interventions (CBIs) can be particularly effective in promoting well-being by fostering a sense of connectedness for all its subdimensions. CBIs have already proven their effectiveness and are receiving increased attention in mental health care. Further research on interventions that increase compassion, connectedness, or both is recommended. Moreover, experimental or longitudinal study designs are recommended to establish causality.

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Appendix A

Relational Compassion Scale

Please read each statement carefully before answering. Indicate how much you agree with each statement.

Do not agree I Do slightly agree I Agree moderately I Agree strongly

1. Other people tend to be understanding.
2. Generally, people do not try to understand others' problems.
3. I like to listen to other peoples' experiences.
4. When I am upset, I try to be warm, sensitive and sympathetic to myself.
5. I tend to become attuned to other peoples' feelings.
6. People generally don't tend to listen to others.
7. Generally, people dismiss other peoples' problems.
8. I find it hard to understand other people's problems.
9. Other people I know tend to be sensitive to my wellbeing.
10. Other people I know are empathetic when I make a mistake.
11. I don't know what to do when other people are distressed.
12. When I am emotionally upset, I try to see my thoughts and feelings as valid.
13. When I am emotionally upset, I treat myself with kindness and care.
14. I am interested to understand others' experiences and emotions.
15. Other people I know tend to show understanding and caring.
16. Other people I know are caring when I am distress.

Relational subscales

SS (self to self) >4,12,13
OS (others to self) >9, 10, 15, 16
SO (self to others) >3, 5, -8, -11, 14
OO (others to others) >1, -2, -6, -7

Appendix B

Mental Health Continuum – Short Form

Please Indicate, How often during the past month did you feel...

Never / once or twice a week / about once a week / about 2 or 3 times a week / almost every day / everyday

1. happy?
2. interested in life?
3. satisfied with your life?
4. that you had something important to contribute to society?
5. that you belonged to a community (like a social group, your neighbourhood, your city, your school)?
6. that our society is becoming a better place for people like you?
7. that people are basically good?
8. that the way our society works makes sense to you?
9. that you liked most parts of your personality?
10. good at managing the responsibilities of your daily life?
11. that you had warm and trusting relationships with others?
12. that you had experiences that challenged you to grow and become a better person?
13. confident to think or express your own ideas and opinions?
14. that your life has a sense of direction or meaning to it?

Appendix C

Watts Connectedness Scale (WSC)

Reflecting on how you have felt over the past 2 weeks, please rate the following items on a scale from “Not at all” to “Entirely” according to how you have felt over this time period. Please answer every item, even if you are unsure or feel the item is unclear or poorly worded. Drag the indicator to a position on the scale (0-100) that shows how much you agree or disagree with each of the following statements.

1. I have felt trapped in my mind
2. I have felt connected to my heart/emotion
3. I have felt connected to my senses (touch, taste, sight, smell, hearing)
4. I have felt connected to a range of emotions
5. If I had chosen to, I could have 'sat with' painful memories
6. I have felt connected to my body
7. I have been able to fully experience emotion, whether positive or negative
8. I have felt alone
9. I have felt connected to friends and/or family
10. I have felt connected to a community
11. I have felt connected to all humanity
12. I have felt unwelcome amongst others
13. I have felt separate from the world around me
14. I have felt connected to a purpose in life
15. I have felt connected to nature
16. I have felt connected to a spiritual essence (in the secular or religious sense)
17. I have felt connected to a source of universal love
18. I have seen things from a broad perspective, 'the bigger picture'
19. I have felt that everything is interconnected

→items 1, 8, 12, and 13 are reversed items

Appendix D

Questionnaire demographics

1. How old are you?
2. What gender you identify as? Female / Male / Diverse / Other I prefer not to say
3. What is your nationality? German / Dutch / Other
4. What is your level of education? Didn´t finish secondary education / High-school / College education / Bachelors degree / Masters degree I Ph.D. / Other higher qualification / Prefer not to say

Appendix E

Informed Consent

Introduction

What is the survey about?

This survey is about assessing the relationships between feeling connected and social networking site use, compassion, authenticity, and political orientations.

Am I suitable to take part?

In order to participate in this survey you need to be at least 18 years old and have sufficient English skills.

Do I need to take part?

No, you are not obliged to take part in this study. Once you have given your consent, you will be redirected to the questionnaires. However, you can withdraw from the study at any time by simply closing your browser. You do not have to give a reason for your withdrawal and there will be no consequences for you. If you decide to cancel the study by closing your browser, all data collected up to that point will be deleted. However, if you finish the study, the researchers will no longer be able to delete your data. This is because your data will be recorded anonymously so the researchers can no longer identify your data once it has been recorded.

What will happen when I take part in this survey?

If you agree to participate in this study, you will be redirected to the questionnaire, which will take about 20 minutes to complete. There are no right or wrong answers for any of the questionnaires and we ask you to answer as fully as possible as we are interested in your own opinion. At the end of this survey, you will be asked questions about your demographic data, but these will not include questions about identifiable information. However, you are free not to provide your demographic information.

What are the risks of taking part in this survey?

During this research, you will answer questions relating to your general mental health and feeling of connectedness. If you struggle with that you are welcome to contact the following services:

- https://www.therapyroute.com/article/suicide-hotlines-and-crisis-lines-in-germany
- https://www.government.nl/topics/mental-health-services/question-and-answer/help-for-mental-health-problems

After the survey, what will happen to my data and the results of this survey?

No identifiable information will be collected during this survey. The collected data will be stored on password-protected devices for at least 10 years, which complies with the audit requirements of the research integrity policy. Furthermore, the recorded data will only be analysed by the research team, which consists of psychology students from the University of Twente who are analysing this data for their bachelor theses. However, the research data may be shared with the research community, published in research articles or used for future research, but only in anonymised form.

Contact details Researchers:

…

This research project is supervised by:

…

Please indicate whether you consent

I consent to take part in this study

I do not consent to take part in this study

Appendix F

R-Script

```
# Load the readxl package for Excel file reading
library(readxl)
library(tidyr)
library(dplyr)
library(psych)
library(mediation)
library(multilevel)
library(dagitty)

# Set the file path to your Excel file
file_path <- "data.xlsx"

# Read the Excel file
data <- read_excel(file_path)
data %>% View()

##1 demographics
# age
age_sd <- sd(demo$age)
print(age_sd)
summary(demo$age)

#gender
gender_summary <- table(demo$gender)
print(gender_summary)

gender_count <- table(demo$gender)
gender_percentage <- prop.table(gender_count) * 100
print(gender_percentage)

# # 'Female' gender
female_data <- subset(demo, gender == "Female")
```

```
# Calculate mean and standard deviation for 'age' within the 'Female' category
mean_age_female <- mean(as.numeric(female_data$age), na.rm = TRUE)
sd_age_female <- sd(as.numeric(female_data$age), na.rm = TRUE)

cat("Mean age for Female:", mean_age_female, "\n")
cat("Standard deviation for age in Female:", sd_age_female, "\n\n")

# 'Male' gender
male_data <- subset(demo, gender == "Male")

# Calculate mean and standard deviation for 'age' within the 'Male' category
mean_age_male <- mean(as.numeric(male_data$age), na.rm = TRUE)
sd_age_male <- sd(as.numeric(male_data$age), na.rm = TRUE)



cat("Mean age for Male:", mean_age_male, "\n")
cat("Standard deviation for age in Male:", sd_age_male, "\n")



#nationality
nationality_summary <- table(demo$nationality)
print(nationality_summary)

nationality_count <- table(demo$nationality)
nationality_percentage <- prop.table(nationality_count) * 100
print(nationality_percentage)

#education level
education_summary <- table(demo$education)
print(education_summary)

education_count <- table(demo$education)
education_percentage <- prop.table(education_count) * 100
```

```
print(education_percentage)

##2 to numeric and reversing scores
#OO1-OO4
data <- data %>%
  mutate(OO1 = recode(OO1,
                      "do not agree" = 1,
                      "agree moderately" = 2,
                      "agree slightly" = 3,
                      "agree strongly" = 4))
data <- data %>%
  mutate(OO2 = recode(OO2,
                      "do not agree" = 4,
                      "agree moderately" = 3,
                      "agree slightly" = 2,
                      "agree strongly" = 1))
data <- data %>%
  mutate(OO3 = recode(OO3,
                      "do not agree" = 4,
                      "agree moderately" = 3,
                      "agree slightly" = 2,
                      "agree strongly" = 1))
data <- data %>%
  mutate(OO4 = recode(OO4,
                      "do not agree" = 4,
                      "agree moderately" = 3,
                      "agree slightly" = 2,
                      "agree strongly" = 1))

#SO1-SO5
data <- data %>%
  mutate(SO1 = recode(SO1,
                      "do not agree" = 1,
                      "agree moderately" = 2,
```

```
                "agree slightly" = 3,
                "agree strongly" = 4))
data <- data %>%
  mutate(SO2 = recode(SO2,
                "do not agree" = 1,
                "agree moderately" = 2,
                "agree slightly" = 3,
                "agree strongly" = 4))
data <- data %>%
  mutate(SO3 = recode(SO3,
                "do not agree" = 4,
                "agree moderately" = 3,
                "agree slightly" = 2,
                "agree strongly" = 1))
data <- data %>%
  mutate(SO4 = recode(SO4,
                "do not agree" = 4,
                "agree moderately" = 3,
                "agree slightly" = 2,
                "agree strongly" = 1))
data <- data %>%
  mutate(SO5 = recode(SO5,
                "do not agree" = 1,
                "agree moderately" = 2,
                "agree slightly" = 3,
                "agree strongly" = 4))
#SS1-SS3
data <- data %>%
  mutate(SS1 = recode(SS1,
                "do not agree" = 1,
                "agree moderately" = 2,
                "agree slightly" = 3,
                "agree strongly" = 4))
data <- data %>%
```

```
  mutate(SS2 = recode(SS2,
                      "do not agree" = 1,
                      "agree moderately" = 2,
                      "agree slightly" = 3,
                      "agree strongly" = 4))
data <- data %>%
  mutate(SS3 = recode(SS3,
                      "do not agree" = 1,
                      "agree moderately" = 2,
                      "agree slightly" = 3,
                      "agree strongly" = 4))
#OS1-OS4
data <- data %>%
  mutate(OS1 = recode(OS1,
                      "do not agree" = 1,
                      "agree moderately" = 2,
                      "agree slightly" = 3,
                      "agree strongly" = 4))
data <- data %>%
  mutate(OS2 = recode(OS2,
                      "do not agree" = 1,
                      "agree moderately" = 2,
                      "agree slightly" = 3,
                      "agree strongly" = 4))
data <- data %>%
  mutate(OS3 = recode(OS3,
                      "do not agree" = 1,
                      "agree moderately" = 2,
                      "agree slightly" = 3,
                      "agree strongly" = 4))
data <- data %>%
  mutate(OS4 = recode(OS4,
                      "do not agree" = 1,
                      "agree moderately" = 2,
```

```
                    "agree slightly" = 3,
                    "agree strongly" = 4))
data %>% View()

data <- data %>%
  mutate(EWB1 = recode(EWB1,
                    "never" = 0,
                    "once or twice" = 1,
                    "about once a week" = 2,
                    "about 2 or 3 times a week" = 3,
                    "almost every day" = 4,
                    "every day" = 5))

data <- data %>%
  mutate(EWB2 = recode(EWB2,
                    "never" = 0,
                    "once or twice" = 1,
                    "about once a week" = 2,
                    "about 2 or 3 times a week" = 3,
                    "almost every day" = 4,
                    "every day" = 5))

data <- data %>%
  mutate(EWB3 = recode(EWB3,
                    "never" = 0,
                    "once or twice" = 1,
                    "about once a week" = 2,
                    "about 2 or 3 times a week" = 3,
                    "almost every day" = 4,
                    "every day" = 5))



#SWB1-SWB5
data <- data %>%
```

```
  mutate(SWB1 = recode(SWB1,
                       "never" = 0,
                       "once or twice" = 1,
                       "about once a week" = 2,
                       "about 2 or 3 times a week" = 3,
                       "almost every day" = 4,
                       "every day" = 5))
data <- data %>%
  mutate(SWB2 = recode(SWB2,
                       "never" = 0,
                       "once or twice" = 1,
                       "about once a week" = 2,
                       "about 2 or 3 times a week" = 3,
                       "almost every day" = 4,
                       "every day" = 5))
data <- data %>%
  mutate(SWB3 = recode(SWB3,
                       "never" = 0,
                       "once or twice" = 1,
                       "about once a week" = 2,
                       "about 2 or 3 times a week" = 3,
                       "almost every day" = 4,
                       "every day" = 5))
data <- data %>%
  mutate(SWB4 = recode(SWB4,
                       "never" = 0,
                       "once or twice" = 1,
                       "about once a week" = 2,
                       "about 2 or 3 times a week" = 3,
                       "almost every day" = 4,
                       "every day" = 5))
data <- data %>%
  mutate(SWB5 = recode(SWB5,
                       "never" = 0,
```

```
                    "once or twice" = 1,
                    "about once a week" = 2,
                    "about 2 or 3 times a week" = 3,
                    "almost every day" = 4,
                    "every day" = 5))
#PWB1-PWB6
data <- data %>%
  mutate(PWB1 = recode(PWB1,
                    "never" = 0,
                    "once or twice" = 1,
                    "about once a week" = 2,
                    "about 2 or 3 times a week" = 3,
                    "almost every day" = 4,
                    "every day" = 5))
data <- data %>%
  mutate(PWB2 = recode(PWB2,
                    "never" = 0,
                    "once or twice" = 1,
                    "about once a week" = 2,
                    "about 2 or 3 times a week" = 3,
                    "almost every day" = 4,
                    "every day" = 5))
data <- data %>%
  mutate(PWB3 = recode(PWB3,
                    "never" = 0,
                    "once or twice" = 1,
                    "about once a week" = 2,
                    "about 2 or 3 times a week" = 3,
                    "almost every day" = 4,
                    "every day" = 5))
data <- data %>%
  mutate(PWB4 = recode(PWB4,
                    "never" = 0,
                    "once or twice" = 1,
```

```
                    "about once a week" = 2,
                    "about 2 or 3 times a week" = 3,
                    "almost every day" = 4,
                    "every day" = 5))
data <- data %>%
  mutate(PWB5 = recode(PWB5,
                    "never" = 0,
                    "once or twice" = 1,
                    "about once a week" = 2,
                    "about 2 or 3 times a week" = 3,
                    "almost every day" = 4,
                    "every day" = 5))
data <- data %>%
  mutate(PWB6 = recode(PWB6,
                    "never" = 0,
                    "once or twice" = 1,
                    "about once a week" = 2,
                    "about 2 or 3 times a week" = 3,
                    "almost every day" = 4,
                    "every day" = 5))

# reverse reversed connectedness items
reverse_score <- function(variable) {
  if (all(variable >= 0) && all(variable <= 100)) {
    return(100 - variable)
  } else {
    warning("Variable not scored between 0-100. Skipping.")
    return(variable)
  }
}

# reverse
data$CTO1 <- reverse_score(data$CTO1)
data$CTO2 <- reverse_score(data$CTO2)
```

```
data$CTO5 <- reverse_score(data$CTO5)
data$CTO6 <- reverse_score(data$CTO6)

data %>% View()

##3creating variables according to scale and subscales of compassion, cronbachs alpha
sapply(data, class)

# create compassion variable

data$compassion <- rowSums(data[, c("OO1", "OO2", "OO3", "OO4",
                                    "SS1", "SS2", "SS3",
                                    "SO1", "SO2", "SO3", "SO4", "SO5",
                                    "OS1", "OS2", "OS3", "OS4")])
#data <- data %>%
#mutate(compassion = OO1 + OO2 + OO3 + OO4 + SS1 + SS2 + SS3 + SO1 + SO2 + SO3 +
         SO4 + SO5 + OS1 + OS2 + OS3 + OS4)

head(data)
class(data$compassion)
head(data$compassion)
sd(data$compassion)
summary(data$compassion)

#Cronbachs alpha compassion
compassionalpha <- data[, c("OO1", "OO2", "OO3", "OO4", "SS1", "SS2", "SS3",
                            "SO1", "SO2", "SO3", "SO4", "SO5", "OS1", "OS2", "OS3", "OS4")]
alpha_reliability <- cronbach.alpha(compassionalpha)
alpha_reliability

##4 creating variables according to scales and subscales of wellbeing, cronbachs alpha
# Create 'wellbeing' variable
data$wellbeing <- rowSums(data[, c("EWB1", "EWB2", "EWB3",
                                   "SWB1", "SWB2", "SWB3", "SWB4", "SWB5",
```

```
                    "PWB1", "PWB2", "PWB3", "PWB4", "PWB5", "PWB6")])

#data <- data %>%
# mutate(wellbeing = EWB1 + EWB2 + EWB3 + SWB1 + SWB2 + SWB3 + SWB4 + SWB5
        + PWB1 + PWB2 + PWB3 + PWB4 + PWB5 + PWB6)

head(data)
class(data$wellbeing)
head(data$wellbeing)
sd(data$wellbeing)
summary(data$wellbeing)

##5 creating variables according to scales and subscales of connectedness, cronbachs alpha
#create variable 'connect'
data$connect <- rowSums(data[, c("CTS1", "CTS2", "CTS3", "CTS4", "CTS5", "CTS6",
                        "CTO1", "CTO2", "CTO3", "CTO4", "CTO5", "CTO6",
                        "CTW1", "CTW2", "CTW3", "CTW4", "CTW5", "CTW6", "CTW7")])

#data <- data %>%
#mutate(connect = CTS1 + CTS2 + CTS3 + CTS4 + CTS5 + CTS6 + CTO1 + CTO2 + CTO3
        + CTO4 + CTO5 + CTO6 + CTW1 + CTW2 + CTW3 + CTW4 + CTW5 + CTW6 +
        CTW7)

head(data)
class(data$connect)
head(data$connect)
sd(data$connect)
summary(data$connect)

#Cronbachs alpha connect
connectalpha <- data[, c("CTS1", "CTS2", "CTS3", "CTS4", "CTS5", "CTS6","CTO1",
        "CTO2", "CTO3", "CTO4", "CTO5", "CTO6","CTW1", "CTW2", "CTW3", "CTW4",
        "CTW5", "CTW6", "CTW7")]
alpha_reliability <- cronbach.alpha(connectalpha)
```

```
alpha_reliability

##5.1 create variable connectedness to the self CTS
data <- data %>%
  mutate(CTS = CTS1 + CTS2 + CTS3 + CTS4 + CTS5 + CTS6)

data$CTS <- rowSums(data[, c("CTS1", "CTS2", "CTS3", "CTS4", "CTS5", "CTS6")])

head(data)
class(data$CTS)
head(data$CTS)
sd(data$CTS)
summary(data$CTS)

#Cronbachs alpha CTS
CTSalpha <- data[, c("CTS1", "CTS2", "CTS3", "CTS4", "CTS5", "CTS6")]
alpha_reliability <- cronbach.alpha(CTSalpha)
alpha_reliability

##5.2 create variable connectedness to others CTO
data <- data %>%
  mutate(CTO = CTO1 + CTO2 + CTO3 + CTO4 + CTO5 + CTO6)

data$CTO <- rowSums(data[, c("CTO1", "CTO2", "CTO3", "CTO4", "CTO5", "CTO6")])

head(data)
class(data$CTO)
head(data$CTO)
sd(data$CTO)
summary(data$CTO)

#Cronbachs alpha CTO
CTOalpha <- data[, c("CTO1", "CTO2", "CTO3", "CTO4", "CTO5", "CTO6")]
alpha_reliability <- cronbach.alpha(CTOalpha)
```

```
alpha_reliability

##5.3 create variable connectedness to the world CTW
data <- data %>%
  mutate(CTW = CTW1 + CTW2 + CTW3 + CTW4 + CTW5 + CTW6 + CTW7)

data$CTW <- rowSums(data[, c("CTW1", "CTW2", "CTW3", "CTW4", "CTW5", "CTW6",
          "CTW7")])

head(data)
class(data$CTW)
head(data$CTW)
sd(data$CTW)
summary(data$CTW)

#Cronbachs alpha CTW
CTWalpha <- data[, c("CTW1", "CTW2", "CTW3", "CTW4", "CTW5", "CTW6", "CTW7")]
alpha_reliability <- cronbach.alpha(CTWalpha)
alpha_reliability

##7 correlations
correlation <- cor(data$compassion, data$connect)
print(correlation)

correlation1 <- cor(data$compassion, data$wellbeing)
print(correlation1)

correlation2 <- cor(data$connect, data$wellbeing)
print(correlation2)

correlation3 <- cor(data$CTS, data$CTW)
print(correlation3)

correlation4 <- cor(data$CTS, data$CTO)
```

```
print(correlation4)

correlation5 <- cor(data$CTO, data$CTW)
print(correlation5)

correlation6 <- cor(data$CTS, data$compassion)
print(correlation6)

correlation7 <- cor(data$CTS, data$connect)
print(correlation7)

correlation8 <- cor(data$CTO, data$compassion)
print(correlation8)

correlation9 <- cor(data$CTO, data$connect)
print(correlation9)

correlation10 <- cor(data$CTW, data$compassion)
print(correlation10)

correlation11 <- cor(data$CTW, data$connect)
print(correlation11)

correlation12 <- cor(data$CTS, data$wellbeing)
print(correlation12)

correlation13 <- cor(data$CTO, data$wellbeing)
print(correlation13)

correlation14 <- cor(data$CTW, data$wellbeing)
print(correlation14)

###8.0 linear regression models for mediation analyisis, including checking for assumptions
#compassion on well-being
```

```
model0 <- lm(wellbeing ~ compassion, data=data)
summary(model0)

conf_intervals <- confint(model0, level = 0.95)
print(conf_intervals)

#compassion on CTS
model1 <- lm(CTS ~ compassion, data=data)
summary(model1)

conf_intervals <- confint(model1, level = 0.95)
print(conf_intervals)

model2 <- lm(wellbeing ~ compassion + CTS, data=data)
summary(model2)

conf_intervals <- confint(model2, level = 0.95)
print(conf_intervals)

#compassion on CTO
model1 <- lm(CTO ~ compassion, data=data)
summary(model1)

conf_intervals <- confint(model1, level = 0.95)
print(conf_intervals)

model2 <- lm(wellbeing ~ compassion + CTO, data=data)
summary(model2)

conf_intervals <- confint(model2, level = 0.95)
print(conf_intervals)

#compassion on CTW
model1 <- lm(CTW ~ compassion, data=data)
```

```
summary(model1)

conf_intervals <- confint(model1, level = 0.95)
print(conf_intervals)

model2 <- lm(wellbeing ~ compassion + CTW, data=data)
summary(model2)

conf_intervals <- confint(model2, level = 0.95)
print(conf_intervals)
#8.1 #linearity, normality, homoscedasticity, outliers
par(mfrow = c(2, 2))
plot(model0) #okay

par(mfrow = c(2, 2))
plot(model1) #homo not okay

par(mfrow = c(2, 2))
plot(model2) #linearity critical, homo quite okay

#8.2 Histogram of residuals for normality
hist(model0$residuals)
hist(model1$residuals)
hist(model2$residuals)

#8 .3Homoscedasticity
# Plot of residuals against fitted values
plot(model0$fitted.values, model0$residuals)
# Add a horizontal line at zero
abline(h = 0, col = "red")

plot(model1$fitted.values, model1$residuals)
abline(h = 0, col = "red")
```

```
plot(model2$fitted.values, model2$residuals)
abline(h = 0, col = "blue")

#8.4Independence of residuals
# Plot of residuals against observation order
plot(residuals(model0) ~ seq_along(residuals(model0)))
plot(residuals(model1) ~ seq_along(residuals(model1)))
plot(residuals(model2) ~ seq_along(residuals(model2)))

## 9 Mediation Analysis, non-parametric, boodstrap of 5000 and sensitivity analysis##

##bootstrap with 5000, CTS

model.m<-lm(CTS~compassion,data)
summary(model.m)
conf_intervals <- confint(model.m, level = 0.95)
print(conf_intervals)

model.p<-lm(CTS~wellbeing,data)
summary(model.p)
conf_intervals <- confint(model.p, level = 0.95)
print(conf_intervals)

model.y<-lm(wellbeing~compassion+CTS, data)
summary(model.y)
conf_intervals <- confint(model.y, level = 0.95)
print(conf_intervals)


mediation_results <- mediate(model.m = model.m,
                             model.y = model.y,
                             sims = 5000,
                             boot = TRUE,
                             mediator = "CTS",
```

```
                        treat = "compassion")
summary(mediation_results)

##bootstrap with 5000, CTO
model.m<-lm(CTO~compassion,data)
summary(model.m)
conf_intervals <- confint(model.m, level = 0.95)
print(conf_intervals)

model.p<-lm(CTO~wellbeing,data)
summary(model.p)
conf_intervals <- confint(model.p, level = 0.95)
print(conf_intervals)

model.y<-lm(wellbeing~compassion+CTO, data)
summary(model.y)
conf_intervals <- confint(model.y, level = 0.95)
print(conf_intervals)

mediation_results2 <- mediate(model.m = model.m,
                        model.y = model.y,
                        sims = 5000,
                        boot = TRUE,
                        mediator = "CTO",
                        treat = "compassion")
summary(mediation_results2)

##bootstrap with 5000, CTW
model.m<-lm(CTW~compassion,data)
summary(model.m)
conf_intervals <- confint(model.m, level = 0.95)
print(conf_intervals)

model.p<-lm(CTW~wellbeing,data)
```

```
summary(model.p)
conf_intervals <- confint(model.p, level = 0.95)
print(conf_intervals)

model.y<-lm(wellbeing~compassion+CTW, data)
summary(model.y)
conf_intervals <- confint(model.y, level = 0.95)
print(conf_intervals)



mediation_results3 <- mediate(model.m = model.m,
                              model.y = model.y,
                              sims = 5000,
                              boot = TRUE,
                              mediator = "CTW",
                              treat = "compassion")
summary(mediation_results3)

#10.1 confounding & sensitivity analyisis
#confounding analysis
dag <- dagitty('dag {
  compassion -> CTS -> wellbeing
  compassion -> wellbeing
  U -> compassion
  U -> wellbeing
}')
plot(dag)

dag <- dagitty('dag {
  compassion -> CTO -> wellbeing
  compassion -> wellbeing
  U -> compassion
  U -> wellbeing
}')
```

```
plot(dag)

dag <- dagitty('dag {
  compassion -> connect -> wellbeing
  compassion -> wellbeing
  U -> compassion
  U -> wellbeing
}')
plot(dag)



dag <- dagitty('dag {
  compassion -> CTW -> wellbeing
  compassion -> wellbeing
  U -> compassion
  U -> wellbeing
}')
plot(dag)

##sensitivity analysis
#CTS
sensitivity_analysis <- medsens(mediation_results, rho.by = 0.01)
summary(sensitivity_analysis)
plot(sensitivity_analysis)
#CTO
sensitivity_analysis <- medsens(mediation_results2, rho.by = 0.01)
summary(sensitivity_analysis)
plot(sensitivity_analysis)
#CTW
sensitivity_analysis <- medsens(mediation_results3, rho.by = 0.01)
summary(sensitivity_analysis)
plot(sensitivity_analysis)
```