

What Effect does Perceived Stress have on the Frequency and Intensity of Aesthetic Experiences?

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Abstract

Aesthetic experiences (AEs) show remarking effects that involve a person in an emotional and meaningful experience, which may be beneficial for their well-being if harnessed correctly. The current paper investigated the correlation between perceived stress and AEs, more particularly the frequency and intensity of AEs. It was hypothesized that lower Perceived Stress Scale (PSS) scores would be related to more intense and frequent AEs. The study employed a diary-based approach, wherein participants reported their frequency and perceived stress in a pre-and post-questionnaire. In between participants can freely add their AEs and make an entry where they rate the intensity of each encounter. While participants exhibited a positive change in PSS scores, the study did not find support for the main hypotheses, that would indicate a relationship between PSS scores and frequency or intensity of AEs. Nevertheless, through the change in perceived stress, the study implies practical applications for integrating AEs into therapeutic settings and emphasizing the potential for stress relief. It also highlights the high PSS scores among first-year university students and appeals for measures that enhance their well-being. Despite limitations, this research makes a further step for future investigations, into the relationship between perceived stress and intensity and frequency of AEs.

Keywords: Aesthetic Experience, Intensity, Frequency, Perceived Stress

What Effect does Perceived Stress have on the Frequency and Intensity of Aesthetic Experiences?

Throughout life, people are bound to experience stressful periods. We all have unique methods for recovering and returning to a positive state. Sometimes, when you break away from your usual routine and find yourself gazing upon something aesthetic, it may help restore a sense of clarity and provide a break from your inner turmoil. Such turmoil as stress is a pervasive global health problem that can lead to the development of various health issues if it is not adequately addressed (Fekete et al, 2022). Especially the transition to university is a vulnerable period in which students perceive greater amounts of stress (Zhao et al., 2023). Conversely, various aesthetic experiences (AEs), such as exposure to nature (Bowler et al., 2010) or listening to a vibrant music piece (Fekete et al., 2022), can lead to a diminishment of stress and elicit states of consciousness that may aid in the reduction of stress.

Aesthetic Experience

AEs have been compared to being as crucial to human life as love, sex, hunger, aggression, and hate (Hagman, 2011). Overall, an AE can be described as a state of consciousness that distinguishes itself from everyday experience (Marković, 2012). It can involve a certain subject-object relationship in which particular stimuli greatly engage the perceiver's mind, shutting out all other surrounding objects and events (Ognjenović, 1997). Such an experience may elicit strong emotions, body sensations, and meaningful states within that individual.

The study of AEs has a rich historical background and is the oldest discipline in experimental psychology (Chatterjee & Vartanian, 2016). The origin of the domain lies with Gustav T. Fechner (1876), who aspired to create a comprehensive system of general principles for beauty and art based on empirical data (Nadal & Vartanian, 2022). However, for over a

century, empirical aesthetics faced challenges in reaching that goal, leading to Daniel E. Berlyne's (1974) reformulation of the field, shifting the focus on motivational mechanisms and arousal-related properties (Nadal & Vartanian, 2022).

Over time, the study of aesthetics branched out into several fields. Psychological aesthetics is the oldest domain and is based on Fechner's (1871, 1876) idea of experimental psychology with the goal being to understand the psychological processes that are involved in aesthetic appreciation and the creation of psychological consequences (Nadal & Vartanian, 2022). As an example, Brielman and Pelli (2017) have established such a consequence, by showing that the appreciation of beauty involves executive functions by manipulating cognitive load. Similarly, stress's impact on cognition primarily stems from competition for mental resources, where stress functions as cognitive load (Stwaski et al., 2006). Resultingly, the present paper tries to shed light on such a consequence in the form of perceived stress and asks to what extent stress and AEs are interconnected.

Perceived stress

Just as AEs, the word "stress" has been regarded as one of the vaguest concepts, despite its extreme popularity in science and general language (Wezyk et al., 2023). Three distinct conceptualizations of stress have been established and used in the fields of medical- and social sciences (Wezyk et al., 2023). These perspectives portray stress either as a stimulus, a stress response, or as an interactive and transactional process involving the individual and their surroundings (Wezyk et al., 2023). Thereby, one of the most prevalent theories has been the appraisal of stress, which influences coping responses and well-being (Wezyk et al., 2023). For example, former research demonstrated that either perceiving stress as negative or positive leads to substantial outcomes in terms of well-being and performance (Crum et al., 2013). We further investigate this notion of perception by looking at the concept of so-called perceived stress, which pertains to a similar notion as the aforementioned theory.

It incorporates the feelings or thoughts someone has about the amount of stress they are experiencing at a certain point or time frame (Lazarus & Folkman, 1984). Individuals may experience a similar detrimental circumstance, but evaluate the severity of it to a different degree, which may be the result of factors like certain coping resources (Phillips, 2013). These coping resources may incorporate the perception of an AE, which can elicit receding effects on a person's stress level. As in various cases, it has been demonstrated that an individual's AEs may aid in the reduction of stress. For instance, Clow and Fredhoi (2006) found that self-reported measures of stress in combination with cortisol levels, have decreased significantly after individuals visited an art gallery in London.

Perceived stress in students

Stress is especially prevalent in students, as numerous studies have established a link between stress and student populations. One meta-analysis by Wu et al. (2021) even revealed that a substantial 50% of students experienced high levels of stress. Such students show increased depressive symptoms, more anxiety, and decreased life satisfaction (Hoyt et al., 2021; Samaha & Hawi, 2016). In particular, their perceived stress incorporates sources such as deadlines, financial troubles, interpersonal concerns, and job problems (Bojuwoye, 2002; Hudd et., 2000). This risk is increased by the transition to university, as it often poses a big challenge to students as they have to deal with challenges, such as living away from their family for the first time and getting used to their new social environment (Arnett, 2016).

Intensity of AEs

A factor that could present mitigating effects for perceived stress is the intensity and frequency of AEs. Intense AEs may encompass a range of emotional responses, such as goosebumps, a disconnection from one's environment, a feeling of time slipping away, and sensations of wonder (Harrison & Clark, 2016). Sloboda (1991) found such intense aesthetic states commonly in individuals, with 90% of participants in a survey reporting shivers and

62% indicating goosebumps while listening to music in the last five years. Another study found that the dispositional effect of participants impairs the intensity of AEs, making them more intense when they have a positive effect right before the experience (Weigand & Jacobsen, 2021). In this manner, a positive effect may be similar to lower perceived stress and strengthen the chance to experience higher intensity.

Frequency of AEs

Previous studies have also revealed intriguing associations between the frequency of AEs and specific psychological factors that show a resemblance to perceived stress. Harrison et al. (2016) showed that individuals have more frequent AEs when they are lower in reactivity to their inner experience. The perception of someone's inner experience could also refer to exposure to stressful states, which would also lead to a reduction of AEs. Similarly, Weigand and Jacobsen (2021) demonstrated that the frequency and intensity were negatively predicted by high working memory load or when attention was focused on a demanding task. This raises the question of whether experiencing high levels of perceived stress could overload an individual's working memory to the extent that it significantly reduces the likelihood of AEs. On the contrary, Weigand and Jacobsen (2023) found that a dispositional effect of either positive or negative valence did not matter whether participants had an AE.

Despite the increasing volume of research in the field of the reviewed literature, there are still existing gaps in our understanding. Firstly, though the study of AEs has a long history, the literature investigating the intensity and frequency of their occurrence is still quite scarce. Additionally, there has been limited research on specific groups, such as students, in relation to AE and the aspect of their university transition which has been understudied (Zhao et al., 2023).

The current study aims to enhance this body of knowledge using a diary study, where participants can make entries of their own AE, which is followed by distinct questions about

the experience. The advantage of a diary study is that it offers insights into real-world processes over time, allowing for analysis of both between-and within-subject differences (Silvia & Cotter, 2021). This enables precise investigation of an individual's AE, and in particular the content of its intensity and frequency in concordance with perceived stress. In particular, we also take a closer look at the population of first-year students who face novel academic challenges.

The Present Study

Based on the previously described literature review, this study aims to explore the potential connection between perceived stress levels and the frequency of AEs among first-year university students. The study makes use of a diary study and is structured into three distinct parts. As visualized in Figure 1, the first part contains a pre-questionnaire that incorporates measures of perceived stress and the number of AEs. The perceived stress levels are going to be measured with the Perceived Stress Scale (PSS) (Cohen et al, 1983). PSS has found great use in former research and was primarily constructed as a global measure of stress, demonstrating adequate validity and reliability (Georgiou et al., 2020; Yan et al., 2021). The responses to perceived stress and frequency will be collected at the beginning and by the end of the study, while intensity will be indicated by participants when they make a new entry for their AE. Resultantly, it was hypothesized that lower perceived stress levels at the beginning of the study would show a correlation of higher frequency and intensity of AEs (Hypothesis 1). Additionally, we hypothesized that more intense and frequent AEs would be correlated with lower perceived stress levels at the end of the study (Hypothesis 2).

Figure 1

Overview of Study Procedure and Measurements



Note. The conduction of the study with the three distinct phases (pre-questionnaire, entry phase, and post-questionnaire) is shown.

By shedding light on this relationship, the study aims to enhance the understanding of how students promote their well-being, by making use of AEs. As the relationship between perceived stress and AE has not been directly addressed, it broadens the understanding of what extent AEs can be utilized as a coping source for stress. This may serve as a further informational contribution to mental health issues such as anxiety and depression, as stress is shown to be a significant contributor (Slavich, 2016).

Methods

Based on a checklist developed by the EC-BSS at the University of Groningen, the study was exempt from full ethical review (PSY-2324-S-0031).

Participants

A total of $N = 236$ participants were recruited, of which 61 participants met the final criteria for this study. More specifically, respondents who failed to fully complete the experiment by December 13th, 2023 were excluded from the analysis of the present study. The majority of the study sample were female participants (52 females, eight males, and one non-binary). Furthermore, the study required participants to be at least 16 years old (57 participants were 18-24 years old, two participants were 35-44 years old, one participant was 16-18 years old, and another participant was 55-64 years old). The study was available in

three languages of which, 57,4% used Dutch, 34,4% used English, and 8,2% used German. Only one participant indicated not being a first-year student and 67,2% of participants moved to a new city within the last year. Each participant submitted at least two entries to the diary study excluding pre-and post-questionnaires ($M_{entries} = 3.72$, $SD_{entries} = 1.08$) accumulating to a total of 227 journal entries, thus, separate AEs. An a priori power analysis was conducted using G*Power version 3.1.9.7 (Faul et al., 2007) to determine the minimum sample size required to test the study hypotheses. Results indicated the required sample size to achieve 80% power for detecting a medium effect, at a significance criterion of $\alpha = .05$, was $N = 36$ for Repeated Measures analysis. Thus, the obtained sample size of $N = 61$ is adequate to test the study hypotheses.

Recruitment methods included – i) targeted advertisement via the research panel website (SONA) aimed at first-year psychology students at the University of Groningen, Netherlands; ii) public advertisement on the communication/social media platforms (e.g.: Facebook, Instagram, LinkedIn, Twitter, Whatsapp group chats); and iii) flyer distribution at local centers for leisure, culture and educational activities (e.g.: Dat Bolwerk Museum in Zutphen, USVA, bookstores, literary cafes, etc.).

Research Design and Procedure

The online self-report survey was designed collaboratively among the research group to assess several personal attributes of participants both outside of and about their AE. The survey was made available to participants in an app and a website format designed with Qualtrics (<https://www.qualtrics.com>) and was accessible for four consecutive weeks, from November 9th to December 12th, 2023. This longitudinal design allowed participants to choose freely when to add entries to report naturally occurring AE. Participants were prompted to report at least two entries relating to separate AE. Participants gave their email

addresses as identifiers to link their separate entries together, and email reminders to add an entry were sent once per week. The questionnaire was set up in three phases that are described hereafter.

1. Pre-questionnaire. The pre-questionnaire included Informed Consent (IF) and Information Form (IF), a short definition of AE, demographics and self-perceived occurrence, frequency, and importance of AE. Furthermore, measures of self-perceived stress level, art knowledge and interest, current mood, and self-reflection were assessed.
2. Entries. Upon completion of the pre-questionnaire, participants could access the journal entry phase of the survey. Each entry included a reminder of the definition of AE and several questions about the specific AE participants chose to report on. This included the time at which the experience occurred, the perception of time during the experience, and the stimulus that initiated the experience. Furthermore, X-point Likert scale measures were used to assess the self-perceived appreciation, intensity, and meaningfulness of the AE. Other measures were used to assess current mood, emotions evoked by the experience, mind-wandering, and immersion. Additionally, participants were prompted to describe the self-perceived meaning of the AE in their own words as per think-aloud protocols by Tenbrink (2015). Participants were given the same questions each time they chose to report a new experience.
3. Post-questionnaire. After the last journal entry, the post-questionnaire could be accessed. It included measures of self-perceived stress level and capability of mental imagery.

Measures

The inventories used to assess specific traits can be found in Appendix A. For the analysis of the present study, the Perceived Stress Scale (PSS-10) and items regarding the characteristics (i.e.: frequencies, intensity) of AE were used.

Materials

Perceives Stress Scale (PSS-10)

The PSS-10 is a 10-item questionnaire measuring perceived stress throughout the last month, using a 5-point Likert scale response system (0= *never* to 4= *very often*). After reversing scores for four of the items, scores can range from 0-40 and be separated into levels of low, moderate, and high perceived stress. The PSS-10's Cronbach alpha was assessed at $>.70$ in 12 studies, and its test-retest reliability was across four studies which all reported coefficients higher than $.70$. (Lee, 2012). Further, The PSS-10 shows concurrence with depression and anxiety measures through moderate and strong correlation (Lee, 2012), and convergence with measures of stressful life events (Liu et al., 2022).

Intensity

After the pre-questionnaire, the diary entries were partaken in. With each entry, participants indicated the intensity of their AE on a 7-point Likert scale (1= not intense at all to 7= extremely intense) as per the scale from recalled AE (RAE, Buzzo & Sayim, 2023).

Frequency

Participants were asked for the number of AEs they had during the past month in the pre-and post-questionnaire.

Results

The analysis of the data was done using IBM SPSS version 28.

Assumptions

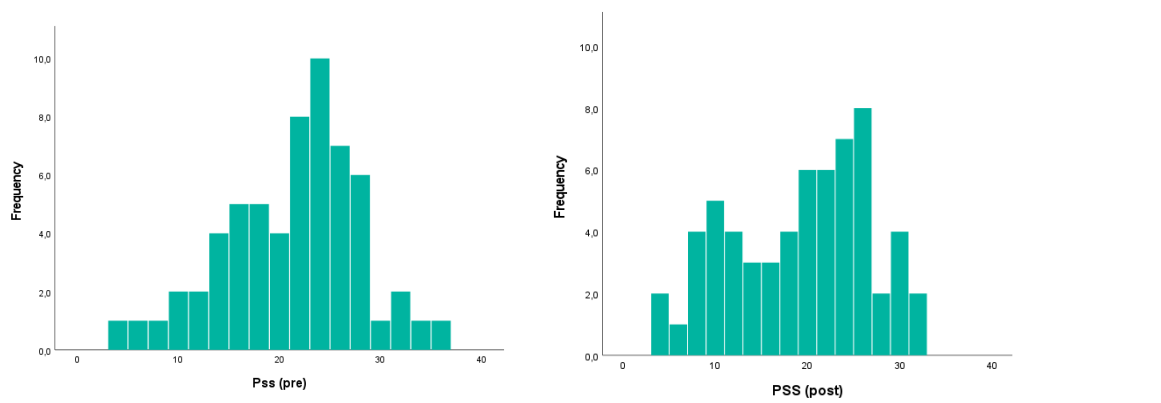
For the analysis, the assumptions of normality were not met for the variable of frequency, and a non-parametric measure was used instead. All assumptions for the analysis between the pre and post Perceived Stress Scale (PSS) variables were met.

Perceived Stress

When inspecting Figure 2, we can see a visual difference in the respective distribution between PSS pre ($M_{PSS} = 20.74$, $SD_{PSS} = 6.72$) and post scores ($M_{PSS} = 18.87$, $SD_{PSS} = 7.45$), which shows a strong correlation between both measurements $r(61) = 0.74$. As both seem to be relatively normally distributed, as seen by the bell curve shape, higher PSS pre-scores were more abundant. Similarly, a paired sample t-test revealed a significant difference between pre- and post-scores, $t(60) = 2.81$, $p = .006$.

Figure 2

Pre-and post-scores of the PSS



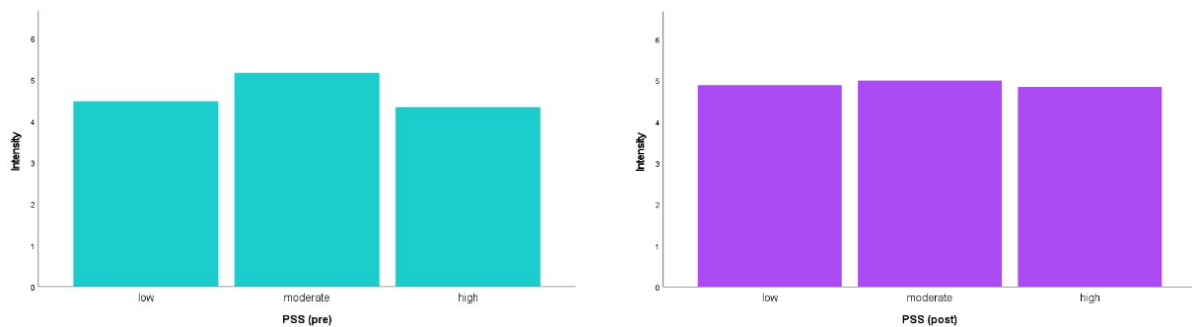
Note. On the left is a bar graph displaying the PSS scores of the pre-questionnaire for the last month (x-axis), and the corresponding quantities (y-axis). On the right is a bar graph, portraying the PSS scores of the post-questionnaire.

Intensity of AE

The PSS pre-scores ($M = 20,74$, $SD = 6.72$, $N = 61$) have been sorted into low (0-13), moderate (14-26), and high (27-40). In Figure 3, we can see an even distribution between the levels low and high, while the moderate level demonstrates slightly higher scores. This is not in line with the first hypothesis that higher PSS scores would demonstrate more intense aesthetic experiences (AEs). Similarly, no substantial difference is visible in the PSS post-scores, as all of the three levels are quite even in their intensity (see Figure 1). This is further supported by an extremely low correlation measured between PSS pre-and post-scores concerning intensity, ranging from $r(61) = -.007$ to $r(61) = .009$.

Figure 3

PSS pre-and post-levels in concordance with intensity scores



Note. On the left is a bar graph of the levels (low, moderate, and high) of PSS reported during the pre-questionnaire (x-axis) and how they differ in their rating of intensity (y-axis). On the right are the PSS levels and the intensity rating reported in the month of data collection.

Frequency of AE

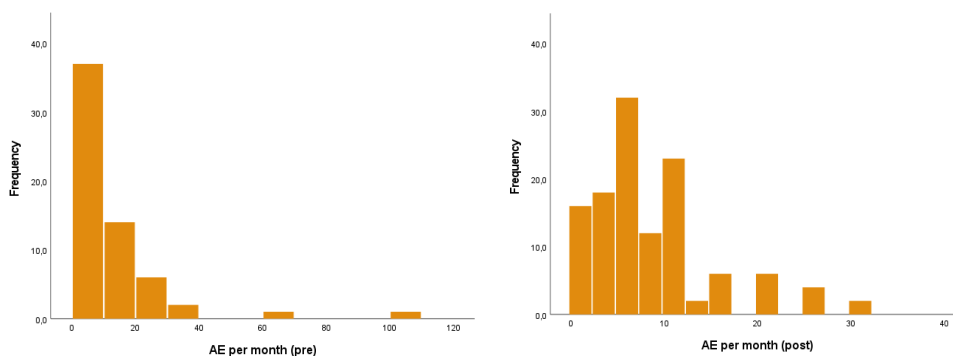
As seen in Figure 4, the majority of participants who reported their frequency of AE for the last month in the pre-questionnaire reported having less than 10 AEs ($Mdn_{Pre} = 5$). Furthermore, the bar graph shows a strong right-skewed distribution, with two participants being classified as outliers, reporting to have had 65 and 100 AEs in the previous month. The results of the post-questionnaire show a more even spread of ($Mdn_{Post} = 6$) of the data, with

the majority of participants reporting to have had close to 10 AEs, by the end of the study. The bar graph does still show a relatively strong right skewness, with several potential outliers, with a maximum of 30 occurrences of AEs reported by the end of the study.

Furthermore, a pre-and post-analysis was done using non-parametric measures for frequency since the assumption of normality is violated, due to the skewed distribution. The Wilcoxon signed-rank test revealed no significant difference between pre-and post-questionnaire scores ($z = -0.047, p = 0.936$).

Figure 4

Distribution of AE per month of the pre-and post-questionnaire

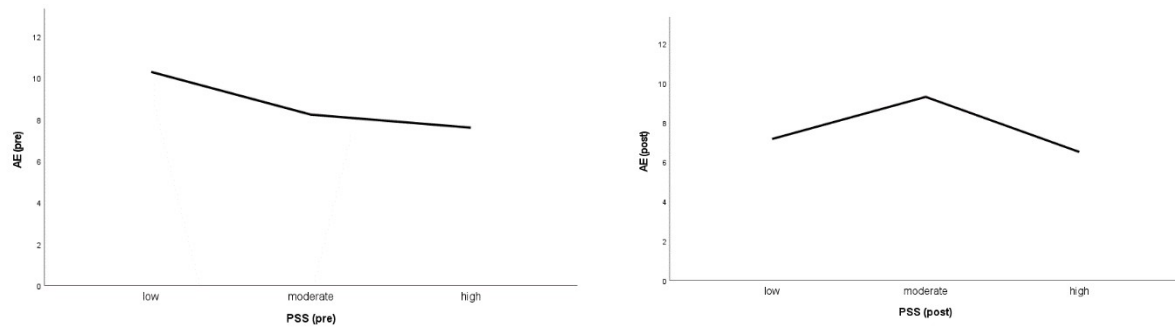


Note. On the left is a bar graph displaying the AEs during the pre-questionnaire for the last month (x-axis), and the corresponding quantities (y-axis). On the right is a bar graph, portraying AEs from the post-questionnaire for the last month.

When this is further compared with the levels of the PSS in Figure 5, we can see that participants with low PSS levels reported fewer AEs by the end of the study, while the moderate level showed an increase, and high levels reported about the same amount. This would support the first hypothesis, that a lower PSS score is related to a higher frequency, but the opposite effect is observed in the case of the second hypothesis, where the low level shows a strong decrease and a similar amount to the high level.

Figure 5

Pre and post PSS levels in concordance with the number of occurrences of AEs (y-axis) during the data collection period (i.e.: one month)



Note. On the left is a line graph of the levels (low, moderate, and high) of PSS reported during the pre-questionnaire (x-axis) and how they differ in their number of AEs (y-axis) in the month before the experiment. On the right are the PSS levels and the number of AEs reported in the month of data collection.

Discussion

This paper aimed to investigate whether a lower level of perceived stress within first-year students, would lead to more frequent and intense aesthetic experiences (AEs). Furthermore, measurements of frequency and perceived stress were taken at the beginning and the end of the study, while intensity ratings were collected with each entry a participant took. Resultantly, two hypotheses have been formulated that stated that lower perceived stress levels at the beginning of the study would be associated with higher reports of frequency and more intense experiences. Furthermore, greater reported experiences and intense encounters were hypothesized to be correlated to lower perceived stress scores by the end of the study.

Perceived Stress

Although no explicit hypothesis was stated concerning the change in Perceived Stress Scale (PSS) scores by the end of the study, an effect was found. That is, the overall PSS scores of participants have significantly lowered by the completion of the survey in comparison to the beginning. This may be indicative of the positive affect that AEs may have had on participants, as previous research has also established that having various AEs, can lead to a reduction of stress (Bowler et al., 2010; Fekete et al., 2022).

Students and Perceived Stress

The results indicated that participants, consisting almost entirely of first-year students, reported moderate amounts of perceived stress, at the beginning and the end of the study. Cohen and Janicki-Deverts (2012) looked at the distribution of psychological stress. They reported the PSS scores of a large sample in 2009 and found that participants below the age of 25 had much lower PSS scores ($M = 16,8$, $SD = 6.86$) when compared to the current sample. They also repeated the same survey of perceived stress administered in 1983 and 2006 (Cohen and Janicki-Deverts 2012) and found that the results of the questionnaires were quite consistent when relating them to factors such as age, sex, and education. This further shows that the scores may also be representative of present populations. Resultantly, the perceived stress scores of this study seem relatively high in comparison and may be referring to the fact that specifically first-year students are prone to experience high amounts of stress (Bojuwoye, 2002). Though, it may be of consideration that the current participant pool consisted mostly of women, who are reported to indicate higher reports of perceived stress (Cohen & Janicki-Deverts, 2012), the substantial difference in scores seems nevertheless noteworthy.

Intensity of AE

Both the pre-and post-scores of intensity did not seem to have an association with the scoring of the PSS, therefore both statements in the first and second hypothesis could not be supported. Past researchers have found that positive affect was indicative of a stronger AE

(Weigand & Jacobsen, 2023), but we did not find the same results with PSS scores as a precursor. Accordingly, lower perceived stress may not be conceptually similar to positive affect and may not be an accurate predictor of AEs. This is supported by the fact that individuals tend to seek AEs in stressful states as a method to reduce it (Weigand & Jacobsen, 2021), evidenced by increased mind wandering during stress-inducing tasks (Smallwood et al., 2009). Alternatively, participants also did not indicate their immediate stress level right before making a new entry but only gave it in the pre-and post-questionnaire as an indicator, which may have inflated the possibility of confounds. Thus, a closer measure of any changes in stress may have yielded different results.

According to Sloboda and colleagues (2015), AEs are bound to be quite an intense and common phenomenon in individuals. This could also be found in the current study. However, though intense AEs were quite frequent among participants, they did not lower the perceived stress levels of individuals. As most AEs were shown to be quite intense, there may be a threshold or a certain intensity needed for participants to even classify the encounter as an AE, which is further supported by the low number of participants that estimated their AE to have low intensity. As mentioned by Marković (2012), an AE is an exceptional state of consciousness with an elevated sense of connection to the stimulus that triggered the experience, suggesting its inherently intense nature. This offers a plausible explanation for the overall high intensity scores, as AEs are known for their impactful nature (Marković, 2012).

Frequency of AE

The first hypothesis that lower PSS scores at the beginning of the study would be related to higher AEs, found partial support. On the contrary, the second hypothesis that lower PSS scores by the end of the study would be related to more AEs was not supported, revealing similar frequencies of AEs for individuals with low and high PSS levels. However, interpreting the first observation is challenging due to right-skewed datasets, notable outliers,

and uneven participant distribution across PSS levels (especially with fewer participants in the low and high stress levels). Thus, it is difficult to estimate any practical implication of those results. Scores in the post-questionnaire nonetheless showed a tendency that participants shifted away from reporting no to any AE and it also reduced the number of extreme outliers, showing a closer resemblance to a normal distribution, which may demonstrate a more realistic estimation of their actual frequency of AEs. Again, further analysis demonstrated that no significant difference was found between pre-and post-scores.

As no definitive evidence could be found for the relation of PSS levels and frequency, it contradicts the findings of Harrison et al. (2016) that individuals with higher inner reactivity to ones' inner experience, would have fewer AEs. One reason may be the operationalization of frequency, as we asked participants for an estimated number of their frequency of AEs during the last month in the pre-and post-questionnaire, which may not have been an accurate measurement, due to recall bias (Colombo et al., 2020). Contrary, Weigand and Jacobsen (2021) measured frequency by randomly prompting participants 12 times a day for 14 days through a mobile app to complete reports on their AEs, to find out how many they would have daily. They found support that higher working memory indicated fewer reported AEs (Weigand & Jacobsen, 2021). Through this technique, they achieved a more controlled estimation of their frequency.

Strengths and Limitations

Firstly, using a convenient sample comprising first-year psychology students facilitated an in-depth exploration of a specific group. It allowed us to demonstrate that this group is prone to experience more stress when compared to other populations (Cohen & Janicki-Deverts, 2012). However, this approach deviates from using a probability sample, which is more resistant to biases and allows for greater generalizability (Jager et al., 2017). Furthermore, an even distribution of characteristics like gender helps minimize sampling

variation and increase the chance of the sample accurately representing the population (Morgan & Harmon, 1999). Yet, the majority of female participants in the present study decreases the chance to generalize the findings to a broader population and identify potential gender differences.

Secondly, the use of a diary study allowed for an accurate representation of a person's daily life (Silvia & Cotter, 2021), which may have aided in better capture of AEs. Participants were also free to choose what to report and were not bound to certain objects or situations, demonstrating a strong variation of the construct. Contrary, this may have also been a disadvantage. The linkage of perceived stress and every single AE could have been more strictly documented and controlled like in the aforementioned study by Weigand and Jacobsen (2021). As participants were free to choose when and how long they took to complete the experiment, life events or small changes could have interfered with the stress level of participants, therefore distorting measures.

Thirdly, the design of the study is done via a self-report questionnaire, which is prone to various biases, and may not capture the full complexity of certain phenomena. For example, recall bias may happen as they report an AE from the past, which could make them inaccurately remember certain details and estimations they originally made about that experience. This is supported by the inaccuracy of people recalling emotional events, where affective states are estimated as more intense (Colombo et al., 2020).

Study Implications

Despite these limitations, the results nonetheless serve several implications. Since the study seemed to have a positive effect on the PSS scores, it is further evident that AEs can be harnessed to make a positive change and counter perceived stress within individuals.

Symptoms of stress overlap with mental illnesses such as depression and anxiety (Slavich, 2016). Therefore, promoting the integration of AEs within a clinical or therapeutic setting

could be promising, as AEs can aid in potentially enhancing abilities in emotional regulation (Serrao et al., 2024). This can be done by educating people about these phenomena and logging the AE in a journal, to treasure their experience.

The elevated levels of perceived stress among students highlight the need for targeted interventions aimed at dealing with specific stressors prevalent in that population. As a result, learning to cope with stress using beneficial strategies can diminish the subsequent consequences on both physical and mental well-being (Khan et al., 2011). Furthermore, the appreciation of art, which can represent an AE, lets observers enhance their interpretation of internal states (Serrao et al., 2024), which can aid in regulating their perceived stress. Solutions may include developing effective stress management programs at universities that have the potential to alleviate psychological distress, depression, and anxiety by aiding students in adjusting their ineffective coping mechanisms (Amanvermez et al., 2023).

Lastly, educators and clinicians may support regularly reflecting upon AEs. By consciously dealing with the AE, writing them down, and assessing them through our questionnaire, participants may have benefitted more from each experience. Therefore, a reflective practice could be introduced by journaling, discussion groups, and developing awareness of the potential stress-relieving effects of AEs.

Future Directions

Given the lack of support for both hypotheses regarding intensity and frequency, future research may establish a more controlled study design, where participants report AEs to similar time points and finish the study at the same time, and give indications about their stress level right before they had the experience, to rule out possible confounds.

Furthermore, other variables of interest could be tested for AE and stress reduction. In particular, reflection upon the AE. This could also be inspected in an experimental setting or

by establishing comparison groups, where the levels of reflection with AEs can be varied. Especially, the context of a diary study could be expanded upon by giving different participants, different instructions, about their inclusion of their AEs, to analyze and test differences.

A bigger sample size, including a more balanced distribution of gender, could also be helpful, to have better generalizability. The focus upon first-year students can also be expanded upon, by making a comparison to more advanced university students or other populations.

Conclusion

Despite the mentioned limitations, the current paper can be seen as a first step, by shedding light on the relationship between perceived stress and AEs, while incorporating more established variables in this domain by frequency and intensity. Though not much evidence was found for both hypotheses, interesting links before and after effects of perceived stress were observed, while showing the importance stress may have in a population of first-year students.

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Appendix A

Table A1

Inventory table of all D.E.A.R. Study instruments

Inventory/Scale	Source	Purpose	Items/Method	Used in
Perceived Stress Scale (PSS-10)	Lee (2012)	Measuring self-perceived stress levels of the last month	10 Items, Likert scale (<i>1 = never, 5 = very often</i>)	Pre and Post
Pick-A-mood	Desmet et al. (2016)	Assessing state mood	8 facial expressions represent different moods, one neutral option	Diary entries
Vienna Art and Interest Knowledge (VAIAK)	Specker et al. (2020); Specker et al. (2023)	Assessing participants' art knowledge and interest	Scale Interest: 11 Likert scale items (<i>1 = not at all, 7 = very much</i>) Scale Knowledge: 6 Items, multiple-choice	Pre
Self-reflection and Insight Scale (SRIS-12)	Silvia (2021)	Capturing engagement tendencies in self-reflection, need for self-reflection and internal state awareness	Shortened version, Likert scale (<i>1 = strongly disagree, 7 = strongly agree</i>)	Pre
Bodily Sensation Maps (BSMs)	Nummenma et al. (2014)	Assessing bodily sensations, evoked through emotions during AEs	Point out on body map where activity is felt to intensify or diminish	Diary entries
The Geneva Wheel of Emotion 2.0 (GEW 2.0)	Scherer, K. R. (2005)	Assessing emotions constituting the experience	Placement of up to two emotion indicator points inside the wheel	Diary entries

Flow Short Scale	Laakuso et al. (2022)	Assessing flow levels of the experience by subscales capturing absorption and fluency levels	Likert scale (<i>1 = strongly disagree, 7 = strongly agree</i>)	Diary entries
Questionnaire for Mind-Wandering	Composed of 3 items adopted from Taruffi (2021), 4 items from Deil et al. (2022), 1 item from the Mind-Wandering Inventory (MWI) (Gonçalves et al., 2020)	Assessing components of mind wandering within AEs	1 multiple-choice item; 6 Likert items (anchored individually, ranging from <i>low</i> to <i>high</i>); 2 multiple-choice items	Diary entries
The Plymouth Sensory Imagery Questionnaire (Psi-Q)	Andrade et al. (2013)	Assessing participants' mental imagery ability across 7 sensory modalities and one global score (e.g. visual, sound, smell, taste, touch, bodily sensation, feeling)	35 items with 5 items per subscale. Response ranging from (0) " <i>No image at all</i> " to " <i>Perfectly clear and as lively as seeing it for real</i> " (10)	Post
Recalled Aesthetic Experiences – abridged version (RAE)	Buzzo & Sayim (2023)	Assessing specific characteristics such as intensity over time, duration and trigger of the experience.	Intensity: Likert scale (<i>1 = not at all intense, 7 = extremely intense</i>), Duration: hours and minutes, Trigger: 9 items, multiple choice	Diary entries

Note. The scales have been split into “pre” and “post”, indicating the start- and end questionnaire of the study, while also including “diary-entries”, which participants completed every time they added a new entry.