Investigating the Role of Self-Compassion in the Relationship of

Attention-Deficit/Hyperactivity Disorder and Self-Regulated Learning

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Abstract

Introduction: University students with ADHD symptoms show a disadvantage in academic achievement. High levels of ADHD are associated with less use of Self-Regulated Learning (SRL) strategies. Higher achieving students, who apply these SRL strategies, display higher levels of Self-Compassion (SC). Showing SC might serve as a protective factor for students with ADHD symptoms. **Method:** Data from N=168 participants, who completed the self-report questionnaires MSLQ, SCS, and CAARS-S:L was used to perform regression analyses. In addition, Hayes' (2013) PROCESS Macro for SPSS was used to assess mediation or moderation of SC. **Results:** ADHD symptoms are negatively related to use of SRL strategies as well as to SC. No significant relation was found between SC and SRL. These results are in line with the available literature. In addition, neither the mediation, nor the moderation analysis yielded significant results. **Discussion:** As a whole, SC does not significantly change the relation between ADHD symptoms and SRL in our sample. Further research is recommended in which specific components of the variables are investigated, such as the Inattention symptoms of ADHD and the uncompassionate self-responses component of SC.

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According to the *Diagnostic and Statistical Manual of Mental Disorders* (5th ed.; DSM–5; American Psychiatric Association, 2013), the definition for ADHD is as follows: a persistent pattern of inattention and/or hyperactivity-impulsivity which is developmentally and functionally deficient. Inattentiveness is characterized by failing to direct or maintain attention, difficulty organizing, easily getting distracted by external stimuli. Conversely, Hyperactivity-Impulsivity is characterized by hyperkinesis, often being on the go, and incessant talking. Presentations include Predominantly Inattentive (when criteria for Inattention, but not Hyperactivity/Impulsivity are met in the last six months), Predominantly Hyperactive/Impulsive (when criteria for Hyperactivity/Impulsivity, but not Inattention are met in the last six months), and Combined Presentation (both Inattentiveness and Hyperactivity-Impulsivity criteria are met in the last six months). Specifications include Partially in Remission, and Mild, Moderate or Severe regarding current severity. In this definition, current worldwide prevalence estimates in adults are around 2.5% (Faraone et al., 2021).

From as early as the eighteenth century, physicians and other professionals involved in mental health have observed symptoms of ADHD, and reported that these symptoms diminished with age (Crichton, 1798, taken from Lange et al., 2010). Whether adults with ADHD displayed more severe symptoms as a child or not, there are evident functional deficits that adults with ADHD symptoms face, resulting in issues with occupation, social functioning, and in family settings (Döpfner et al., 2021). Adults diagnosed with ADHD as a child, have been shown to be at higher risk of developing a variety of mental issues, such as substance use disorder, antisocial disorders, mood disorders, and anxiety disorders. Additionally, they are reported to be at higher

risk of unwanted pregnancy, arrest, committing suicide, and academic underperformance (Erskine et al., 2016). Children with an ADHD diagnosis are less likely to finish high school, and thus follow tertiary education. If, as adults, they do attend university, they are more likely to get suspended or expelled, and will more likely stay back a grade (Erskine et al., 2016). In their review, Daley & Birchwood (2010) found that across the developmental spectrum, ADHD characteristics of inattention and executive dysfunction (e.g. difficulty planning, self-monitoring and managing time) are associated with academic issues. Considering this, students with high levels of ADHD symptomatology may be at a disadvantage in academic settings. In addition, prevalence of above threshold ADHD symptomatology in university students is estimated higher than its worldwide prevalence, between 7.6% and 15.9% (Davis et al., 2011; Kwak et al., 2015; Roshani et al., 2020).

This population of college students with ADHD struggles to regulate themselves effectively for academic achievement. Students with ADHD learn better when the material is novel, interesting, challenging, and salient. They reportedly show a motivational deficit in that they prefer easy work, like learning less, are less persistent in their study behavior, and rely more on external rather than internal standards to judge their performance (Carlson et al., 2002). Inadvertently, college students with ADHD symptoms might face great difficulty in regulating their study behavior and successfully completing their tertiary education. As Zimmerman & Martinez-Pons (1986) have shown, high academic achievers use more self-regulatory learning (SRL) strategies, such as monitoring their progress and planning, than do low achievers. Given that poorer academic achievement seems to be a well-known phenomenon in (adult) ADHD populations, it could be inferred that higher ADHD symptoms are associated with less use of SRL strategies.

Correspondingly, this relationship was studied by Shelton et al. (2019), who, by using the Motivated Strategies for Learning Questionnaire (MSLQ), have indeed shown that the inattention component of ADHD in college students negatively predicted all aspects of SRL. Firstly, *Expectancy* is the aspect of SRL that encompasses the belief that academic success stems from internal effort, task mastery appraisals, and task performance expectation. Then, *Value* refers to a task's internal value, perceived importance, and usefulness of accomplishing academic tasks. Thirdly, *Self-Regulation strategies* indicate the use of self-regulated learning strategies, such as planning, monitoring, and maintaining effort while studying uninteresting material or when distracted. Shelton and colleagues (2019) show that on average university students with a greater degree of inattention symptoms seem to apply fewer SRL strategies. The use of SRL strategies and academic performance can be improved by utilizing SRL interventions (Theobald, 2021), though one must be cognitively and intellectually able to study the material at hand – abilities in which students with ADHD seem to have no meaningful deficit (Barkley, 2006). Given that academic achievement requires effective expectation management, value appraisals and resource management, students with ADHD appear to be at a disadvantage.

Interestingly, higher levels of academic self-efficacy, less attributions of academic disappointment to bad luck, lack of effort or lack of ability, and more effective use of resources are associated with individuals who show higher levels of Self-Compassion (SC; Martin et al., 2019). SC is compassion shown to the self out of feelings of interconnectedness and equality to other (Brown, 1999, taken from Neff, 2003a). The concept comes from Eastern philosophy, and is defined as involving "*...being touched by, and open to one's own suffering, not avoiding or disconnecting from it, generating the desire to alleviate one's suffering and to heal oneself with kindness(...)offering nonjudgmental understanding with regards to one's pain, inadequacies and*

failures, so that one's experience is seen as a part of the larger human experience" (Neff, 2003a, p. 87). The dimensional components of SC are as follows: self-kindness versus self-judgment, common humanity versus isolation, and mindfulness versus overidentification (Neff, 2003a; Neff, 2003b). In its totality SC could be interpreted as recognizing and welcoming failures and mistakes that you make, instead of negatively judging yourself for them, realizing that this is part of life and everyone deals with similar experiences of mistake and failure, and not regarding them as a failure of you as a person (Beaton et al., 2020).

Self-kindness, feelings of common humanity and mindfulness are not commonplace to people who receive systematic scrutiny from others for their behavior. Systematic external scrutiny has been argued to contribute to directing negativity to the self (Thompson, & Zuroff, 1999a, 1999b), and in turn might solidify into a negative intrapersonal style over the course of many years. And indeed, research has shown that people with ADHD show less self-compassion, by considering themselves "wrong" or "not normal" (Brod et al., 2012), or participate in discourse concerning failure and self-criticism (Guntuku et al., 2019). Beaton et al. (2020) confirmed that SC is correlated with symptoms of ADHD, and not with the diagnosis itself: higher levels of perceived criticism are associated with lower levels of SC. Additionally, self-compassion partially contributes to ill-being as well as well-being in individuals with ADHD (Beaton et al., 2022).

SC is characterized by a lack of wanting to boost one's self-image out of neurotic considerations, and instead goes hand in hand with compassionate motivation to improve one's performance and well-being (Neff et al., 2005). High SC individuals seem to be at an advantage in regulating themselves emotionally in academic settings versus low SC individuals, which, as mentioned previously, might also affect those who display high levels of ADHD symptoms.

Moreover, SC entails being loving towards yourself, which proves to be harder for self-critical people who have faced repeated external criticism for their behavior in the past, like people with ADHD (Neff et al., 2005). Partially in line with this, Shahar et al. (2003), showed that there is a negative predictive relationship between self-criticism and adolescents' autonomous self-regulation. In addition, the feelings of common humanity within SC, as well as managing resources in SRL, emphasize the need for social connectedness, which is something people with ADHD report they lack, as shown in correlational research by Kiraz & Sertçelik (2021). And Willoughby and Evans (2019) found no significant relationship between self-compassion and SRL in a sample of students with self-identified learning disability and/or ADHD. The above studies provide ample reason to hypothesize that levels of self-compassion and use of self-regulated learning strategies significantly positively relate to each other.

Altogether, individuals with ADHD symptoms who experience deficits in SRL might see these deficits strengthened by lower levels of SC and increased self-criticism. Higher levels of ADHD symptomatology are associated with less SC (Neff et al., 2005), which mediates the relationship between ADHD traits and well-being, increasing distress levels (Farmer et al., 2023). In addition, self-criticism has been linked to decreased autonomous self-regulation (Shahar et al., 2003). Interventions targeting increases in SC, however, have shown to enhance emotion regulation and increase well-being (Kiraz & Sertçelik, 2021), potentially mitigating the adversities associated with increased levels of ADHD symptomatology. Therefore, SC might function as a protective factor for individuals with ADHD who struggle to self-regulate their learning process.

The Present Study

The present study will use a dimensional approach to ADHD symptoms. Heidbreder (2015) argues that ADHD symptoms are best seen as a spectrum, or conceptualized dimensionally, because of the high comorbidity rates in people with ADHD, the pillar symptoms of the disorder being transdiagnostic, and an abundant presence of subthreshold symptomatology. Hence, the dimensional approach to symptoms of ADHD is chosen, meaning that participants will not be categorized based on the presence or absence of an ADHD diagnosis. I expect self-compassion to be a protective factor in the relationship between ADHD symptoms and self-regulated learning, based on the above research. Strengthening that expectation are the findings that ADHD symptomatology is associated with increased emotional suffering (Kessler et al., 2006), increased criticism from others, less self-compassion (Beaton et al., 2020), and less use of SRL strategies (Shelton et al., 2019). Therefore, I hypothesize that (1) higher ADHD symptomatology is negatively related to SRL, as well as (2) self-compassion. Furthermore, I expect (3) low levels of self-compassion to be associated with low levels of SRL, and that (4) self-compassion has a mediating or moderating effect on the relationship between ADHD and SRL.

Methods

Participants

The sample of our study consisted of first-year students from the Dutch and International tracks of the Psychology Bachelor's Degree program of the Rijksuniversiteit Groningen. The participant recruitment was facilitated through the Experiment Management System (SONA), serving as an integral component of the students' coursework. Participation was entirely

voluntary and as a compensation for the involvement in the study all participants received a small amount of course credits (SONA credits) needed for the completion of their class.

Prior to involvement in the present study, participants underwent a self-report assessment on ADHD symptomatology in a separate study (see materials section). Inclusion criteria for the current study were English language proficiency and presence of the self-report assessment on ADHD symptoms from the previous study. The sample consisted of N = 237 participants, but 69 were excluded from the analysis for reasons such as incomplete data or failure to correctly answer the honesty/attention question and the inconsistency/infrequency index (see materials section). This resulted in a final sample of N = 168, of which 22.5% were male (n=38), 75.7% female (n=128), and 1.8% other (n=3). The mean age was 19.7.

Materials

Motivated Strategies for Learning Questionnaire

The Motivated Strategies for Learning Questionnaire (MSLQ) investigates both motivational and cognitive components of academic learning strategies (Pintrich, 1995). The sum of this self-reported instrument includes 85 items, which were designed to measure the attitudes and learning strategies (Wang et al., 2022). In our study, the questions referred to the course Introduction to Psychology (English track) or Overzicht in de psychologie (Dutch track). Items are scored through a 7-point Likert-type scale ranging from 1 (not at all true of me) to 7 (very true of me). The MSLQ is divided into 15 different subscales. The questionnaire contains a motivation section that measures the goals of value beliefs for a course, students' perceptions of their capacity to succeed in a course and their anxiety surrounding course exams. The motivation section is measured within six different sub-scales. From the motivations scale we use the subscales Value and Expectancy. The MSLQ also contains a learning strategies section, which

includes the items regarding students' use of different cognitive and metacognitive strategies and items concerning student management of different resources. From this section we only use the subscale Cognitive and Metacognitive Strategies (Duncan & McKeachie, 2005) (Hilpert et al., 2013).

According to Hilpert at al. (2013) the MSLQ proves to have an internal consistency rating ranging from .83 to .92. Furthermore, the MSLQ shows predictive validity when compared to the questionnaire outcome with the final attainable grade. However, the correlation has a modest value (Shelton et al., 2019).

Connor's Adult ADHD Rating Scale and Infrequency Index

Connor's Adult ADHD Rating Scale (CAARS) is a questionnaire used to measure a cross-section of symptoms and behaviors that are related to ADHD in adults (Conners et al., 1999). Different versions of the CAARS exist. There are short or long versions, and self-report or observer ratings. In the current study the CAARS-S:L was assessed, which is the self-report long form.

The CAARS-S:L consists of 66 items with nine subscales of four factor-derived subscales, three symptom measures according to the DSM-IV (APA, 1994), an ADHD Index and an Inconsistency Index subscale. To measure ADHD symptoms, the subscale *CAARS DSM Total* (based on the DSM-IV) is used. This measures the total amount of ADHD symptoms without differentiation between the inattentive or hyperactive-impulsive symptoms (APA, 1994).

The Inconsistency Index is constructed to evaluate inconsistency in responding to items that measure related content (e.g., 'I'm disorganized' and 'I'm absent-minded in daily activities'). The items are measured on a 4-point Likert-scale from (0 = Not at all, never; 1 = Just a little, once in a while; 2 = Pretty much, often, 3 = Very much, very frequently). The self-report

forms were normed on a large sample of nonclinical adults (*N*=1.026) ranging from 18 to 72 years old.

The CAARS-S:L has shown to be a valid measure of ADHD symptoms. According to Conners et al., (1999) the test met the criteria for good fit, and the intercorrelations of the subscales provided support for the multidimensionality of the CAARS. Both indicate factorial validity. The four factor-derived subscales and the ADHD Index were assessed for discriminant validity with both showing good results (the former 85% overall correct classification and the latter 73% overall correct classification) (Conners, 1999). Lastly the construct validity was evaluated by looking at the relationship between; childhood and current symptoms; and self-report and observer ratings. Both cases support the argument that the CAARS has a good construct validity (Conners, 1999). For the target population, the DSM-IV Total scale serves as an appropriate measure. Lefler et al. (2021) discovered that a unidimensional model (as opposed to a two or three-factor model that differentiates between hyperactivity, impulsivity, and attention) is most suitable for analyzing the population of college students.

The CAARS-S:L does not include a measure to assess noncredible self-report. The included Inconstancy Index only measures inconsistency in responding to items that measure the same content. An Infrequency Index for CAARS (CII) was therefore designed by Suhr et al. (2010). According to their research it is not difficult for a motivated participant to identify the ADHD symptoms and to simulate having these, which makes it necessary for an additional instrument that measures this potential overreporting (Suhr et al., 2010). The constructed CII was found to have a good internal consistency with a Cronbach's Alpha of .86. Using a cutoff score of 20 was found to give the best results, being specific and relatively sensitive to an external

criterion of validity, noncredible cognitive performance. The use of the CII adds 15 items to the CAARS-S:L making it a questionnaire with a total of 81 items.

The reliability of the CAARS-S:L has proven to be good. The internal consistency of the subscales found in the original study by Conners and colleagues (1999) gives support for this claim, ranging from .64 to .91. The mean inter-item correlations also provide support for the reliability ranging from .14 to .64 in the original study (Ehardt & Sparrow, 1999). Finally, the test-retest reliability for the CAARS-S:L was originally evaluated with 61 individuals, with an interval of one month. The results showed only significant correlations ranging from .80 to .91. Because the present study only assessed the questionnaire once, no test-retest reliability could be measured. The mean inter-item correlations, ranging from .14 to .64 in the original study by Conners et al. (1999) support the reliability of the measure. Additionally, the test-retest reliability of the CAARS-S:L was initially assessed with a sample of 61 individuals over a one-month interval, revealing consistently significant correlations between .80 and .91. Test-retest reliability could not be evaluated since it is a cross-sectional study.

Self-Compassion Scale

Self-compassion was measured by the long version of the Self-Compassion-Scale (SCS) invented by Neff (2003), which was developed by using an undergraduate sample with the average age of 21,3 years (N=71). The SCS is a self-report scale and consists of 26 items using a 5-point Likert-scale from 1 (Almost never) to 5 (Almost always). These 26-items are compartmentalized in six factors that measure self-kindness, self-judgment, common humanity, isolation, mindfulness, and over-identification. A confirmatory factor analysis (CFA) found an adequate fit to a six-factor inter-correlated. Additionally, a CFA found a marginal fit to a single higher order factor that could explain the inter correlations between subscales (Neff, 2003).

Further, the internal consistency for the 26-Items in the original study was found to be .92 (Neff, 2003). In addition, test-retest reliability of the SCS showed solely significant correlations ranging from .80 to .93 (Neff, 2003). Besides that, SCS could demonstrate internal reliability across different studies (e.g., Allen et al. 2012; Neff and Pommier 2013; Werner et al. 2012, as cited in Neff, 2016).

Moreover, the predictive validity could be demonstrated by investigating self-compassion as an independent variable on wellbeing (Neff, 2003). Furthermore, the SCS encompasses a high group validity, as tested by comparing a sample of practicing Buddhists with a sample of undergraduate students. The group of Buddhists did score higher on self-compassion than the undergraduates (Neff, 2003). Additionally, the SCS shows a good discriminative validity to other self-attitude scales who tested for concepts of self-esteem and narcissism (Neff, 2003).

Procedure

The study was reviewed and approved by the Ethical Committee of Psychology at the University of Groningen (PSY-2021-S-0054), as a study conducted in the context of a Bachelor's Thesis project. Participants were recruited via the first-year practicum platform SONA, allowing participants to acquire course credits. Only those participants whose demographic information was collected, and whose ADHD symptoms were assessed with the CAARS-S:L (Conners et al., 1999) in the previous studies "PSY-2122-S-0006 Parts 1 & 2" were eligible to participate in the current study. The participants signed the informed consent form, stating that they consent to participation in the current study, as well as connecting it to the previous studies they participated in. Administration of the study happened digitally, via Qualtrics (https://www.qualtrics.com), participants were briefed about the study, then signed informed consent forms, and subsequently were able to begin the questionnaire parts of the study. Firstly, they completed the MSLQ, then

the SCS, and thirdly they optionally, after consent, provided their grade on the course

Introduction to Psychology/Inleiding in de Psychologie (PSBE1-01/PSBA1-01, respectively).

Before ending the survey, participants were asked to confirm whether they had answered

seriously and honestly and whether they would allow us to use their data in our research. The

ending screen saw them being instructed to click the red arrow in order to receive their SONA

credits.

Statistical analysis

For the statistical analysis I relied on several assumptions for linear and multiple

regression (see Appendix A). The additional computational tool compatible with SPSS,

PROCESS Macro, developed by Hayes (2013), was used to statistically analyze the relationships

between our variables of interest, as shown in Appendix B.

Firstly, by using simple linear regression I investigated the hypothesized negative

association between CAARS DSM Total and MSLQ. Subsequently, I examined the hypothesized

negative relationship between CAARS DSM Total and SCS, followed by testing the third

hypothesis of a positive association between SCS and MSLQ.

Finally, I explored the mediation and moderation models. The mediation effect was

assessed by analyzing both the total effect (path c) and the direct effect (path c') (see Appendix

B) of CAARS DSM Total on MSLQ, as well as paths a and b using the PROCESS Macro

(Hayes, 2013). In order to establish mediation, paths a, b and c must be statistically significant,

and path c' must be closer to zero than path c (Hayes & Rockwood, 2017). Moderation was

investigated by examining the interaction effect of (CAARS total scores x MSLQ total scores).

Moderation can be established when the interaction term in (ADHDxSC) is statistically

significant (Hayes & Rockwood, 2017). For this analysis, SC was reversed, in order to bring the independent variables on the same directional level.

Results

Descriptive statistic and bifactorial correlations are summarized in Appendix D. A simple linear regression revealed the following significant model (β = -.014, p = .007), with 4.3% of the variance explained (R^2 = .043, F(1, 166) = 7.41). This is in support of hypothesis 1, indicating that higher levels of ADHD symptoms are associated with less use of SRL strategies. A second simple linear regression analysis yielded the following significant model (β = -.019, p < .001), explaining 7.0% of the variance in SRL (R^2 = .070, F(1, 166) = 12.41). This provides support for hypothesis 2, confirming a negative association between ADHD symptoms and self-compassion, indicating that higher levels of ADHD symptoms are associated with lower levels of self-compassion. A third linear regression of SC on SRL, controlling for ADHD symptoms, yielded the following nonsignificant model (β = .085, R^2 = .008, F(1, 166) = 1.41 p = .24), disconfirming the third hypothesis, and showing no support for a significant positive association between SC and SRL. Regarding hypothesis 4, testing for mediation using Hayes' (2013) PROCESS macro provided the following paths: path c (β = -.014, p = .007), path a (β = -.019, p < .001), path b (β = .037, p = .61), and path c' (β = -.013, p = .014). Since not all paths are significant, SC cannot be regarded as mediating the relationship between ADHD and use of SRL strategies. Testing for moderation provided a significant model, R^2 = .052, F(3, 164) = 2.97, p = .034, which included ADHD symptoms (b = .02, p = .55), Self-Compassion (b = .11, p = .46) and an interaction term (ADHDxSC; b = -.01, p = .26). All terms in the moderation model were nonsignificant, providing no evidence for moderation.

Discussion

The current study investigated students' use of Self-Regulated Learning Strategies and how their levels of ADHD Symptoms and Self-Compassion relate to their use of these strategies.

In the present sample, higher levels of ADHD symptomatology are related to significantly less use of SRL, supporting the first hypothesis. This partially replicates Shelton et al. (2019), in which Inattention is significantly negatively related to all MSLQ subscales, and Hyperactivity/Impulsivity to two out of three subscales. Since the present study considered the full-scale ADHD scores and the total MSLQ scores, it is only a partial replication. In combination with the known literature, these results indicate that indeed more ADHD symptoms mean less use of SRL. In turn, less use of SRL is associated with poorer academic performance in people with ADHD (Stevens et al., 2022).

Moreover, the current study showed that increased levels of ADHD Symptomatology was associated with lower levels of Self-Compassion in university students, which supported the second hypothesis. This is in line with previous studies, such as Willoughby & Evans (2019), who show that people with an ADHD diagnosis score lower on SC. This finding is strengthened by Beaton et al. (2020), who found that not only people with an ADHD diagnosis, but also those with high levels of ADHD Symptoms score lower on the SCS. But Self-Compassion can be taught/learned, which might go paired with a decrease in ADHD symptom severity, and an increase in well-being (Beaton et al., 2022). Future research might investigate which aspects of self-compassion contribute to ameliorating mental health in people with ADHD.

The analysis testing the third hypothesis provided no evidence for an association between Self-Compassion and Self-Regulated Learning behavior. This outcome is in line with Willoughby & Evans (2019), who found no significant relationship ($r = .15$, $p = .19$) between

Self-Compassion and Learning Strategies. This replication indicates a potential absence of a relationship between Self-Compassion and use of SRL strategies. Conversely, Shahar et al. (2003) found that self-criticism negatively relates to autonomous self-regulation in adolescents. Though this is a seemingly contrasting finding, the population (adolescents instead of adults) and constructs (self-criticism instead of SC, self-regulation instead of SRL) differ from the current study. Therefore a direct comparison cannot be made. Altogether, the third hypothesis was not confirmed, indicating a potential lack of a true relationship between SC and SRL.

Both the mediation and moderation analysis show that there is no mediation or moderation effect found, which leads to the conclusion that considering Self-Compassion does not meaningfully change the observable relationship between ADHD symptoms and use of SRL strategies. Despite these nonsignificant results, it is nevertheless possible that specific aspects of SC might mediate the relationship between ADHD symptoms and SRL. High levels of ADHD symptoms are associated with uncompassionate self-responding (USR), which in turn positively relates to distress and negatively to well-being (Farmer et al., 2023). In turn, investigating the potential mediating role of USR on the relationship between ADHD symptoms and SRL is warranted.

Other studies considering the current variables have shown similar outcomes (Beaton et al., 2020; Shelton et al., 2019; Willoughby & Evans, 2019). This study investigated how the variables interact together, while partially replicating previous research. Further research is needed to dive deeper into the subject matter, not exclusively by studying how the subscales of the three concepts relate to each other. For example, Shelton et al. (2019), showed that Inattention explains more variance in usage levels of SRL strategies than did Hyperactivity/Impulsivity. Researching how this predictive relationship interacts with the

different subscales of self-compassion might also expand our understanding, although since it requires more advanced statistical techniques, such as Structural Equation Modeling, it goes beyond the scope of the current project.

The current study has three notable strengths. Firstly, The large sample size grants statistical power and therefore a smaller chance of a Type I or Type II error. Secondly, investigating this population and its self-regulatory learning behavior, combined with the dimension of ADHD symptoms, provides a valuable insight into how students navigate tertiary education. This is the case, because the current results suggests that not SC as a whole, but possibly specific aspects of it, such as USR are involved in the relationship between ADHD symptoms and effective use of SRL strategies in the current sample. This finding provides a direction for future research. Lastly, another strength of the study lies in the use of validated questionnaires for self-report research. Using self-report questionnaires allows for comparison on a large scale in a relatively practical manner. Additionally, the use of validated questionnaires and strict exclusion of unreliable responses makes the self-reported nature of our data more valid, despite some well-known pitfalls of self-report research.

In contrast to the aforementioned strengths, two limitations are notable. Firstly, one of the current study's limitations is that it compares full scale scores from all questionnaires, but does not investigate the specific components of all constructs. This is a limitation, as evidence pointed towards more nuanced relationships between the constructs (Shelton et al., 2019). Consequently, conducting analysis of the subscales of the acquired data might yield more nuanced results. A second limitation of the study is that the current sample is very homogenous, which might raise population validity concerns. The sample consists of first year psychology students in Groningen, mostly with western backgrounds, who are still in the process of adjusting to

academia. Therefore, it would be warranted to conduct similar studies with other student populations. Examples might include year two and three students, master's degree students, and PhD students, as well as students from different degree programs and predominantly nonwestern backgrounds.

Conclusion

The present study has considered the relationship between ADHD symptoms, Self-Compassion and the use of Self-Regulated Learning Strategies. Although ADHD symptoms are indeed related to SC, as well as to SRL, SC has no significant relation to SRL. This study is the first to address this relationship in a sample of first year university students, while keeping a dimensional approach to ADHD. The current study partially replicates the relationship found between ADHD and SRL (Shelton et al., 2019), and stimulates our curiosity on how SC relates further to ADHD and SRL. Standardized, validated self-report questionnaires were used on a moderately sized sample, granting enough statistical power. However, its homogeneity warrants replication in broader samples. For future research, advanced statistical modeling of subscales of the investigated constructs would provide a more nuanced analysis.

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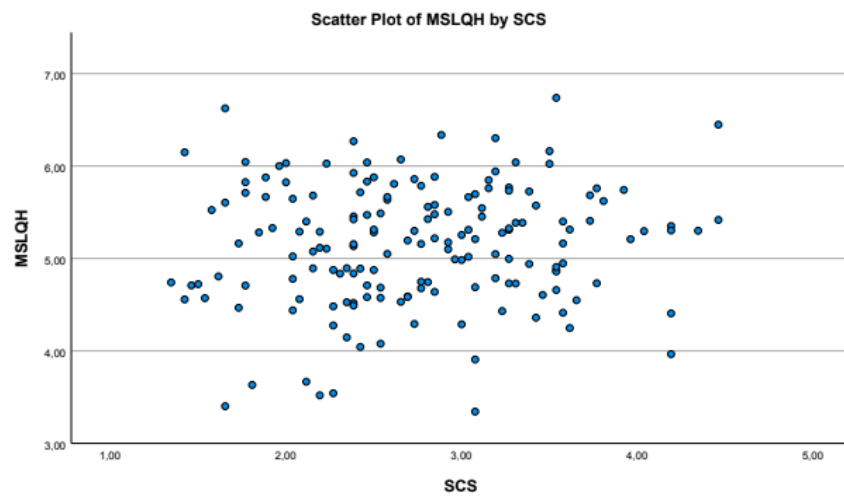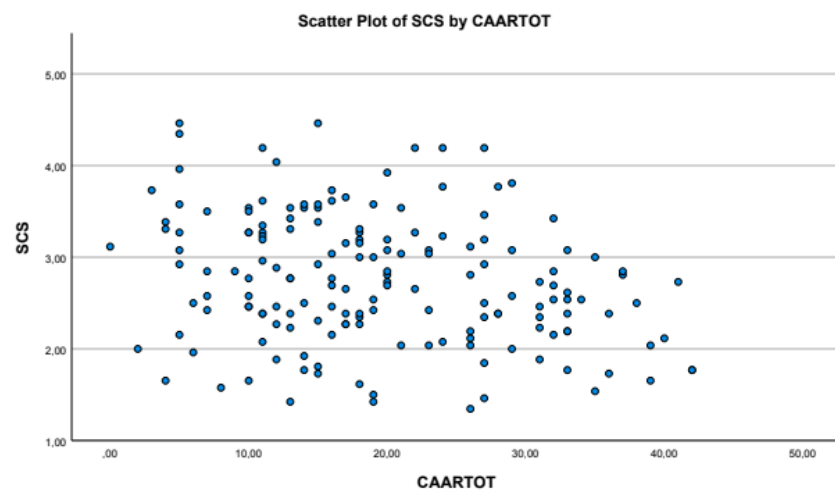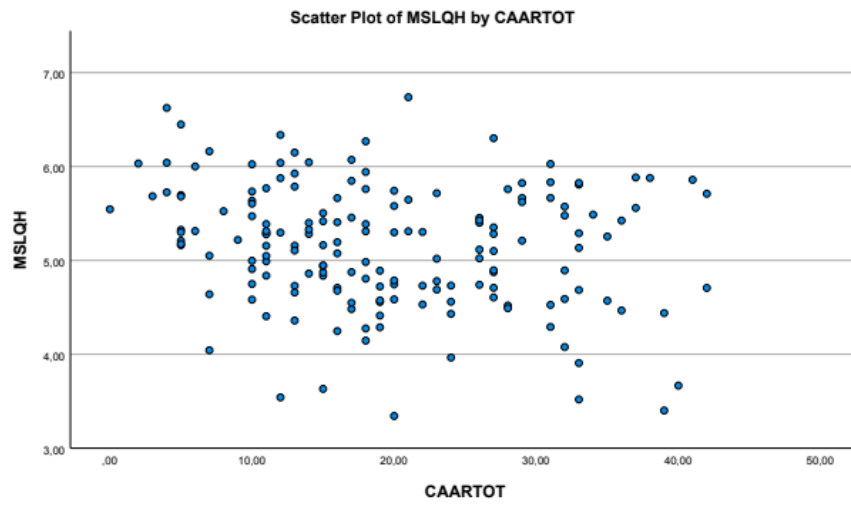   https://doi-org.proxy-ub.rug.nl/10.1111/ldrp.12209

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Appendix A

Assumption checks:

Linearity:

Scatter Plot of MSLQH by CAARTOT

Scatter Plot of SCS by CAARTOT

Scatter Plot of MSLQH by SCS

For the independence of errors check, the Durbin-Watson value is 2.034. No autocorrelation.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	,210[a]	,044	,033	,63878	2,034

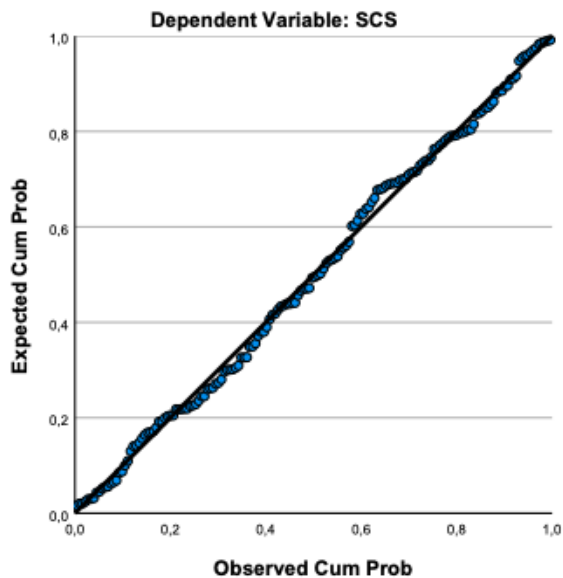a. Predictors: (Constant), CAARTOT, SCS
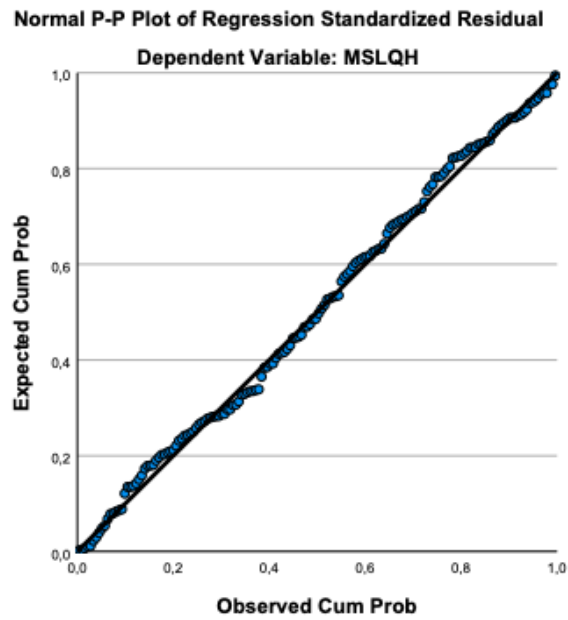b. Dependent Variable: MSLQH

For the homoscedasticity check, no clear pattern was observed, which suggests homoscedasticity.

**Normal P-P Plot of Regression Standardized Residual**

Dependent Variable: MSLQH

Normal P-P Plot of Regression Standardized Residual

Dependent Variable: SCS

29

Normal P-P Plot of Regression Standardized Residual

Dependent Variable: MSLQH
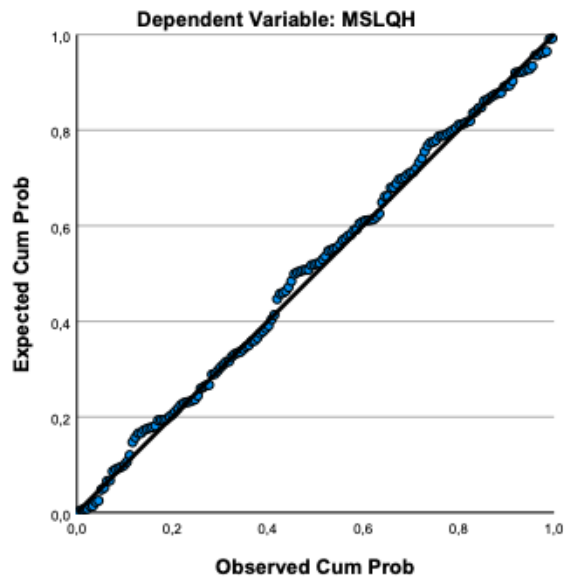
Normality of residuals: both indicate approximate normality of the residuals.

Normal P-P Plot of Regression Standardized Residual

Dependent Variable: MSLQH

Histogram

Dependent Variable: MSLQH

Mean =1,93E-15
Std. Dev. =0,994
N =168

Frequency (y-axis)

Regression Standardized Residual (x-axis)
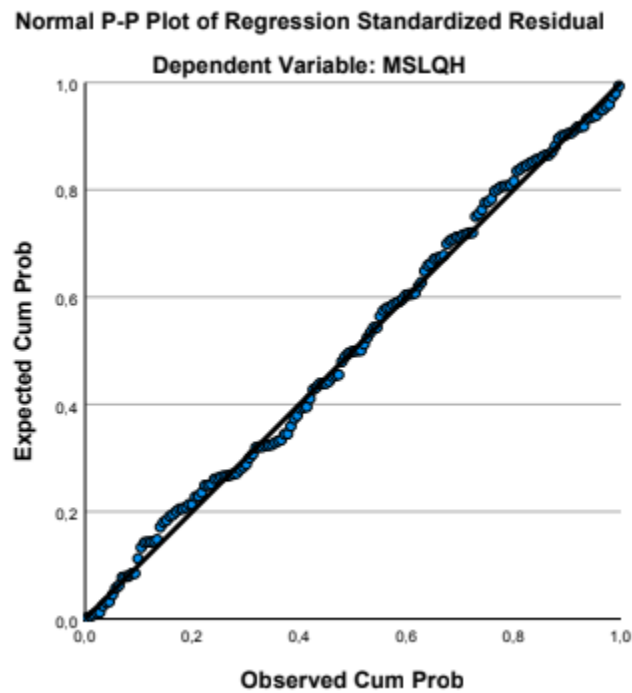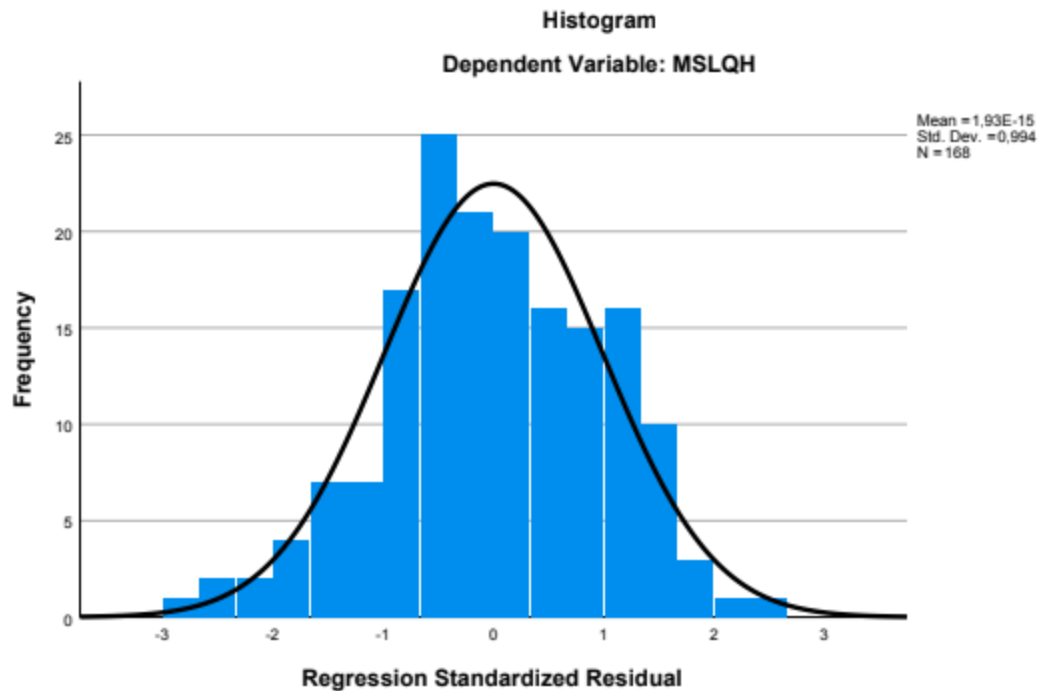
Multicollinearity: VIF 1.075, Tolerance .930. VIF values are below 2, hence no multicollinearity.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics
		B	Std. Error	Beta	t	Sig.	Tolerance
1	(Constant)	5,524	,237		23,290	<,001	
	SCS_M_R	-,037	,073	-,040	-,511	,610	,930
	CAARTOT	-,013	,005	-,196	-2,485	,014	,930

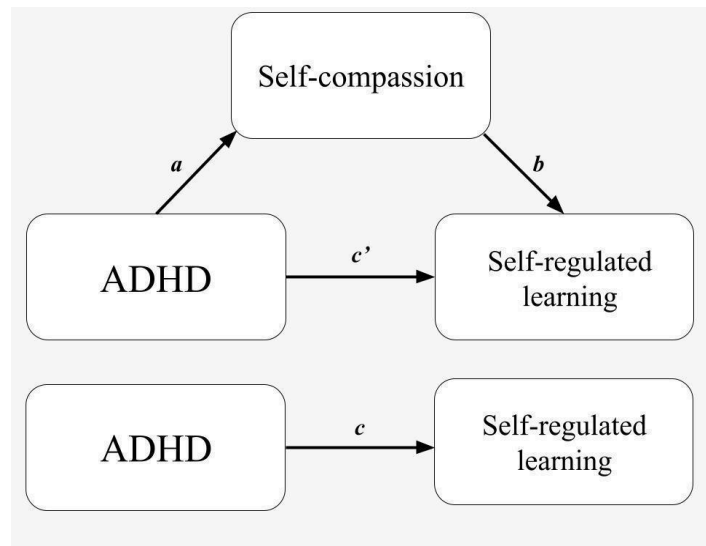| Model		Collinearity Statistics
		VIF
1	(Constant)	
	SCS_M_R	1,075
	CAARTOT	1,075

a. Dependent Variable: MSLQH

No outliers in the final sample.

Appendix B
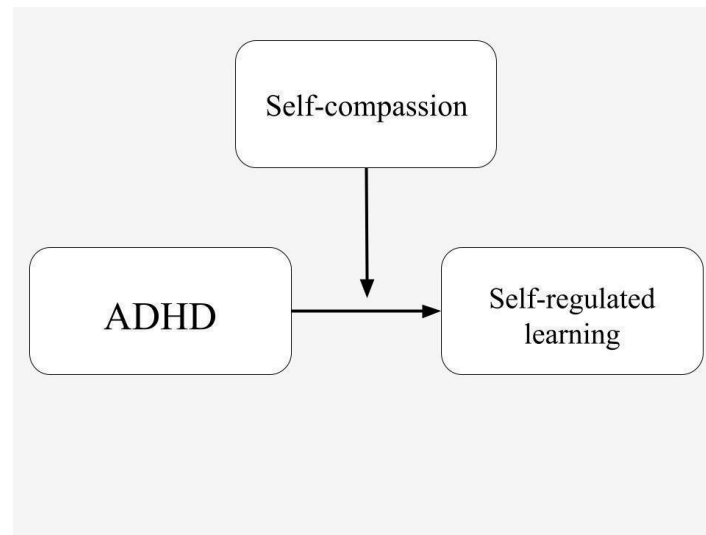
The hypothesized moderation model.

The hypothesized mediation model with corresponding paths.

Appendix C

The following is the output from the Hayes PROCESS Macro for SPSS; the mediation analysis and moderation analysis, respectively.

Mediation:

```
Run MATRIX procedure:

*************** PROCESS Procedure for SPSS Version 4.2 beta ***************

         Written by Andrew F. Hayes, Ph.D.       www.afhayes.com
    Documentation available in Hayes (2022). www.guilford.com/p/hayes3


**************************************************************************
Model  : 4
    Y  : MSLQH
    X  : CAARTOT
    M  : SCS_M_R

Sample
Size:  168


**************************************************************************
OUTCOME VARIABLE:
 SCS_M_R

Model Summary
         R        R-sq        MSE          F        df1        df2          p
     ,2637       ,0695      ,4606    12,4065     1,0000   166,0000      ,0006

Model
              coeff         se          t          p       LLCI       ULCI
constant     2,8822      ,1161    24,8341      ,0000     2,6531     3,1113
CAARTOT       ,0188      ,0053     3,5223      ,0006      ,0083      ,0293


**************************************************************************
OUTCOME VARIABLE:
 MSLQH

Model Summary
         R        R-sq        MSE          F        df1        df2          p
     ,2103       ,0442      ,4080     3,8192     2,0000   165,0000      ,0239

Model
              coeff         se          t          p       LLCI       ULCI
constant     5,5243      ,2372    23,2901      ,0000     5,0560     5,9927
CAARTOT      -,0129      ,0052    -2,4851      ,0139     -,0232     -,0027
SCS_M_R      -,0373      ,0731     -,5113      ,6098     -,1816      ,1069


****************** DIRECT AND INDIRECT EFFECTS OF X ON Y ******************

Direct effect of X on Y
```

```
     Effect          se           t           p        LLCI        ULCI
     -,0129        ,0052     -2,4851       ,0139      -,0232      -,0027

Indirect effect(s) of X on Y:
           Effect      BootSE    BootLLCI    BootULCI
SCS_M_R    -,0007      ,0015      -,0043       ,0020


*********** BOOTSTRAP RESULTS FOR REGRESSION MODEL PARAMETERS ************

OUTCOME VARIABLE:
 SCS_M_R

           Coeff    BootMean     BootSE    BootLLCI    BootULCI
constant   2,8822     2,8841      ,1193      2,6530      3,1264
CAARTOT     ,0188      ,0187      ,0050       ,0085       ,0283


----------

OUTCOME VARIABLE:
 MSLQH

           Coeff    BootMean     BootSE    BootLLCI    BootULCI
constant   5,5243     5,5208      ,2376      5,0493      5,9848
CAARTOT    -,0129     -,0128      ,0058      -,0244      -,0017
SCS_M_R    -,0373     -,0372      ,0777      -,1936       ,1114


*********************** ANALYSIS NOTES AND ERRORS ***********************

Level of confidence for all confidence intervals in output:
  95,0000

Number of bootstrap samples for percentile bootstrap confidence intervals:
  5000

------ END MATRIX -----
```

Moderation

```
Run MATRIX procedure:

*************** PROCESS Procedure for SPSS Version 4.2 beta ***************

        Written by Andrew F. Hayes, Ph.D.       www.afhayes.com
    Documentation available in Hayes (2022). www.guilford.com/p/hayes3

**************************************************************************
Model  : 1
    Y  : MSLQH
    X  : CAARTOT
    W  : SCS_M_R

Sample
Size:  168

**************************************************************************
OUTCOME VARIABLE:
 MSLQH

Model Summary
          R        R-sq        MSE         F         df1        df2          p
      ,2270       ,0515       ,4074     2,9711     3,0000    164,0000       ,0335

Model
             coeff         se          t          p        LLCI       ULCI
constant    5,0277       ,5015    10,0247       ,0000      4,0374     6,0180
CAARTOT      ,0157       ,0260       ,6031      ,5473      -,0356      ,0669
SCS_M_R      ,1124       ,1520       ,7398      ,4605      -,1876      ,4125
Int_1       -,0084       ,0075     -1,1237      ,2628      -,0232      ,0064

Product terms key:
 Int_1    :         CAARTOT   x        SCS_M_R

Test(s) of highest order unconditional interaction(s):
      R2-chng          F         df1         df2           p
X*W      ,0073      1,2627      1,0000    164,0000       ,2628

*********** BOOTSTRAP RESULTS FOR REGRESSION MODEL PARAMETERS ************

OUTCOME VARIABLE:
 MSLQH

             Coeff      BootMean     BootSE     BootLLCI    BootULCI
constant    5,0277      5,0144       ,5425      3,9509      6,0673
CAARTOT      ,0157       ,0162       ,0285      -,0384       ,0711
SCS_M_R      ,1124       ,1149       ,1717      -,2231       ,4438
Int_1       -,0084      -,0085       ,0085      -,0252       ,0080

********************** ANALYSIS NOTES AND ERRORS ************************

Level of confidence for all confidence intervals in output:
  95,0000

Number of bootstrap samples for percentile bootstrap confidence intervals:
  5000

------ END MATRIX -----
```

Appendix D

Table 1

Descriptive Statistics and Bifactorial Correlations

	Mean	SD	SC	SRL
ADHD	19.43	9.85	-.264*	-.207**
SC	2.75	.70		.092***
SRL	5.15	.65		

* *p* < .001

** *p* = .007

*** *p* = .235