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Don't Be So Hard on Yourself!
Impacting Factors on the Relationship between
Relatedness and Mental Well-Being in Swedish High
School Students:
A Longitudinal Analysis

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Abstract

This longitudinal study explored the factors influencing the relationship between relatedness and mental well-being in 16–18-year-old Swedish high school students ($N=249$; $m=87$, $f=159$, $N/A=3$) attending upper secondary school. Measurements were the DASS-21 (Henry & Crawford, 2005), BPNSFS (Chen et al., 2015), SFS-SF (Raes et al., 2011), and the HSC-21 (Weyn et al., 2022), with relevant scores being extracted from different years of inquiry. We found that relatedness in the first year of measurement positively predicted levels of self-compassion in the second year and negatively predicted anxiety, depression, and stress in the third year. Self-compassion emerged as a key protective factor, mediating the impact of social support on mental health. Gender differences were significant, with males reporting higher self-compassion and females experiencing more mental health issues. In most cases, sensitivity did not significantly influence the relationship between first-year relatedness and third-year mental well-being, whether in simple models or moderated mediation analyses. However, at low and average level, aesthetic sensitivity was found to be a moderator in the relation, meaning that it might be seen as a potential risk factor for developing higher depression in individuals with lower relatedness. Gender was not revealed to moderate the extent to which self-compassion mediated the relationship between relatedness and outcomes of anxiety, depression, and stress. The findings of this study suggest that prevention programs should focus on enhancing self-compassion, particularly in girls, to mitigate psychological problems at school.

Keywords: Gender, high school students, mental health, relatedness, self-compassion, sensitivity

Introduction

Many people remember adolescence as being a troublesome time in their lives. Among the most prominent reasons for this judgment are commonly factors such as parental conflicts, romantic issues, or concerns about school and the future (Núñez-Regueiro & Núñez-Regueiro, 2021). Moreover, it is a period that demands the formation of a coherent sense of self, potentially leading to inner conflicts (Erikson, 1959). People aged 12-18 years need to explore their interests, values, and goals to form a unique identity. However, if they feel overwhelmed when trying to follow these ambitions, they may experience role confusion, meaning an insecurity about their integrity and place in the world. Against this background, it logically follows that the three high school years before graduation might present themselves as especially challenging for students, since they play an important role in determining prospects and career chances that can be perceived as distressing.

The Swedish educational system reflects the common Western perspective of placing the responsibility for critical thinking on individuals (Ringmar, 2001) and encourages students to be mindful that they are in charge to determine the course of their lives. Yet, the freedom Swedish students enjoy with pursuing their academic goals comes with the necessity of being confident in their abilities to assert themselves in an environment that gets especially competitive when it comes to higher academia (Beach, 2013). This might prove difficult for some individuals, especially those who struggle with developing a sense of self that grants them a fundament of comfort and pride.

A meta-analytic review of current research emphasizes the importance of peer attachment in providing opportunities for the build of self-esteem (Gorrese & Ruggieri, 2013), which in turn is a crucial factor that helps build adaptive coping mechanisms when faced with disappointment and failure (e.g. Baumeister et al., 2003; Crocker & Park, 2004; Orth et al., 2012). However, the immediate social surroundings therefore might also form a risk factor in that they impose judgments and opinions made by others on the individual which can threaten their confidence and sense of self. In Swedish upper secondary education (Gymnasium), students are confronted with settling into a new environment that includes being assigned to a new school class and getting familiar with a specific, self-chosen track of study. In this context, they get the chance to further develop their unique talents and actively engage with topics that are of interest to them. However, they might face competition and a resulting realization that other people might be equally skilled, or even outperform them in their specialized areas. Whilst this is an important learning experience for young adults that prepares them for the competitive nature of academia and employment, academic pressure is known to be a potential threat to

mental well-being (stress, depression, and anxiety) (e.g., Deb et al., 2015; Pascoe et al., 2020; Salmela-Aro et al., 2009). Thus, it is indispensable to take these factors into account when striving to ensure a safe and appropriate learning environment for students.

Relatedness and Mental Health

An influential study by Neff & McGehee (2010) revealed relatedness to be positively associated with self-compassion, which in turn mediated the relationship between family dynamics and mental well-being. Connections with family members were found to play a significant role in these tendencies, as were attachment styles. It seems reasonable to convey these observations to other areas of life, since personally meaningful relationships can also be formed with people outside one's own family. A supportive environment is well established to exhibit positive effects on psychological well-being (e.g., Turner, 1981) and has also been shown to be beneficial for promoting learning and preventing anxiety (Johnston-Wilder et al., 2021). However, in contrast to this stands the "personal fable", an immature belief that, among other things, feelings and experiences are unique to the affected person and cannot be understood by others (Elkind, 1967, 1987). This well-known phenomenon can be a hindrance for developing a sense of relatedness and thus negatively impact significant relationships.

High school represents a crucial period for students, often marked by additional challenges such as the pressure to excel in final exams, rising insecurities, and impending life changes. These factors can trigger anxiety, a common mental health issue during adolescence (Mazzone et al., 2007). As students navigate their personal development and the demands of building a strong foundation for their future, many experience significant mental strain, including stress and depressive symptoms, leading to efforts to develop effective intervention programs with varying success (Feiss et al., 2019). Given the well-established role of gender in mental health, with females showing higher lifetime prevalence rates of anxiety disorders and depression compared to males (Kessler et al., 1993), it is important to consider this factor in research. Observed differences are often linked to both biological (e.g., hormonal) factors and psychosocial influences, such as gender roles and socialization (McLean & Anderson, 2009). Moreover, research by Bangasser & Valentino (2014) indicates that females report higher levels of perceived stress and are more susceptible to stress-related disorders.

It is essential for students to develop effective strategies for managing external stressors and their psychological responses to maintain their mental well-being. One highly effective approach is seeking social support, whether from friends, family, or teachers. As a result, being confronted with a completely new class environment could pose either a potential threat on the one hand, for instance if students face separation from their friends, or a chance to form new

interpersonal bonds and friendships on the other hand. Either way, students will most likely be strongly affected by the new experiences they have and incorporate new perspectives and judgments into their general worldview and self-image. Whether they feel socially accepted or rejected by others should substantially influence the thoughts they develop over themselves and their abilities, and thereby heavily impact their inclination to either harshly criticize themselves or be self-compassionate in instances of perceived failure, inadequacy, or suffering.

Self-Compassion

Neff (2003a) defined the concept of self-compassion as being composed of three main pillars – self-kindness, common humanity, and mindfulness. While self-kindness means adopting a kind and understanding attitude toward oneself, common humanity tailors the perception of one’s experience as part of the larger human experience. Lastly, mindfulness entails having a balanced awareness, therefore not over-identifying with painful thoughts and feelings. As such, self-compassion is said to be a non-evaluative, emotionally beneficial self-attitude that can protect against negative consequences of self-judgment, isolation, and rumination. We therefore believe self-compassion operates as a mediator between relatedness and mental well-being among students in that it helps decrease adverse symptoms by accepting failure, embracing personal deficits, and self-kindness (Neff, 2003a). Importantly, the aspect of common humanity stands in direct conflict with relatedness, since low levels of the latter enhance a feeling of isolation and thereby undermine the formation of this facet of self-compassion. High levels of relatedness conversely enhance the perception of a common human experience in a beneficial way.

While social factors can foster the development of self-compassion, gender has once again been shown to play a significant role. In Western societies, men have robustly reported higher self-compassion levels than women (Neff, 2003b; Neff et al., 2005; Yarnell & Neff, 2013). However, a study by Yarnell et al. (2019) has demonstrated that in addition to self-identified gender, gender roles influence self-compassion, with traits typically perceived as masculine correlating with higher levels of self-compassion compared to those perceived as feminine. This indicates that socialization plays an important part in these aspects, for instance through cultural norms and differing societal expectations that get placed on men and women, accordingly.

Sensitivity

Another important aspect to consider when examining the mediating role of self-compassion on psychological issues is individual sensitivity to environmental influences. The term sensory processing sensitivity (SPS) was introduced by Aron & Aron (1997) to describe a

temperament trait marked by deeper cognitive processing of sensory input, heightened emotional reactivity, and increased sensitivity to external stimuli. This concept has since been further developed and validated, emphasizing its role in shaping individual responses to interventions and prevention programs (Pluess & Boniwell, 2015). Research indicates that highly sensitive individuals benefit more from supportive environments and intervention programs, but they are also more negatively affected by adverse environmental circumstances compared to their less sensitive peers. This suggests that sensitivity amplifies the impact, whether positive or negative, of external influences (e.g., Lionetti et al., 2022; Nocentini et al., 2018; Pluess & Belsky, 2010).

Assuming that sensitivity plays a crucial role in how deeply individuals internalize and evaluate statements and feedback from others, we incorporated its elements from the bifactor model proposed by Weyn et al. (2022) into our considerations. This model includes a general sensitivity factor and two combined specific factors: Ease of Excitation – Low Sensory Threshold, and Aesthetic Sensitivity, which may help explain individual differences in the experience of relatedness and development of self-compassion.

The Present Study

Bearing all these deliberations in mind, the present study considered self-compassion as a variable that should stand in relation to relatedness, with the expectation that, if the presented notions are valid, relatedness should predict reported levels of self-compassion. Moreover, since social connectedness (i.e. relatedness) was previously found to form a protective factor for mental health issues (Wickramaratne et al., 2022), a general negative correlation with anxiety, depression, and stress was expected. The extent to which an individual internalizes human connections and integrates others' feedback into their inner dialogue (i.e. how receptive or sensitive they are to external stimuli), however, can significantly affect both their development of self-compassion and mental well-being. To address this, sensitivity was included as a moderator variable.

The primary objective was to assess whether self-compassion mediated the relationship between relatedness and mental health issues (anxiety, depression, and stress) over time among Swedish high school students, while also examining potential moderating effects of sensitivity and gender. The latter was included as a factor affecting several aspects of the study, with the hypothesis that male gender would positively influence reported levels of self-compassion and mental health outcomes.

Data was gathered within a three-year longitudinal study designed to investigate long-term effects of the interesting variables. In the first year, relatedness data was collected to inform

general perceived levels of social support and belonging that were expected to predict the development of self-compassion inquired in the following year. Finally, anxiety, depression, and stress were questioned in the final year, which was believed to be a crucial time for students preparing for graduation from high school, to see whether the data gathered before could predict their levels. Because sensitivity is regarded as a personality trait in literature, related datapoints were considered from only one year.

In summary, it was hypothesized that:

- (1) Levels of relatedness in the first year would positively predict self-compassion in the following year
- (2) Gender would have a significant effect on self-compassion in the second year with the expectation that males will show higher levels than females
- (3) Relatedness in the first year would negatively predict anxiety, depression, and stress in the third year
- (4) Females would report higher levels of anxiety, depression, and stress in the third year than males
- (5) Self-compassion would show a significant mediation effect between relatedness in the first year and anxiety, depression, and stress in the third year
- (6) Sensitivity would serve as a moderating variable both on its own and in conjunction with self-compassion as a mediator between relatedness and anxiety, depression, and stress
- (7) Gender would moderate the extent to which self-compassion in the second year mediated relatedness from the first year and anxiety, depression, and stress in the third year, respectively

To our knowledge, no previous work has yet investigated these effects among Swedish high school students in a longitudinal design. Therefore, the current study offers an opportunity to evaluate the implications of any significant findings for future research and practice.

Methods

The present study was part of a research project run by Daiva Daikantaite, Mia Maurer & Eva Hoff on well-being processes among adolescents that provided the dataset that was used for analysis. The thesis author constructed their own hypotheses, and a selection of scales was made to analyze and explore these. The study has been approved by the Swedish Ethical Review Authority (Etikprövningsmyndigheten, EPM), with decision number 2019-06552. Respondents

were informed of their right of withdrawal and signed informed consent before the distribution of questionnaires.

Participants

The dataset consisted of 3-year longitudinal data among 16–18-year-old Swedish students ($N = 249$; $m = 87$, $f = 159$, $N/A = 3$) who were attending their three years of upper secondary school (Gymnasium) at the time of data collection. Measuring points were the months of December 2021, 2022, and 2023, respectively. The different study tracks students were enrolled in were not controlled for. Participants were removed from the dataset if they answered the majority of control questions incorrectly, had three or more missing data points, or did not appear to respond faithfully to the questions. As a result, 387 participants were excluded from the analysis.

Measures

The Depression, Anxiety & Stress Scale-21 (DASS-21) (Henry & Crawford, 2005)

The short version of the original 42-item DASS (Lovibond & Lovibond, 1995) is designed to measure negative emotional states of depression, anxiety, and stress. The scale consists of 21 items, with 7 items forming the subscales of depression, anxiety, and stress, respectively. The questionnaire was distributed in Swedish language and each item was rated on a 4-point Likert scale ranging from 0 ("Beskriver mig inte alls" – Doesn't describe me at all) to 3 ("Beskriver mig väldigt mycket" – Describes me very much). The internal consistency of this measure is considered acceptable, with coefficients ranging from 0.87 to 0.94 across all subscales. Additionally, the DASS-21 has demonstrated good construct validity. Sinclair et al. (2012) reported that component analysis revealed only one component, accounting for 47% of the item-level variance. However, confirmatory factor analyses (CFA) indicated that a three-factor structure was more suitable than a single-factor model.

The Basic Psychological Needs and Frustration Scale (BPNSFS) (Chen et al., 2015)

BPNSFS is designed to measure the satisfaction and frustration of basic psychological needs, as outlined by Self-Determination Theory, namely autonomy, competence, and relatedness. Items assess how these needs are satisfied or frustrated in a person's life, since they implicate overall well-being and motivation. The scale includes multiple items for each need, divided into two sections, one for satisfaction and one for frustration. It is an extension and refinement of earlier scales, e.g. the Need Satisfaction and Frustration Scale (NSFS) (Longo et al., 2016). For our research purposes, we used a Swedish language translation, and participants rated the extent to which they agreed with statements related to their experiences on a Likert scale ranging from 1 ("Stämmer inte alls" – Not true at all) to 5 ("Stämmer fullständigt" –

Completely true). The BPNSFS has demonstrated strong internal consistency with Cronbach's alpha coefficients ranging from 0.64 to 0.89 for all subscales (Chen et al., 2015). Construct validity has proven to be good as well, with confirmatory factor analyses (CFA) loading appropriately onto the six expected factors. Furthermore, the scale has demonstrated good convergent validity in showing solid correlations with related constructs. With our interest lying solely on levels of relatedness among participants, the subscale covering relevant items was extracted and used for the analysis. All items from the remaining subscales were excluded.

The Self-compassion scale – short form (SCS-SF) (Raes et al., 2011)

SCS-SF is a concise version of the original Self-Compassion Scale (SCS) created by Neff (2003b). The SCS-SF is designed to measure an individual's self-compassion, which is the ability to treat oneself with kindness and understanding in times of suffering or failure. The purpose is to assess the six components of self-compassion, which are self-kindness, self-judgment, common humanity, isolation, mindfulness, and over-identification. The scale consists of 12 items, with two items representing each of the six subscales from the original 26-item SCS. Again, we used a Swedish translation that applied a Likert-type response format ranging from 1 (“Stämmer inte alls” – Not true at all) to 5 (“Stämmer mycket bra” – Fits very well). The SCS-SF has demonstrated adequate internal consistency, with Cronbach's alpha coefficients reported to be ≥ 0.86 in all samples, as well as good construct validity. It correlates strongly with the full version of the SCS ($r \geq 0.97$), indicating that the short form is a valid proxy for the longer scale (Raes et al., 2011). The SCS-SF further shows strong convergent validity, as it correlates well with measures of psychological well-being and positive mental health.

The Highly Sensitive Child Scale (HSC-21) (Weyn et al., 2022)

HSC-21 is a psychological assessment tool designed to measure sensory processing sensitivity (SPS) in children. The concept of high sensitivity refers to the heightened sensory processing and emotional responsiveness observed in some individuals, which can manifest as increased awareness of subtleties in the environment, deeper cognitive processing of stimuli, and stronger emotional reactions. As such, the HSC-21 aims to assess the degree of sensory processing sensitivity in children, capturing the nuances of how children experience and respond to their environment. It consists of 21 items and is based on three main factors identified in highly sensitive individuals, namely ease of excitation (EOE), which reflects the child's tendency to become easily overwhelmed by external stimuli and internal experiences, aesthetic sensitivity (AES), representing the child's appreciation for sensory experiences, and low sensory threshold (LST), which indicates a heightened sensitivity to subtle stimuli. Participants

were asked to rate each item on a Likert scale ranging from 1 (“Nästan inte alls” – Not at all) to 7 (“Väldigt mycket” – Very much) using the Swedish version of the questionnaire. The HSC-21 has been reported to show strong internal consistency, with Cronbach's alpha coefficients for the total scale and its subscales ranging from 0.75 to 0.93 (Weyn et al., 2022). Moreover, it demonstrates good construct validity, as the scale correlates well with other measures of sensory processing sensitivity and related constructs. The three-factor structure of the HSC-21 (EOE, AES, LST) has been supported by confirmatory factor analysis (CFA), demonstrating that the items load appropriately onto their respective factors. Convergent validity has also been found to be strong, correlating significantly with related psychological constructs.

Design and Procedure

The students completed the questionnaires during school hours, taking 30 minutes to finish the required questions. The distribution was done via an online link, with each student receiving a personal code to connect their responses across the three-year measurement points.

Data Analysis

Data analysis was performed using the statistical software SPSS and Jamovi. Prior to the statistical procedure, the data was cleaned in SPSS, and relevant scores were extracted and calculated separately for each year. To ensure the internal consistency of all measures used in this study, including the two factors EOE_LST and AES from the HSC-21, we calculated Cronbach's alpha for each scale before initiating the main analysis. The values collectively proved to be satisfactorily high (BPNSFS: $\alpha = .79$, SCS-SF: $\alpha = .78$, HSC-21: $\alpha = .88$, EOE_LST: $\alpha = .88$, AES: $\alpha = .81$, DASS-21: $\alpha = .92$).

Normality checks revealed the distribution of participants to be normal and overall inconspicuous. Furthermore, outlier analyses were conducted to detect extreme datapoints. There was a small number of outliers, ranging from two to seven, for all inspected variables except DASS-21 stress in year three, which presented none. However, all values were still in close proximity to the range of datapoints. Checking against a sample that excluded the outliers demonstrated that, presumably due to the sample being sufficiently large, they did not change the results in any significant way. Therefore, all conditions for statistical analysis were satisfied.

To get a general overview over the data at hand, descriptive statistics were examined with SPSS. Linear regression models were employed to test the assumptions that relatedness in year one predicted self-compassion in year two, as well as anxiety, depression, and stress in year three. Additionally, gender was tested as a predictor of self-compassion in year two and anxiety, depression, and stress in year three.

As a next step, a simple three-year mediation model was computed in Jamovi using the Medmod package, with relatedness from year one as predictor, self-compassion from year two as mediator, and depression, anxiety, and stress respectively from year three as the outcome to examine eventual effects. Additionally, the HSC-21 scale was used in a moderation model to check if sensitivity changed the relation between relatedness and any of anxiety, depression, and stress significantly. To control for eventual confounding effects between its two subscales EOE_LST (Ease of Excitation–Low Sensory Threshold) and AES (Aesthetic Sensitivity), given the differing nature of their affiliated questions, first the total score was used, and afterwards the two subscales were examined independently for moderation effects.

Moderated mediation analyses were then conducted in SPSS using PROCESS Model 7 (Hayes, 2018), with year one relatedness as predictor, year two self-compassion as mediator, the total score of year two sensitivity as moderator, and any of year three anxiety, depression, and stress as outcomes. The moderated mediation analysis was then repeated twice for each of the dependent variables, replacing the sensitivity total score with its two subscales, respectively. Due to there being too few participants for computing a more complex model that would allow for the inclusion of two moderators at the same time, an additional moderated mediation model was tested using gender as the moderator, leaving out sensitivity.

Results

The relatedness score was derived from specific items of the BPNSFS, excluding other irrelevant items from further inspection. Whereas self-compassion scores were obtained from the total score of the SCS-SF, values for sensitivity were assessed individually for each subscale to prevent any potential confounding effects within the HSC-21 that could skew the results. Anxiety, depression, and stress were measured using the respective items from the DASS-21 scale and were organized into appropriate subscales for each factor.

Initial checks showed that relatedness did not change significantly over the years, which justified its use solely from year one to predict anxiety, depression, and stress in year three, respectively. Table 1 and table 2 indicate the means and descriptive statistics for all measures in the study.

Table 1

Descriptive Statistics (Means, Standard Deviations, t-values, p-values, Cohen's d) of the Variables

Gender		Relatedness (Year 1)	Self-Compassion (Year 2)	Sensitivity total (Year 2)	EOE_LST (Year 2)	AES (Year 2)
Female	Mean	26.72	34.35	91.75	52.31	39.44
	Std. Deviation	3.81	6.49	17.41	13.52	7.31

Male	Mean	27.46	38.14	81.09	44.16	36.93
	Std. Deviation	3.48	7.44	18.28	13.68	8.63
	<i>t</i>	-1.50	-4.15	4.51	4.50	2.41
	<i>p</i>	.14	< .001	< .001	< .001	.02
	Cohen's <i>d</i>	-.20	-.55	.60	.60	.32
Total	Mean	26.98	35.69	87.98	49.43	38.55
	Std. Deviation	3.71	7.06	18.41	14.10	7.88

Gender		Anxiety (Year 3)	Depression (Year 3)	Stress (Year 3)
Female	Mean	12.36	12.27	15.91
	Std. Deviation	4.02	4.70	4.53
Male	Mean	10.33	10.10	11.98
	Std. Deviation	2.87	3.51	3.99
	<i>t</i>	4.15	3.76	6.79
	<i>p</i>	< .001	< .001	< .001
	Cohen's <i>d</i>	.55	.50	.91
Total	Mean	11.64	11.50	14.52
	Std. Deviation	3.78	4.43	4.73

Note: EOE_LST=Ease of Excitation–Low Sensory Threshold, AES=Aesthetic Sensitivity

Table 2
Descriptive Statistics and Correlations on all Measures

		Relatedness (Year 1)	Self- Compassion (Year 2)	Sensitivity total (Year 2)	EOE_LST (Year 2)	AES (Year 2)	Anxiety (Year 3)	Depression (Year 3)	Stress (Year 3)
Relatedness (Year 1)	Pearson Correlation	1	.27**	-.14*	-.21**	.06	-.22**	-.22**	-.24**
	Sig. (2-tailed)		<.001	.03	<.001	.33	<.001	<.001	<.001
	N	249	249	249	249	249	249	249	249
Self- Compassion (Year 2)	Pearson Correlation	.27**	1	-.33**	-.39**	-.07	-.28**	-.42**	-.49**
	Sig. (2-tailed)	<.001		<.001	<.001	.26	<.001	<.001	<.001
	N	249	249	249	249	249	249	249	249
Sensitivity total (Year 2)	Pearson Correlation	-.14*	-.33**	1	.92**	.70**	.37**	.30**	.42**
	Sig. (2-tailed)	.03	<.001		<.001	<.001	<.001	<.001	<.001
	N	249	249	249	249	249	249	249	249
EOE_LST (Year 2)	Pearson Correlation	-.21**	-.39**	.92**	1	.35**	.41**	.35**	.45**
	Sig. (2-tailed)	<.001	<.001	<.001		<.001	<.001	<.001	<.001
	N	249	249	249	249	249	249	249	249
AES (Year 2)	Pearson Correlation	.06	-.07	.70**	.35**	1	.13*	.06	.18**
	Sig. (2-tailed)	.33	.26	<.001	<.001		.04	.38	.004
	N	249	249	249	249	249	249	249	249
Anxiety (Year 3)	Pearson Correlation	-.22**	-.28**	.37**	.41**	.13*	1	.60**	.70**
	Sig. (2-tailed)	<.001	<.001	<.001	<.001	.04		<.001	<.001
	N	249	249	249	249	249	249	249	249
Depression (Year 3)	Pearson Correlation	-.22**	-.42**	.30**	.35**	.06	.60**	1	.61**
	Sig. (2-tailed)	<.001	<.001	<.001	<.001	.38	<.001		<.001
	N	249	249	249	249	249	249	249	249

Stress (Year 3)	Pearson Correlation	-.25**	-.49**	.42**	.45**	.18**	.70**	.61**	1
	Sig. (2-tailed)	<.001	<.001	<.001	<.001	.004	<.001	<.001	
	N	249	249	249	249	249	249	249	249

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed)

Hypothesis 1: Levels of relatedness in the first year will positively predict self-compassion in the following year

Starting the analysis procedure, simple linear regression models showed that relatedness in year one could positively predict self-compassion in year two ($r^2 = 0.02, p < .001$).

Hypothesis 2: Gender will have a significant effect on self-compassion in the second year with the expectation that males will show higher levels than females

Males exhibited significantly higher levels of self-compassion than females (Table 1), reinforcing the role of gender as an important influencing factor. Self-compassion values from the second year were used as a reasonable midpoint for assessing its function as a mediator, as they provided a representative score reflecting its development over the first year of high school.

Hypothesis 3: Relatedness in the first year will negatively predict anxiety, depression, and stress in the third year

Using a simple linear regression model, it was revealed that relatedness in the first year negatively predicted anxiety ($r^2 = .05, p < .001$), depression ($r^2 = .05, p < .001$), and stress ($r^2 = .06, p < .001$) in the third year for both genders (see Table 2).

Hypothesis 4: Females will report higher levels of anxiety, depression, and stress in the third year than males

Independent samples t-tests validated that females exhibited higher levels of anxiety, depression, and stress in year three compared to males (see Table 1).

Hypothesis 5: Self-compassion will show a significant mediation effect between relatedness in the first year and anxiety, depression, and stress in the third year

The three-year mediation model using relatedness as predictor, self-compassion as mediator, and anxiety as outcome revealed an observable mediation effect (see Table 3). Relatedness and anxiety showed a significant relationship in general that got influenced by self-compassion in the form of partial mediation.

Table 3
Mediation with Self-Compassion as Mediator (Anxiety)

Mediation Estimates					
Effect	Estimate	SE	Z	p	% Mediation
Indirect	-0.07	0.02	-2.89	0.004	28.5

Mediation Estimates

Effect	Estimate	SE	Z	p	% Mediation
Direct	-0.16	0.06	-2.57	0.01	71.5
Total	-0.23	0.06	-3.63	< .001	100.0

Path Estimates			Estimate	SE	Z	p
T1 BPNSFS Relatedness	→	T2 Self-Compassion total	0.50	0.11	4.40	< .001
T2 Self-Compassion total	→	T3 DASS Anxiety	-0.13	0.03	-3.83	< .001
T1 BPNSFS Relatedness	→	T3 DASS Anxiety	-0.16	0.06	-2.57	0.01

In contrast, the three-year mediation model using relatedness, self-compassion, and depression showed full mediation (see Table 4). Thus, self-compassion overall seemed to have a crucial impact on the relationship between relatedness and depression.

Table 4
Mediation with Self-Compassion as Mediator (Depression)

Mediation Estimates

Effect	Estimate	SE	Z	p	% Mediation
Indirect	-0.12	0.03	-3.66	< .001	48.1
Direct	-0.13	0.07	-1.90	0.06	51.9
Total	-0.26	0.07	-3.52	< .001	100.0

Path Estimates			Estimate	SE	Z	p
T1 BPNSFS Relatedness	→	T2 Self-Compassion total	0.50	0.11	4.40	< .001
T2 Self-Compassion total	→	T3 DASS Depression	-0.24	0.04	-6.57	< .001
T1 BPNSFS Relatedness	→	T3 DASS Depression	-0.13	0.07	-1.90	0.06

When stress was used as the outcome variable, the model indicated partial mediation, highlighting both self-compassion and relatedness as significant factors (see Table 5). Therefore, regardless of the specific facet that was inspected, mental health outcomes consistently depended on self-compassion as a key influencing factor.

Table 5
Mediation with Self-Compassion as Mediator (Stress)

Mediation Estimates

Effect	Estimate	SE	Z	p	% Mediation
Indirect	-0.15	0.04	-3.85	< .001	49.6
Direct	-0.16	0.07	-2.17	0.03	50.4
Total	-0.31	0.08	-3.99	< .001	100.0

Path Estimates			Estimate	SE	Z	p
T1 BPNSFS Relatedness	→	T2 Self-Compassion total	0.50	0.11	4.40	<.001
T2 Self-Compassion total	→	T3 DASS Stress	-0.31	0.04	-7.95	<.001
T1 BPNSFS Relatedness	→	T3 DASS Stress	-0.16	0.07	-2.17	0.03

Hypothesis 6: Sensitivity will serve as a moderating variable both on its own and in conjunction with self-compassion as a mediator between relatedness and anxiety, depression, and stress

To examine the potential moderating effect of sensitivity, scores were collected from a single year, as the literature considers sensitivity a stable personality trait that does not significantly change over time. However, to ensure the best possible alignment with the self-compassion value, it was decided to extract sensitivity levels from year two.

Moderation analyses between relatedness and anxiety using the HSC-21 total score ($z = 0.44, p = .66$) as well as the two sub scores EOE_LST ($z = -0.16, p = .87$) and AES ($z = 1.01, p = .31$) did not yield any significant results. Thus, sensitivity and its varieties were not found to moderate the relationship between relatedness and anxiety. The same model using depression as an outcome also failed to reveal any significant effects when using the HSC-21 total score ($z = 1.39, p = 0.16$) and EOE_LST sub score ($z = 0.32, p = 0.75$). However, AES showed a significant interaction, indicating a moderation effect exclusively for this subscale (see Table 6). It meant that at average and low level of aesthetic sensitivity, people with lower relatedness are likely to have more depression. The magnitude of the effect is illustrated in Figure 1.

Table 6
Moderation with AES as Moderator (Depression)

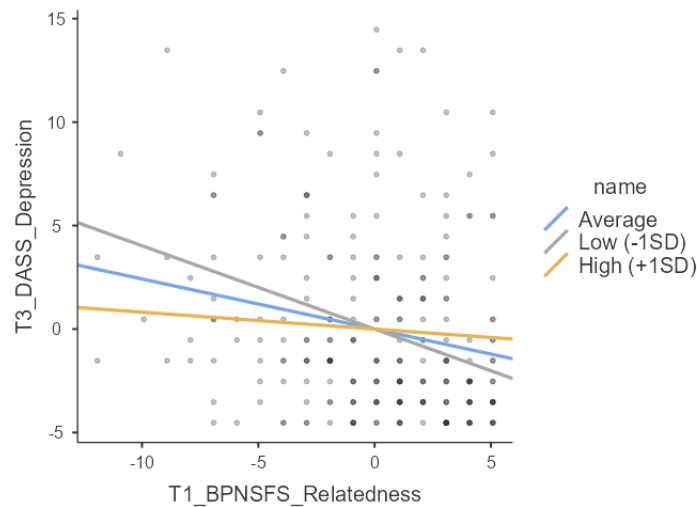
Moderation Estimates				
	Estimate	SE	Z	p
T1 BPNSFS Relatedness	-0.24	0.07	-3.35	<.001
AES	0.04	0.03	1.12	0.26
T1 BPNSFS Relatedness * AES	0.02	0.009	2.26	0.02

Simple Slope Estimates				
	Estimate	SE	Z	p
Average	-0.24	0.07	-3.31	<.001
Low (-1SD)	-0.40	0.10	-4.19	<.001
High (+1SD)	-0.08	0.11	-0.76	0.45

Note. shows the effect of the predictor (T1 BPNSFS Relatedness) on the dependent variable (T3 DASS Depression) at different levels of the moderator (AES)

Figure 1

Simple Slope Plot: Moderation with AES as Moderator (Depression)



Regarding stress, the moderation model using the HSC-21 total score ($z = 5.52e-4, p = 1$), EOE_LST ($z = -0.15, p = .88$), and AES ($z = 0.08, p = .94$) revealed no significant interaction effects with relatedness. Therefore, no moderation was observed between relatedness and stress when considering sensitivity.

Next, moderated mediation analyses were conducted using PROCESS Model 7 (Hayes, 2018) to examine whether the mediated relationships between relatedness from year one and mental health issues from year three through self-compassion from year two were additionally moderated by sensitivity. The index of moderated mediation was not significant for anxiety ($b = .001, SE = .001, 95\% CI [-.001, .003]$), depression ($b = .002, SE = .002, 95\% CI [-.001, .005]$), nor stress ($b = .002, SE = .0021, 95\% CI [-.002, .007]$), according to bootstrap analyses, when using the HSC-21 total factor. The same model was computed replacing the HSC-21 total score with EOE_LST and AES as moderating factors. Regarding EOE_LST, moderated mediations were not significant for anxiety ($b = .001, SE = .001, 95\% CI [-.001, .003]$), depression ($b = .002, SE = .002, 95\% CI [-.002, .007]$), nor stress ($b = .002, SE = .003, 95\% CI [-.003, .008]$). Neither were any significant results discovered for AES in connection with anxiety ($b = .001, SE = .002, 95\% CI [-.002, .005]$), depression ($b = .003, SE = .003, 95\% CI [-.004, .01]$), nor stress ($b = .003, SE = .004, 95\% CI [-.005, .01]$). In sum, these outcomes suggest that the conditional indirect effect of relatedness on mental well-being through self-compassion does not vary significantly as a function of sensitivity.

Hypothesis 7: Gender will moderate the extent to which self-compassion in the second year mediated relatedness from the first year and anxiety, depression, and stress in the third year, respectively

Investigations with computed models analogous to the ones presented above that involved gender also led to insignificant results. Specifically, bootstrap analyses did not reveal any notable effects for a moderated mediation regarding anxiety ($b = -.02$, $SE = .03$, $95\% CI [-.09, .05]$), depression ($b = -.03$, $SE = .06$, $95\% CI [-.16, .09]$), nor stress ($b = -.04$, $SE = .08$, $95\% CI [-.19, .11]$). Thus, gender was not found to significantly moderate the mediated relationship between first-year relatedness and third-year mental well-being through the mediator of second-year self-compassion.

Discussion

The current study presented results that confirmed our beliefs about the significance of relatedness and self-compassion in relation to mental health issues among Swedish high school students. The levels of relatedness reported in the first year of the inquiry positively predicted self-compassion in the following year, thereby supporting hypothesis (1) and corroborating Neff & McGehee's (2010) observations which suggested a positive link between these factors. Moreover, in accordance with hypothesis (2), and in line with previous research (Neff, 2003b; Neff et al., 2005; Yarnell & Neff, 2013), in our study males showed higher levels of self-compassion at the time of measurement compared to females. This implies that female high school students in Sweden tend to be more self-critical than their male counterparts, rendering them generally more susceptible to external pressures and adverse mental health conditions. Consistent with hypothesis (3), relatedness negatively predicted mental health issues in the third year for both genders. However, females overall reported higher levels of anxiety, depression, and stress compared to males, thus replicating previous findings (Bangasser & Valentino, 2014; Kessler et al., 1993; McLean & Anderson, 2009) and supporting hypothesis (4).

Following our expectations from hypothesis (5), the three-year mediation model using relatedness as predictor, self-compassion as mediator, and anxiety as the outcome showed a partial mediation effect. The model was also significant for depression and stress, showing full mediation for depression and partial mediation for stress. Considering the positive effects of both self-kindness and supportive social surroundings on alleviating mental health issues that were reported in previous literature (Turner, 1981; Wickramaratne et al., 2022), this observation solidifies the assumed protective value of these factors. Additionally, the results align with Neff

& McGehee's (2010) findings that self-compassion mediates the link between interpersonal relationships and mental well-being.

In contrast, computations involving sensitivity yielded inconsistent results, thus only partly supporting hypothesis (6). While the simple moderation model showed insignificant results with anxiety and stress as outcome variables, replacing those with depression revealed one significant interaction out of the three scales. Specifically, the AES subscale as a moderator significantly interacted with relatedness in its relationship to depression. Individuals with low and average levels of aesthetic sensitivity (AES) thus appear to be more susceptible to higher levels of depression when experiencing low relatedness. This suggests that low and average AES may act as risk factors, with reduced relatedness contributing to increased depression. The observation is particularly noteworthy as it contradicts previous literature which indicates that highly sensitive individuals are more likely to be negatively affected by adverse external stimuli (e.g., Lionetti et al., 2022; Nocentini et al., 2018; Pluess & Belsky, 2010). Further research will therefore be required to investigate this finding in greater depth. If it proves to be replicable, this new insight could enhance our understanding of the overarching relationship between sensitivity and depression. However, the moderated mediation models collectively did not turn out to be significant. Given the theoretical importance of sensitivity in processing external factors and shaping individual responses (Pluess & Boniwell, 2015), these results seem surprising and indicate that the precise role of sensitivity in moderating the examined aspects remains to be clarified.

Lastly, contrary to hypothesis (7), gender did not moderate the extent to which self-compassion mediated the relationship between relatedness and anxiety, depression, and stress. This outcome underscores that irrespective of gender, self-compassion remains a vital protective factor for mental well-being. As an implication, we therefore recommend that prevention programs for Swedish high school students should focus on developing this trait, as it holds significant potential to enhance mental well-being for both genders. Additionally, incorporating activities that strengthen interpersonal bonding may be beneficial, as relatedness appears to support the development of self-compassion over time. Given that girls generally report lower levels of self-compassion, special attention should be given to promoting this trait among them. Future explorations may reveal whether girls are more likely to benefit from such targeted interventions than boys, given their greater need to cultivate self-kindness.

Limitations

Since all examinations were conducted in Sweden, the generalizability of the presented findings to other countries is limited. Additionally, the total number of participants was

insufficient to analyze complex models or investigate potential combined effects of the moderating factors. Further research is therefore needed to validate the observations made in this study, ideally at different schools in various parts of the world. Given that socialization significantly influences factors such as gender, it would be valuable to determine whether our results are replicated with students from diverse cultural and socioeconomic backgrounds.

Moreover, only one of the numerous moderation analyses was significant, which might be attributable to chance given the large number of tests conducted. Further validation is needed to confirm whether this finding reflects a genuine effect.

Finally, although our study employed a longitudinal design, it did not encompass the complete development of the variables examined. A more comprehensive understanding would require tracking students over multiple school years or throughout their entire educational journey. Incorporating additional factors, such as the selected study tracks, would have exceeded the scope of this study and was therefore not feasible.

Conclusion

This project investigated various factors impacting the relationship between relatedness and mental health among Swedish high school students. Findings revealed that higher levels of relatedness in the first year were positively associated with increased self-compassion in the following year, while also being linked to lower levels of anxiety, depression, and stress in the third year. Self-compassion emerged as a key protective factor, mediating the effects of social support on mental health. In contrast, sensitivity generally did not play a significant role, except for a notable interaction involving the aesthetic sensitivity (AES) factor as a moderator. This interaction significantly affected the relationship between relatedness and depression, suggesting a need for further investigation in this area. Gender differences were also evident, with males reporting higher levels of self-compassion and females experiencing more mental health issues. Nevertheless, irrespective of these discrepancies, self-compassion consistently proved to be a crucial factor in sustaining mental well-being.

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