The Relation between Deficits in Emotion Regulation Skills Use and Eating in the

Absence of Hunger in University Students

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Abstract

The current study aimed to discover if deficits in emotion regulation skills (ERS) use are related to higher levels of eating in the absence of hunger (EAH) in university students. First-year university students (N=369, ages ranging from 17-36) completed questionnaires that assessed success of ERS use and levels of EAH. Associations were examined between ERS and EAH total and three EAH subscales; negative affect, fatigue / boredom, and external eating. In concordance with the expectations, the results showed that there is a significant, small to medium negative correlation between use of ERS and levels of EAH and that ERS correlated the highest with negative affect EAH. These findings add to the evidence for the theory that deficits in ERS use are related to higher levels of EAH in university students, which might be explained through deficits in ERS causing more negative affect which can trigger EAH. Through these findings a detailed image of the relation between ERS and levels of EAH is created, which in the future could be used to enhance clinical interventions for disorders and health problems related to overeating.

Keywords: Eating in the absence of hunger, emotion regulation skills

Eating in the Absence of Hunger

Physiological hunger is ordinarily inhibited by cues of satisfaction from the stomach after eating. When food is consumed and digested, satiety hormones notify the brain of a full and satisfied feeling (Druce, 2005). However, one can still eat without physiological hunger, as eating can be brought on by non-physical factors such as environmental, social, or emotional cues. This phenomenon is known as eating in the absence of hunger (EAH); eating while having a full enough stomach and no perceived feelings of physiological hunger (Tanofsky-Kraff et al., 2008). If food is consumed in excessive quantities and is not necessary for survival or functioning, it can have negative consequences for general health, such as undesired weight gain (Bennett et al., 2013). EAH is considered a prominent behavioural phenomenon of both binge eating disorder (BED) (Schmidt et al., 2023), and obesity (Pasquale et al., 2023). BED is one of the most prevalent eating disorders in young adults and is defined by recurrent episodes of binge eating accompanied by a lack of control (Schmidt et al., 2023). These episodes often occur without the presence of physical hunger (Schlüter et al., 2015), indicating that EAH is a key component of BED. The same goes for obesity; as obesity is often perpetuated by overeating, EAH has an integral role in the excessive weight gain that leads to obesity (Blanco et al., 2018). EAH, and concurrent disorders such as BED and obesity are frequent in young adults and particularly university students (Swanson et al., 2011; Arnold et al., 2015). For many university students it is the first time in their lives that they live on their own without parental supervision, and thus have to make their own decisions about their eating schedules and behaviours, possibly resulting in maladaptive habits (Kremmyda et al., 2008). Gaining a deeper and more concrete understanding of EAH in university students and the factors underlying it could be a step towards better clinical interventions for disorders and health problems related to overeating.

Emotion Regulation Skills

When considering possible predictors of EAH, research has indicated that perceived negative emotions might be the most relevant factor. Arnold et al. (2015) showed that, while external and physical factors were also associated with EAH, emotion held the strongest association with EAH. Emotion regulation skills (ERS) encompass the abilities to react to, adapt to, and evaluate one's emotional reactions in a constructive way (Grant et al., 2018). This is in particular relevant for negative emotions, such as anger, sadness or fear. For example, a person's immediate emotional reaction to a situation or trigger can be strong, but when this person has sufficient ERS they can cope constructively with these emotions, for instance by inhibiting the emotion, or by positively reappraising the situations. Consequently, this prohibits spiralling into a longer lasting negative effect. Deficits in emotion regulation skills can cause worsening and persistence of negative affective states even leading to perpetuation or development of mental disorder symptoms (Grant et al., 2018).

Empirical studies have shown associations with emotion regulation skills deficits and a variety of mental disorders, ranging from depression, (Ehring et al., 2008) anxiety (Deleurme et al., 2022), and relevant for this study: eating disorders such as binge eating disorder (Whiteside et al., 2007). For example, difficulties with emotion regulation were found in people who engaged in binge eating. Specifically finding it difficult to label and identify emotional states and having limited access to emotion regulation strategies were strongly associated with binge eating (Whiteside et al., 2007). The hypothesis is that people with BED cope with their negative emotions through binge-eating, due to their insufficient emotion regulation skills. This is an emotional eating theory that proposes binge-eating behaviour as a coping mechanism for emotional distress (Bennett et al., 2013). Leehr et al. (2015) explore this idea further and call it the emotional regulation theory. This considers negative emotions as a trigger for binge eating and binge eating as a way of down regulating

negative affect both during and after a binge episode. Since negative affect is worsened and sustained by deficits in emotion regulation skills (Grant et al., 2018), and EAH has been found to be related to emotional eating and negative affect, it is a relevant question whether poorer emotion regulation skills are a predictor of higher levels of EAH. Particularly in University students, who are more prone to maladaptive eating behaviours and experience above average levels of psychological distress when compared with a general population (Bore et al., 2016), making them likely subjects to engage in EAH due to negative affect.

Previous findings

While studies have not yet directly examined the relationship between ERS and EAH, EAH has already been linked to emotional related concepts such as depressed or negative affect and emotional eating (Kelly et al., 2015). Emotional eating refers to eating as a reaction to or a way of coping with negative feelings (Bennett et al., 2013). Previous research has also been done on the relation between emotion regulation skills and BED. Individuals with BED were found to have significantly poorer emotion regulation skills than healthy individuals (Whiteside et al., 2007). Moreover, multiple studies have found negative emotions and stress, which can both be enhanced through deficits in emotion regulation skills, to be a trigger for binge eating (Leehr et al., 2015). Leehr et al. (2015) concluded that their emotion regulation theory holds up for BED, but not for obesity: they found that negative emotions provide a trigger that activates binge eating behaviour in individuals with BED, however this same trigger was not found in individuals with obesity. Additionally, negative emotional states seemed not to be a trigger for overeating in individuals with obesity and no BED (Leehr et al., 2015). This finding suggests that there is a specific emotional component of BED that triggers binge eating that is not apparent in obesity (Leehr et al., 2015).

Current Study

Given that EAH is considered a relevant ingredient of BED and that negative emotions may result from deficits in emotion regulation skills, The current study will focus on discovering if deficits in emotion regulation skills are related to higher levels of EAH in university students. To measure ERS a scale was used, the ERSQ (Emotion Regulation Skills-Questionnaire; Grant et al, 2018) constructed out of nine different subscales that encompasses different emotion regulation skills. These are awareness, sensations, clarity, understanding, modification, acceptance, tolerance, readiness to confront and self-support. To measure EAH, we used a scale, the EAH-C (*Eating in the Absence of Hunger Questionnaire for Children and Adolescents (EAH-C)* developed by Tanofsky-Kraff et al. (2008). EAH can be separated into three different subscales; negative affect, fatigue / boredom and external eating. Of each of these subscales two distinctions can also be made between in which manner EAH takes place. Continual EAH, which refers to continuing eating even after feeling satiated, and beginning EAH, to begin with eating while having no feelings of hunger The expectation is that a negative correlation will be found between EAH and ERS. Secondly, the expectation is that of the subscales that make up EAH, the negative affect subscale will show the strongest correlation with ERS. Additionally, the study will explore if there are subscales of ERS that are stronger predictors of EAH than others.

Methods

Participants

In this study a total of 416 first year university students were recruited. Participants who did not finish the questionnaires or did not answer the control questions correctly were taken out (*N*=47), which resulted in a total sample of 369 participants.

Measurement

Eating in the absence of hunger

To assess eating in the absence of hunger the *Eating in the Absence of Hunger Questionnaire for Children and Adolescents (EAH-C)* developed by Tanofsky-Kraff et al. (2008) was used. The EAH-C consist of 14 items which are split up in to 7 items referring to continual EAH and 7 items referring to beginning EAH. They differ in how often participants <u>continue</u> with eating for a variety of reasons and how often they <u>begin</u> with eating for the same reasons. The continual EAH items started with the following: "Imagine that you are eating a meal or a snack at home, school, or in a restaurant. Imagine that you eat enough of your meal so that you are no longer hungry. In this situation, how often do you keep eating because….", and the beginning EAH items started slightly different: "Now imagine that you finished eating a meal or snack some time ago and you are not yet hungry. In this situation, how often do you start eating because….". The various reasons that form these prompts into statements are divided into three different subscales; Negative Affect (*".... because you are feeling sad or depressed"*), Fatigue/Boredom (*".... because you are feeling bored"*) , and External Eating (*".... because others are eating"*). Each item could then be answered with a Likert type scale ranging from score 1 (never) to 5 (always). A total score could then be calculated which can range from 14 to 70. The internal consistency of the total EAH score in this sample was acceptable with a Cronbach's alpha of .89. The three individual subscales each also had acceptable internal consistency in this sample, with Negative Affect having a Cronbach's alpha of α= .92, External a Cronbach's alpha of α= .80 and Fatigue/Boredom a Cronbach's alpha of α= .79.

Emotion regulation skills

To assess success of emotion regulation skills use in participants the *Emotion Regulation Skills Questionnaire (ERSQ)* developed by Grant et al. (2018) was used. The ERSQ contains 9 subscales with each 3 items, adding up to a total of 27 items that measure emotion regulation skills. The 9 subscales are: awareness, sensations, clarity, understanding,

modification, acceptance, tolerance, readiness to confront distressing situations, and self-support. Examples of items are "I could experience my feelings consciously" (*awareness*), "I had a clear physical perception of my feelings." (*sensations*), "I was clear about what emotions I was experiencing." (*clarity*) "I knew what my feelings meant." (*understanding*) "I was able to influence my negative feelings." (*modification*), "I was able to accept my negative feelings." (*acceptance*), "I felt I could tolerate my negative feelings." (*tolerance*), "I did what I had planned, even if it made me feel uncomfortable or anxious." (*readiness to confront*), and "I supported myself in emotionally distressing situations." (*self-support*). Each item could be answered through a Likert type scale with 5 scores ranging from 0 (not at all) to 4 (almost always). A average score could then be calculated, ranging from 0 to 4, and for each subscale from 0 to 12. The internal consistency of the total ERS scores in this sample was acceptable, with a Cronbach's alpha of $\alpha = .93$. All individual subscales also had acceptable internal consistencies in this sample, with the lowest Cronbach's alpha being $\alpha = .69$ (see Appendix A).

Procedure

The current study was part of a larger study that aimed to collect data concerning various predictors of divergent eating behaviour in university students. Of all collected data only the data from the EAH-C and ERSQ, descriptive data and validity checks were reported on in this study. The study was approved by the ethical committee of the psychology department of the University of Groningen (PSY-2324-S-0163). Participants were recruited through the university recruiting system for first year students of the University of Groningen and received compensation in the form of course credits. In the online environment Qualtrics the participants all were presented with an informed consent form to participate in this study. They were then asked to fill in multiple questionnaires, of which the ERSQ was presented third and the EAH-C was presented sixth.

Statistical Analysis

To discover if there is a negative association between success of emotion regulation skills use and eating in the absence of hunger, a simple Pearson correlation analysis between the total scores of the variables was performed, and between the three subscales of EAH and the total score of ERS. Then, to explore whether there are specific subscales of ERS that are related to EAH, an individual Pearson correlation analysis for each subscale of ERS with the total score for EAH was done. A multiple regression analysis with the significantly correlated ERS subscales and EAH as a dependent variable was performed, to see if any of the subscales are stronger predictors for EAH than others. For this multiple regression analysis, the enter method where all predictors are entered simultaneously into the model was used. The assumptions for multiple regression (no multicollinearity, linearity, homoscedasticity and normality of the residuals) were assessed visually through P-P plots and scatterplots, or in the case of multicollinearity through variance inflation factors (see Appendix). With the sample size of 369 and a power of 95% this leaves us with an effect size of 0.06 (small to medium)

Results

Descriptive statistics

Of the 369 participants 279 were female and 89 participants were male, with ages ranging from 17 to 36, with an average age of 19,99.

Table 1 shows that EAH total is negatively correlated with ERS total. This is a small to medium correlation. Furthermore, ERS total had a small to medium correlation with the subscales Negative Affect and Fatigue / Boredom, but an insignificant correlation with the subscale External Eating. ERS total had the highest correlation with Negative Affect in comparison with the other two subscales.

Table 1

Descriptive Statistics and Correlations for Study Variables

Variable	M	*SD*	1.	2.	*P*
1. Emotion Regulation Skills	65.08	15.45	–	-.238	<.001
2. Eating in the Absence of hunger	34.85	10.01	-.238	–	<.001
3. Negative Affect	12.03	5.59	-.323	–	<.001
4. Fatigue / boredom	9.83	3.49	-.176	–	<.001
5. External Eating	12.99	3.41	.011	–	.83

Table 2

Correlations between study variables

Variabele	M	SD	Correlation with EAH	*P*
1. Awareness	7.66	2.12	-.149	.004
2. Understanding	7.70	2.34	-.244	<.001
3. Clarity	7.60	2.4	-.208	<.001
4. Sensations	7.23	2.44	-.050	.341
5. Tolerance	7.01	2.60	-.211	<.001
6. Acceptance	6.80	2.46	-.154	.003

7. Self-Support	7.36	2.32	-.134	.010
8. Modification	6.54	2.42	-.198	<.001
9. Readiness to confront	7.20	2.58	-.178	<.001

Table 2 shows that EAH total was significantly negatively correlated with all subscales of ERS: awareness, understanding, clarity, tolerance, acceptance, self-support, modification and readiness to confront, except for the sensations subscale which was not significantly correlated (Table 2). Meaning that lower levels of awareness, understanding, clarity, tolerance, acceptance, self-support, modification and readiness to confront were associated with higher levels of EAH.

Table 3

Multiple regression Analysis

Predictor	*B*	*SE*	*t*	*p*	*CI*	
					LL	*UL*
Constant	45.080	2.286	19.721	<,001	40.59	49.57
Awareness	-.034	.329	-.104	.917	-.682	.613
Understanding	-.770	.371	-2.079	.038	-1.499	-.042
Clarity	-.127	.399	-.319	.75	-.912	.658
Tolerance	-.594	.343	-1.730	.085	-1.270	.081

Acceptance	.397	.342	1.162	.246	-.275	1.069
Self-Support	.310	.302	1.027	.305	-.284	.905
Modification	-.176	.332	-.529	.597	-.828	.477
Readiness to confront	-.381	.253	-1.504	.133	-.878	.117

Lastly, Table 3 shows the results of a multiple regression analysis which was performed to predict EAH from the significantly correlated subscales of ERS. These subscales being awareness, understanding, clarity, tolerance, acceptance, self-support, modification and readiness to confront. These variables together did significantly explain the variance in EAH, $F(8 , 360) = 4.18$, $p < .001$, $R^2 = .09$. However, only the subscale understanding was a significant predictor in the model, $p < .05$. All other Subscales individually did not add unique explanatory value to the model.

Discussion

This study had the aim to gain more insight on the relation between success of emotion regulation skills use and eating in the absence of hunger. The main findings are that there was a medium negative correlation between success of ERS use and EAH, meaning that poorer ERS was indeed associated with higher levels of EAH. The other main finding was that of the EAH subscales, the negative affect subscale had the highest negative correlation with ERS. Furthermore, explorative analysis showed that all subscales of ERS were significantly negatively correlated with EAH except for the subscale sensations, and that the subscales together significantly explained a small part of the variance in EAH. However, only the subscale understanding was a significant predictor in the model.

The first hypothesis was that deficits in ERS are related to higher levels of EAH in university students. The results were in concordance with the hypothesis, as lower levels of successful ERS use were associated with higher levels of EAH. These results are an indication that people with poorer emotion regulation skills are more prone to engage in EAH than people with sufficient or good emotion regulation skills. The theory behind this lies in that when one has poorer emotion regulation skills, this would lead them to experience more negative affect in comparison with people in possession of good emotion regulation skills (Grant et al., 2018), and since negative affect has been related to EAH (Kelly et al., 2015), this negative affect could then trigger EAH easier or more often.

The second hypothesis was that of the three EAH subscales, the negative affect subscale would have the strongest correlation with ERS, and this hypothesis was also supported. This further is some support for the theory that deficits in ERS would cause more negative affect and thus higher levels of EAH. In the future this theory could be explored and established even further, for example through research focusing on immediate negative affective states functioning as a mediator between poorer ERS use and EAH. Since the boredom/ fatigue subscale also had a small significant negative correlation with ERS, but external eating did not, it might be an interesting starting point for further research to look at how ERS are related to EAH that manifested from boredom or fatigue reasons. Since previous research has focused a lot on negative affect in relation to EAH, it could also be beneficial to gain more insight into possible predictors of EAH when it has manifested from external factors.

Additionally, the study aimed to explore whether there were subscales of ERS that are stronger predictors of higher levels of EAH than others. Of the ERS subscales, all subscales showed significant small to medium correlations with EAH, except for the sensations subscale which measures how successful people are in recognizing their sensations as part of their

feelings. A possible explanation for this could not be found in the internal consistency of the sensations scale since the Cronbach's alpha was acceptable, so further investigation could provide more information on this.

Secondly, the multiple regression analysis showed that together, the subscales awareness, understanding, clarity, tolerance, acceptance, self-support, modification and readiness to confront did significantly explain a small part in the variance in EAH, however only one subscale, understanding, added unique explanatory value to the model. It could be true that the subscale understanding enhances the total explanatory value of the predictors. The subscale understanding refers to being able to identify and understand what emotional state you are in (Grant et al., 2018). A possible explanation for this finding might be that understanding is a strong predictor because people are more likely to understand their feeling, and then infer from this understanding that the reason they feel the desire to eat is related to this feeling. A similar finding in regards to binge eating was seen in a study by Whiteside et al., (2007) who found that finding it difficult to label and identify emotional states was strongly associated with binge eating. Since the current study had similar results to this previous finding, future research might benefit from examining the exact relationship between understanding of emotional states and eating in the absence of hunger more concretely.

There were some limitations to this study. First of all, the questionnaires conducted to assess levels of EAH and success of ERS use were presented online, instead of in a controlled environment. This means that there was no way of controlling for environmental factors that could be of influence on the state in which participants filled out the questionnaires. For example, a participants might have been less focused on answering the questions correctly if they were in a noisy environment.

Related to this, the study was also part of a larger study that aimed to collect data regarding a multitude of different possible predictors of differentiation in eating behaviour in

university students. This meant that all participants were presented with not only the ERSQ and EAH-C, but also with thirteen other questionnaires, each consisting of multiple items. For some participants this might have been a long and tiring experience, possibly influencing their focus and seriousness when filling in the questionnaires. However, since the ERSQ was presented third and the EAH-C sixth, the longevity might not have had as much of an effect in this instance. Additionally, all participants were presented with control questions to ensure that they were paying attention, and participants who did not answer these correctly were excluded.

A third limitation lies in the argument that the measurement tool that was used to asses EAH could have been more optimal. Specifically, the EAH-C for children and adolescents developed by Tanofsky-Kraff et al. (2008) was used. This questionnaire is targeted towards children and adolescents while there is also a modified version for college student populations, that has been developed by Arnold et al. (2015). The modified version might have been more suitable for this study since the sample consisted of first year university students, but first year university students are often still adolescents or close to adolescents. Furthermore, all items of the EAH-C still make sense in a university context, so it is doubtful whether this would have made a tangible difference on the outcomes of this study.

Lastly, a limitation lies in the differences in measured participants. The study was conducted with a sample of first year university students, since this is an interesting group due to young adults being more susceptible to psychological distress and changes in eating behaviour (Bore et al., 2016; Swanson et al., 2011), caused by for example living away from home for the first time (Kremmyda et al., 2008). However, participants were not excluded based on age, which created a large range of ages, and were not asked about their living situation. In the future, to get more coherent results on predictors of EAH in this specific

group, the sample might be restricted to only university students who are young adults and are placed in a new living situation.

Conclusion

To conclude, this study showed a negative association between success of emotion regulation skills use and EAH. Furthermore, success of emotion regulation skills use correlated the strongest to negative affect EAH in comparison to the other subscales of EAH. This provides some evidence for the suggestion that deficits in emotion regulation skills use are related to higher levels of EAH in university students. This is in line with the theory that deficits in emotion regulation skills use would lead to more negative affect, which triggers EAH. A next step towards establishing this theory could be made through research that centres negative affect as a mediator between emotion regulation skills use and EAH. Additionally, an explorative analysis showed that all subscales of ERS were significantly correlated with EAH except for sensations, and that a small part of variance in EAH could be explained by the ERS subscales. However, since only the understanding subscale was a significant predictor, it might be valuable to examine the relationship between understanding and EAH further.

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Appendix A: Visual overview of Data

Table 4

Internal consistency of study variables

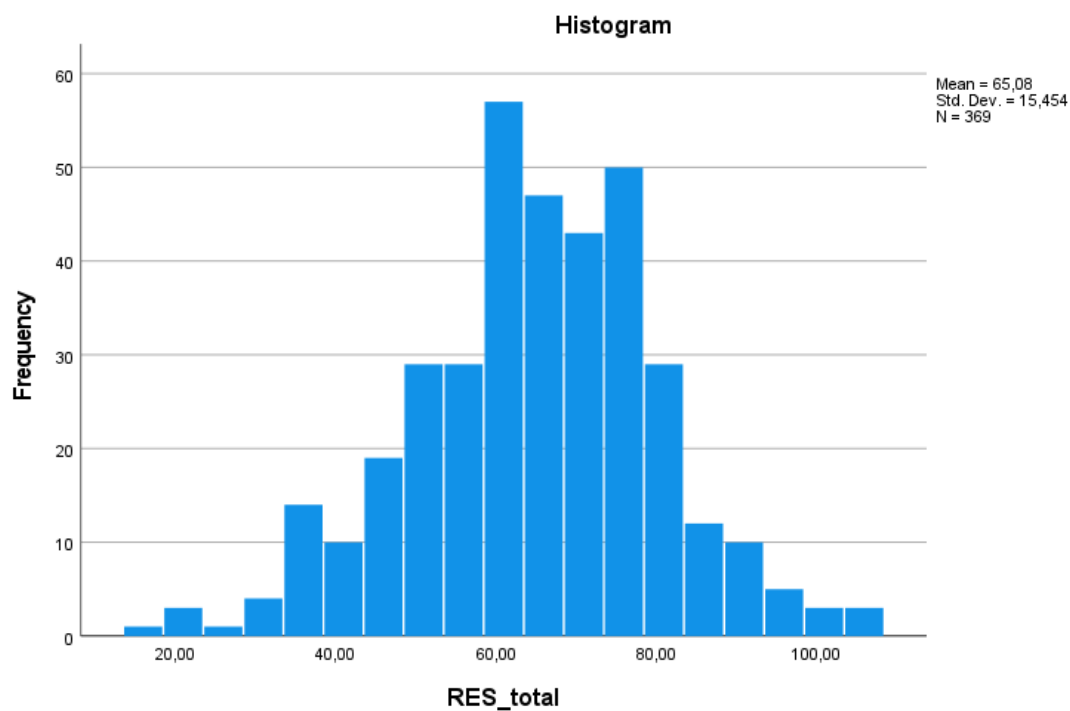| Variable	Cronbach's Alpha
1. Awareness	.73
2. Understanding	.81
3. Clarity	.83
4. Sensations	.73
5. Tolerance	.79
6. Acceptance	.69
7. Self-support	.72
8. Modification	.77
9. Readiness to confront	.79
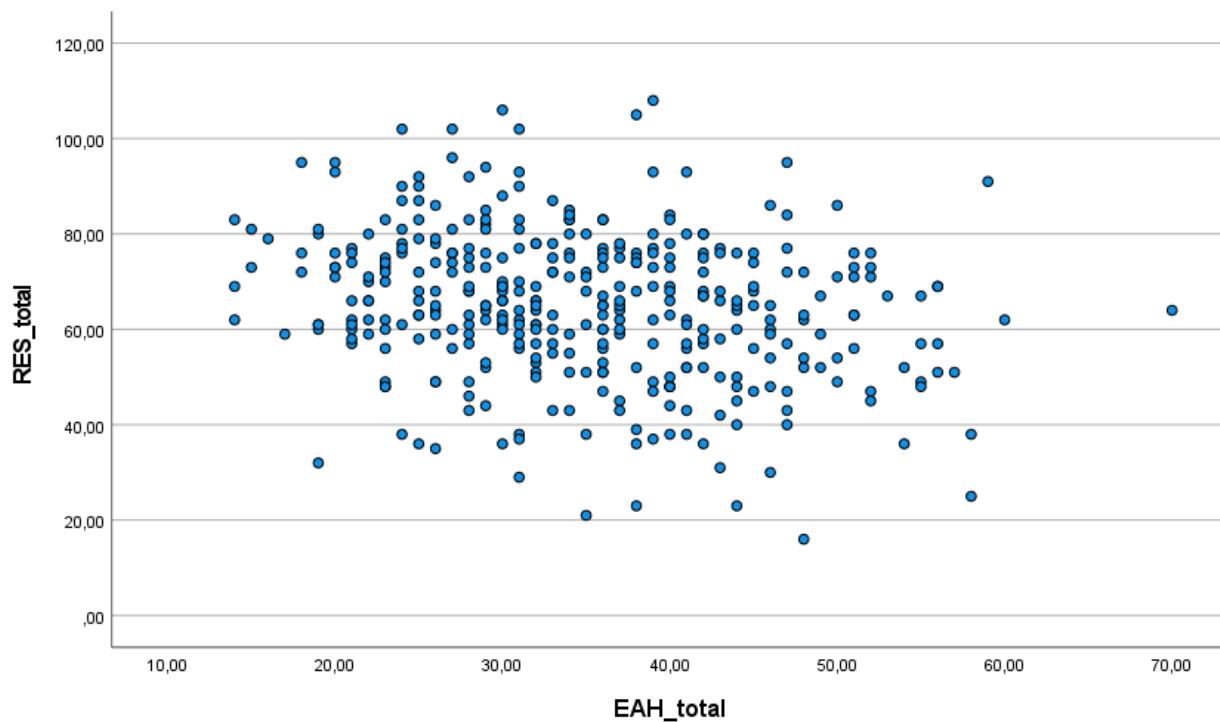
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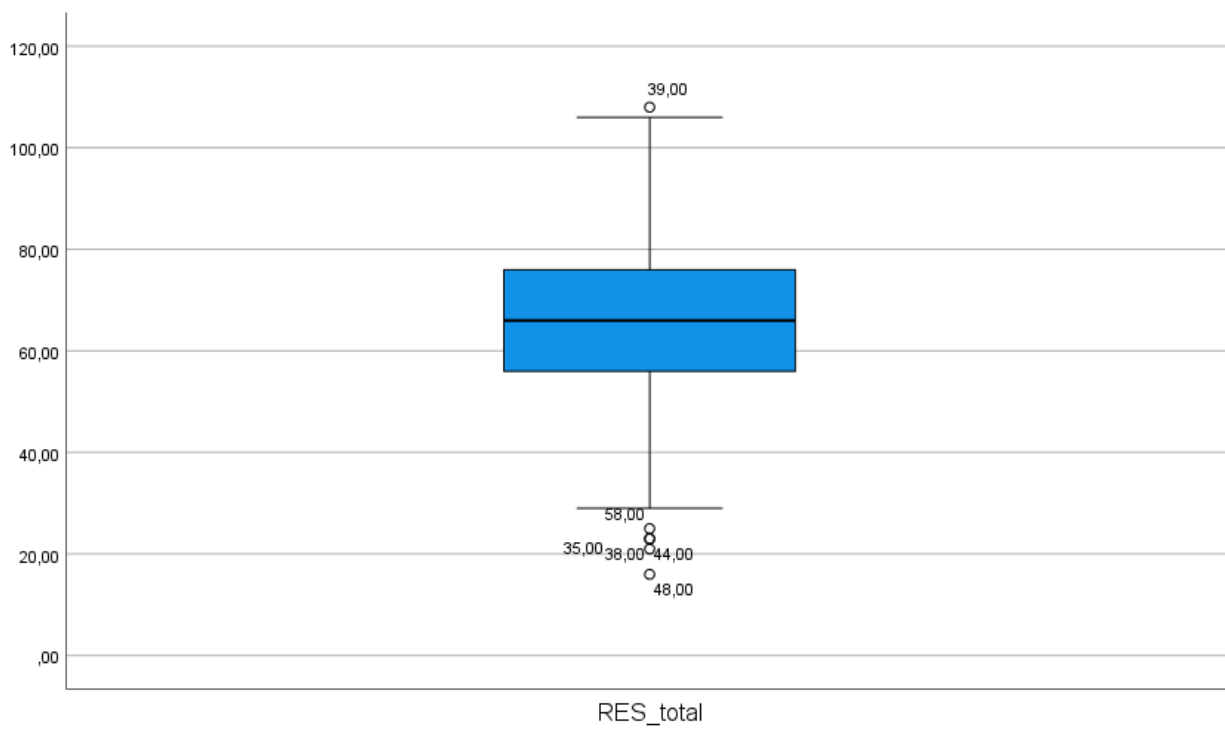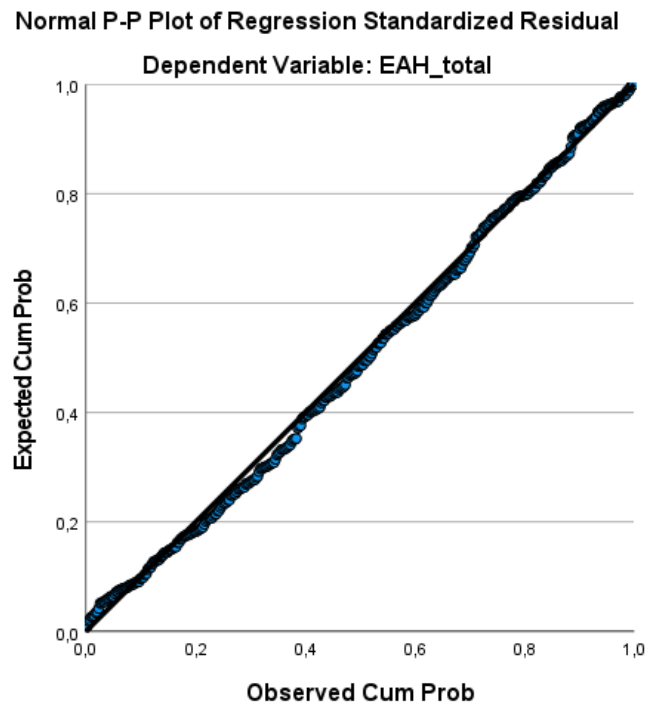

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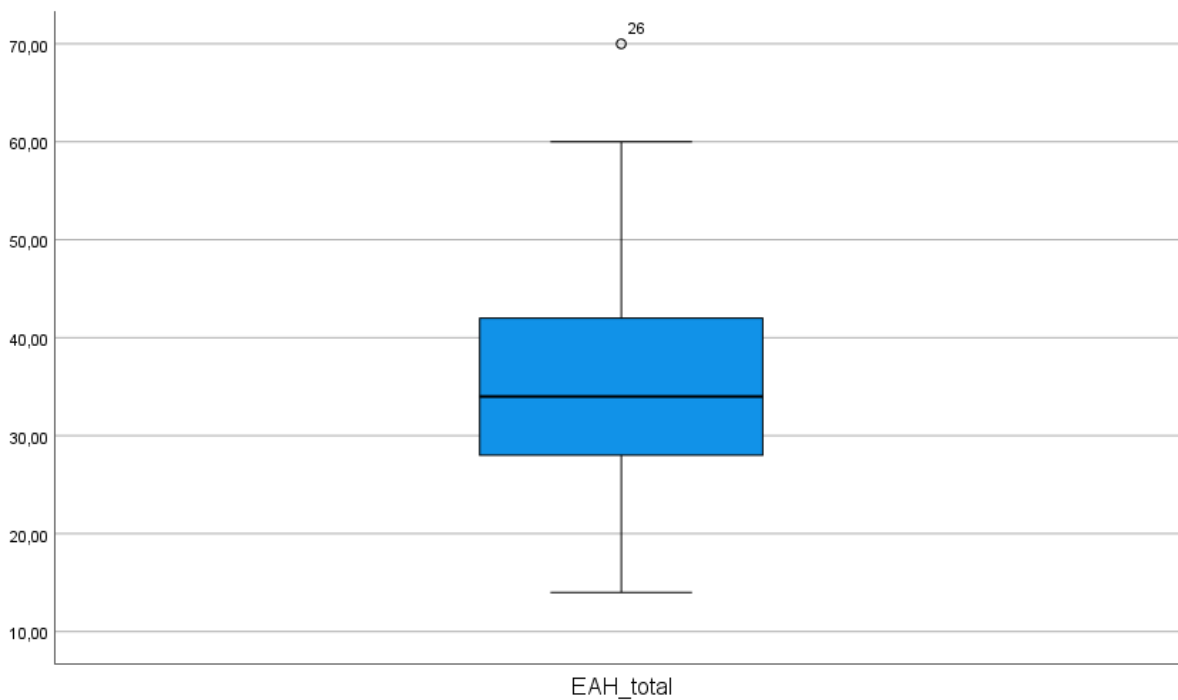
EAH boxplot

RES Histogram
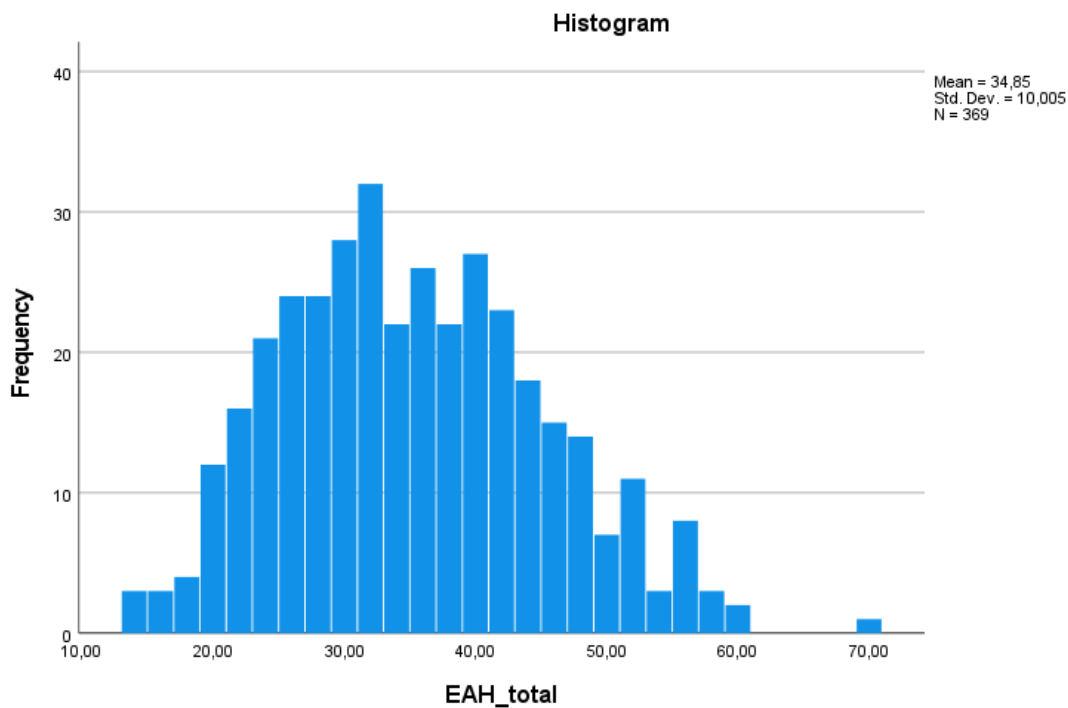
EAH Histogram
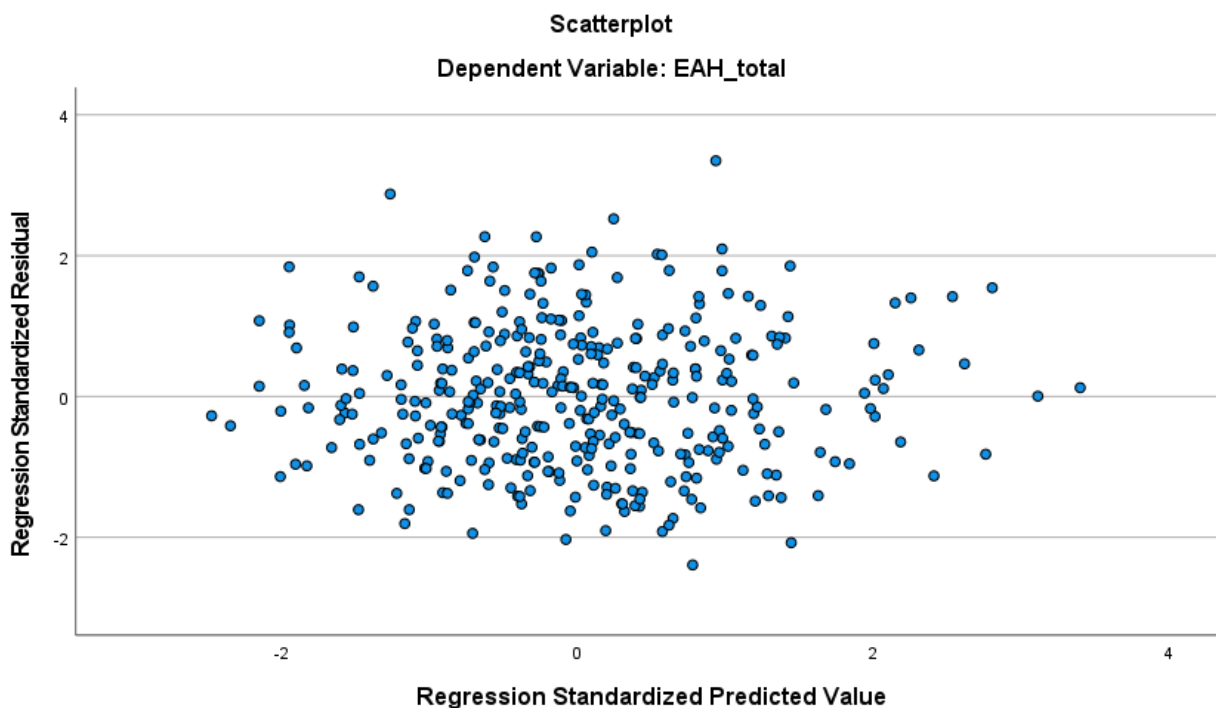
Scatterplot of Residuals

Normal P-P Plot of Regression Standardized Residual

Dependent Variable: EAH_total

P-P plot of Residuals

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	45,080	2,286		19,721	<,001		
	Awareness	-,034	,329	-,007	-,104	,917	,522	1,916
	Understanding	-,770	,371	-,180	-2,079	,038	,339	2,953
	Clarity	-,127	,399	-,030	-,319	,750	,278	3,600
	Tolerance	-,594	,343	-,154	-1,730	,085	,319	3,139
	Acceptance	,397	,342	,098	1,162	,246	,359	2,789
	SelfSupport	,310	,302	,072	1,027	,305	,518	1,930
	Modification	-,176	,332	-,043	-,529	,597	,393	2,546
	Confront	-,381	,253	-,098	-1,504	,133	,599	1,668

a. Dependent Variable: EAH_total

Multicollinearity analysis