

Exploring Rumination in the Presence of Other People. An Experience Sampling Study

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Bachelor's Thesis

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July 3, 2023

Abstract

Background

Previous studies have found a positive association between rumination and negative mood, anxiety, and depressive symptoms. Rumination's association with negative affect in the presence of others has not been investigated daily. It is suggested that co-rumination depends on the relationship quality between two people. Therefore, this study aims to examine daily rumination in the social context using the experience sampling method.

Methods

A convenience sample of 59 Participants (mean age = 29.04, 53.73% female, 46.27% male) was asked about their rumination, affect, and social context of the situation ten times daily for one week. Mixed-effect models were used to analyse the association between rumination and negative affect, as well as moderation of this association by being accompanied and liking this company.

Results

The association of rumination and negative affect was found to be significant ($b = 0.28, p < .001$), while company as a moderator was insignificant ($p = .50$). Liking one's company was marginally significantly associated with higher negative affect scores in moments of rumination ($b = -0.01, p = .07$).

Discussion

The results suggest additional support for an association between rumination and negative affect. Being accompanied was not found to be related to this association. Liking one's company tends to be associated with high negative affect in moments of rumination supporting previous claims of an association between high-quality friendships and the occurrence of co-rumination.

Exploring Rumination in the Presence of Other People. An Experience Sampling Study

Ruminating affects many people's well-being every day. When it comes to thinking and emotions, people mostly look inward for their origins, but often their surroundings play a significant part in this. When diagnosing and treating disorders and their symptoms, psychologists, therefore, also need to consider their social contexts. There has been extensive research on associating rumination with psychopathologies, but it is still unknown which role one's environment plays in this thinking process in daily life.

Rumination is considered a maladaptive emotion-regulation strategy that consists of automatic repetitive negative thinking (Aldao et al., 2010; Arditte et al., 2016). It is positively correlated with depressive symptoms, a decrease in positive affect, anxiety and eating disorders and consists of diving into one train of negative thought and going over it repetitively (Nolen-Hoeksema et al., 2008; Whisman et al., 2020). Even though the most common idea behind rumination is understanding and solving an individual's problem, studies find a negative correlation with problem-solving (Hong, 2007). In addition to the symptoms above and disorders, rumination also affects people's social support, which can additionally impact a person's mental health (Nolen-Hoeksema et al., 2008). A study by Hjartarson et al. (2022) suggests that especially the intuitive nature in which people immediately start thinking repetitively about problems in response to negative mood might be a predictor for depressive vulnerability. This automaticity is described as bringing people to ruminate in different stressful or emotional situations, stemming from and leading to negative affect (Hjartarson et al., 2022).

While a form of thinking appears to be very internal, previous studies investigating ruminative thinking in the presence of other people suggested exciting findings on the interplay of social context and rumination. These studies were often done on child or adolescent samples and found a new type of rumination. Among others, Rose (2002) coined

the term co-rumination, which means to ruminate with other people present. An association was again found between co-rumination and symptoms of depression and anxiety in the participants, especially internalising symptoms (Carlucci et al., 2018; Haggard et al., 2010; Hankin et al., 2010; Rose, 2002).

Other studies have suggested that co-ruminating is not necessarily associated with negative affect and can lower depressive symptoms, at least for people with social interaction anxiety (Hruska et al., 2017; Strickland & Anastasio, 2021). These findings suggest a form of moderation that the presence of others while ruminating displays, which could be due to distraction or a more productive approach to rumination when done collaboratively. Prior studies using child and adolescent samples found a link between the quality of relationship and the occurrence of co-rumination, which suggests that ruminative behaviour in the presence of other people does mainly exist in high-quality relationships (Haggard et al., 2010; Rose, 2002).

The presence of other people might influence the relationship between rumination and negative affect, as it includes distractions and social support. On the other hand, co-rumination shows a version of a collaborative form of this repetitive negative thinking, which might indicate an association with negative affect in some situations and positive affect in other situations, which appears to be linked to the quality of relationship they share (Haggard et al., 2010; Rose, 2002).

While many phenomena related to mood and well-being have been investigated for their social context, rumination studies were first and foremost focused on establishing the latent trait of repetitive negative thinking rather than the explicit forms of it in daily life (Arditte et al., 2016; Steger & Kashdan, 2009). By studying rumination in daily life, the connection to the social context can be made while investigating the association between repetitive negative thinking occurrences and other people's presence in these situations. A

research tool increasingly used for studies concerning daily life is the Experience Sampling Method (ESM) (Verhagen et al., 2016). With this method, participants can be asked multiple times per day to answer relatively short questionnaires that work like diary entries. These entries can help the researcher to get a more nuanced look at a psychological topic and help to reduce problems of recollecting emotions from the past (Verhagen et al., 2016).

In ESM studies, concepts like mood or well-being must be reduced to a more momentary representation. Negative or positive affect can change from situation to situation, connected to the circumstances. As ESM studies ask the participants to indicate their state of mind many times throughout the day, the concept of investigation will be affect, representing the participant's momentary valence and intensity of mood (De Vries et al., 2021). These momentary questionnaires also allow asking for the social context of the participants' situations.

Current Study

The current study focuses on rumination within a social context and its association with negative affect, which is used as a momentary tool for measuring well-being. Additionally, the presence of other people and their relationship to the participant are analysed as previous studies have found the concept of co-rumination, which depends on the relationship's quality. However, the studies so far focused on trait-level observations in child samples, while no studies used social context questions in ESM questionnaires to examine co-rumination as it occurs in daily life.

Therefore, the following research questions are formulated: RQ1: *Is rumination associated with negative Affect in the moment?* RQ2: *Does the Presence of other people in situations of rumination moderate this association?* RQ3: *Does the degree to which someone enjoys the presence of other people moderate this association?* The following hypotheses are proposed: H1: *Rumination is positively associated with momentary negative affect.* Which is

based on previous studies linking ruminative thinking to either negative affect or associating it with depressive symptoms (Hjartarson et al., 2022; Nolen-Hoeksema et al., 2008). H2: *The presence of other people weakens the association of rumination and negative affect.* This is expected because co-rumination studies suggest a possibility for a more productive and problem-solving form of rumination in the presence of other people, which may buffer the association between rumination and negative affect (Hruska et al., 2017; Strickland & Anastasio, 2021). H3: *The more the company is liked, the weaker the association between rumination and negative affect.* This hypothesis is based on the importance of high-quality relationships for effective co-rumination, which suggests, as already hypothesised in H2, an even more effective and problem-solving form of rumination (Haggard et al., 2010; Hruska et al., 2017; Rose, 2002; Strickland & Anastasio, 2021).

Methods

Participants

To recruit participants, all researchers used the convenience sampling method, using their social networks and the SONA platform of the University of Twente. As ESM studies like this one are relatively time intensive, people close to the researchers, as well as SONA participants, that got 1.5 credits in the system for the participation, could be more inclined to fully participate in the study to create valuable data (Verhagen et al., 2016). The inclusion criteria were that participants must be at least 18 years old and that a sufficient English language level and a smartphone are required. This study is part of a larger randomised control trial investigating the effect of response scales in ESM. Only one of these conditions is used in this study.

Materials

As this study is part of a larger project that investigates other stress and coping research questions and ESM methodological questions, the administered questionnaires include several scales and sub-scales that were not used during this study.

Baseline Questionnaire

The baseline questionnaire (Appendix A) consisted of a demographics part and eight subscales to measure relatively stable psychological traits. During the analysis of this study, the baseline questionnaire was only used for the descriptive statistics.

ESM Questionnaire

The ESM questionnaire (Appendix B) consisted of seven different question topics, of which three were used for the analysis of this study. To measure the current state of negative affect, four questions from the ESM Item Repository (esmitemrepository.com), which is an ESM item database that offers open access to a variety of questionnaire items in order to validate them for the specific use in ESM contexts, were chosen (Kirtley et al., 2018). The four questions were: “*How anxious do you feel right now?*”, “*How irritable do you feel right now?*”, “*How down do you feel right now?*”, “*How guilty do you feel right now?*”. These have been shown to work in previous ESM studies (Helmich et al., 2021). The responses on a 7-point Likert scale varied from 1 (not at all) to 7 (extremely).

To assess the social context of the situation the participants find themselves in, they were asked: “*Who are you with right now?*”. To assess the liking of a contact, they indicated on a 7-point Likert scale from 1 (not at all) to 7 (extremely) how they agree with the statement “*I like this company*”. These social context questions again come from the ESM Item Repository.

In the last item relevant to this study, the participants got asked to rate on a 7-point Likert scale from 1 (not at all) to 7 (extremely) if they had *been thinking about their problems*

in the last hour. This question also came from the ESM Item Repository (esमितemrepository.com) and was used to assess rumination in a previous ESM study (Moberly & Watkins, 2008).

Design & Procedure

The study used the online platform and research app Ethica (ethicadata.com). Participants got a briefing email before the trial began, including essential details about the study, their condition's registration number, and instructions on the significance of completing as many questionnaires as possible. After creating an account in the app, the participants were informed about the confidentiality of their data. They were asked to give active, informed consent before the start of the study (Appendix C). The larger project consisted of three different cohorts participating during different weeks. The first participation week started on the 17th of November, 2022 and ended on the 13th of November, 2022. The second wave of data collection was from the 13th of February, 2023, until the 19th of February, 2023, and the last data collection was during the week from the 17th of April, 2023, until the 23rd of April, 2023. During the seven days, the participants received push notifications to complete all questionnaires. The baseline questionnaire did not expire and was initiated once at the beginning of data collection with reminders after 8, 24, and 72 hours. The daily ESM questionnaires were initiated randomly in 90-minute intervals ten times per day from 7.30 to 22.30 and expired after 15 minutes if not filled in. Initiating the daily questionnaires at random intervals is crucial to the data's validity because the questionnaires' predictability increases the reactivity in responses (Verhagen et al., 2016).

Data Analysis

All questionnaires were downloaded from the Ethica website and uploaded to the statistical software RStudio during the data analysis. In RStudio, the data cleaning included removing unused items, observations where the participant missed the questionnaires, and participants below the compliance rate. Previous ESM studies suggested the importance of a minimum of about 30% response rate for the reliability of ESM data; consequently, 59 of 118 participants were removed from the dataset due to participation below this percentage (Wouters et al., 2018). A new variable for negative affect, on a scale from 1 to 7, was created by adding the scores of all four negative affect items in the questionnaire and dividing them by four. The categorical question about the company of someone at the moment was transformed into a dichotomous variable with a score of 1 for all cases of being accompanied and 0 for being alone.

A mixed effect model was used to investigate the association between state rumination and negative affect. As ESM data includes longitudinal data, clustering due to participants was accounted for by considering the random effects of participants in the mixed-effect model (Magezi, 2015). To also get some impression on the individual level of data, three participants' rumination and negative affect levels were plotted per observation. The variability per person can be shown using the participants with the highest and lowest associations between rumination and negative affect in the dataset. The third participant was randomly chosen to not only present hand-picked data.

Checking moderation by the dichotomous variable company was done by a mixed-effect model with the main effects of rumination and company and the interaction effect of these two variables. Four different participants' associations are shown over time to get a more nuanced picture on the individual level. The first two are the participants with the highest and

lowest levels of rumination. At the same time, the last two show the participants that are accompanied the most and least times over the whole data collection period.

An interaction between rumination and liking your company on negative affect was analysed by a new linear mixed model. This model only included the moments in which participants were together with other people, therefore a value of 1 on the company variable, as consequently only in these cases could they be asked how much they like their company.

Results

Descriptive Statistics

Finally, the analysed dataset consisted of 59 of the former 118 participants that completed at least 30% of the ESM questionnaires. To still present a broad overview of the sample, a different subset resulting from the technical problem is used for the descriptive statistics, presenting 67 participants with a mean age of 29.04 (SD = 12.72). Nationalities varied with 92.54% German, 4.48% Dutch and 2.99% other nationalities, including Mexican and Polish. The subset comprised 36 women and 31 men (53.73% female, 46.27% male). The most prevalent statuses of occupation among the sample were student and working. Other details, referring to the highest level of education in the sample, for example, can be found in Table 1.

Table 1*Sample subset characteristics (n=67)*

		n	%
Gender	Male	31	46.27
	Female	36	53.73
Nationality	German	62	92.54
	Dutch	3	4.48
	Other	2	2.99
Occupation	Studying	29	43.28
	Working	21	31.34
	Studying and working	13	19.40
	Self-employed	3	4.48
	Other	1	1.49
	Highest level of education	Middle school	1
	High school	33	49.25
	Bachelor	21	31.34
	Master	8	11.94
	PhD	2	2.96
	Other	2	2.96

Hypothesis 1: Association of Rumination and Negative Affect

The results of the linear mixed model showed a significant association between rumination and negative affect ($b = 0.28$, $SE = 0.01$, $t = 26.14$, $p < .001$), supporting H1. This indicates that higher levels of rumination were significantly associated with higher momentary negative affect in the same moment. Further statistics of this association are included in Table 2. Figure 1 is a scatterplot with a trendline showing the association between rumination and negative affect. This can additionally be seen in the boxplot of Figure 2, which shows the association but also highlights its outliers.

Table 2*Results of the LMM analysing the association of rumination and negative affect*

Parameter	Estimate	Standard Error	t-value	p-value	95% CI	
					LL	UL
Intercept	1.31	0.08	17.16	< .001	1.16	1.46
Rumination	0.28	0.01	26.09	< .001	0.26	0.30

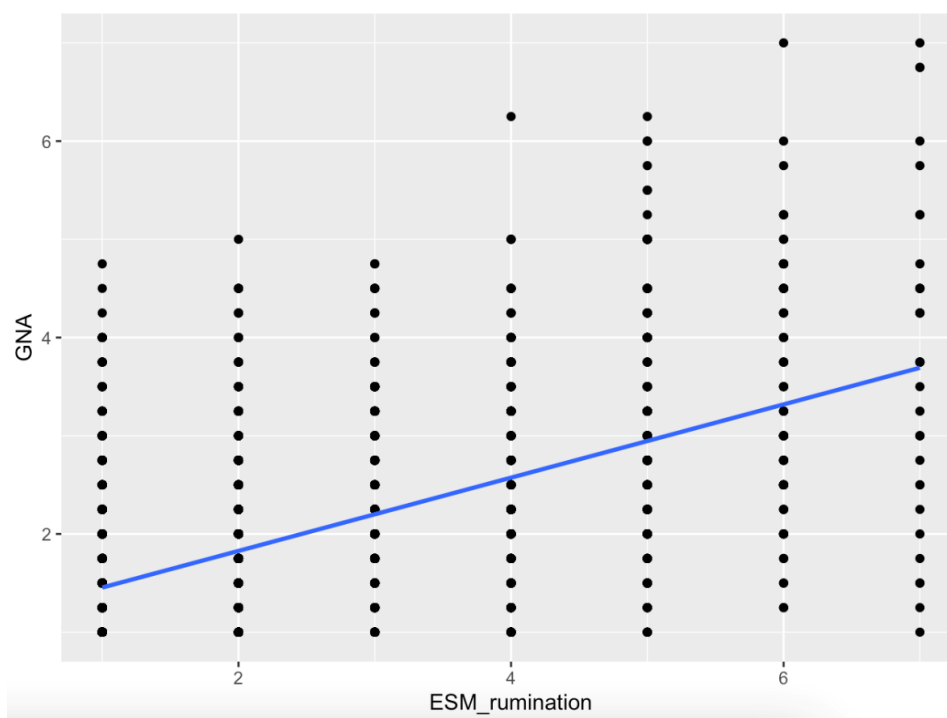
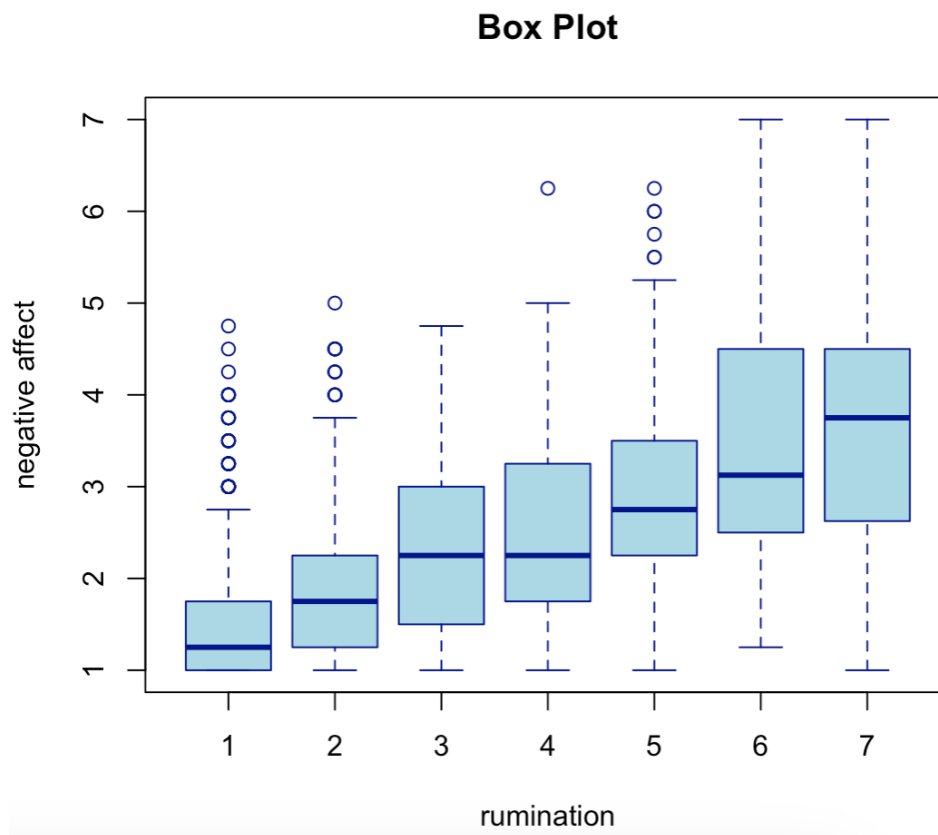
*Note: CI= Confidence Interval; LL=Lower Limit; UL=Upper Limit***Figure 1***Scatterplot with a trend line of the association of rumination and negative affect*

Figure 2

Boxplot of the association of rumination and negative affect



Individual Representations

Three different individual cases were compared to analyse variability in the data. Participant 52705 has the strongest association between rumination and negative affect. A Pearson correlation for this participant was computed, showing a very strong positive correlation, $r(22) = .82, p < .001$. There are differences per timepoint, but, as Figure 3 shows, especially between the timepoints 20 and 60, the association between rumination and negative affect is clear. In contrast to this, Participant 70535 is the participant with the weakest association between rumination and negative affect. A Pearson correlation for this participant was computed, showing no correlation, $r(47) = -.01, p = .97$. The association per timepoint can be seen in Figure 4. The third participant, 62760, was randomly chosen and can be seen in

Figure 5. A Pearson correlation for this participant was computed, showing a strong positive correlation, $r(43) = .79, p < 0.01$.

Figure 3

Observed Scores of Rumination and Negative Affect of Participant 52705

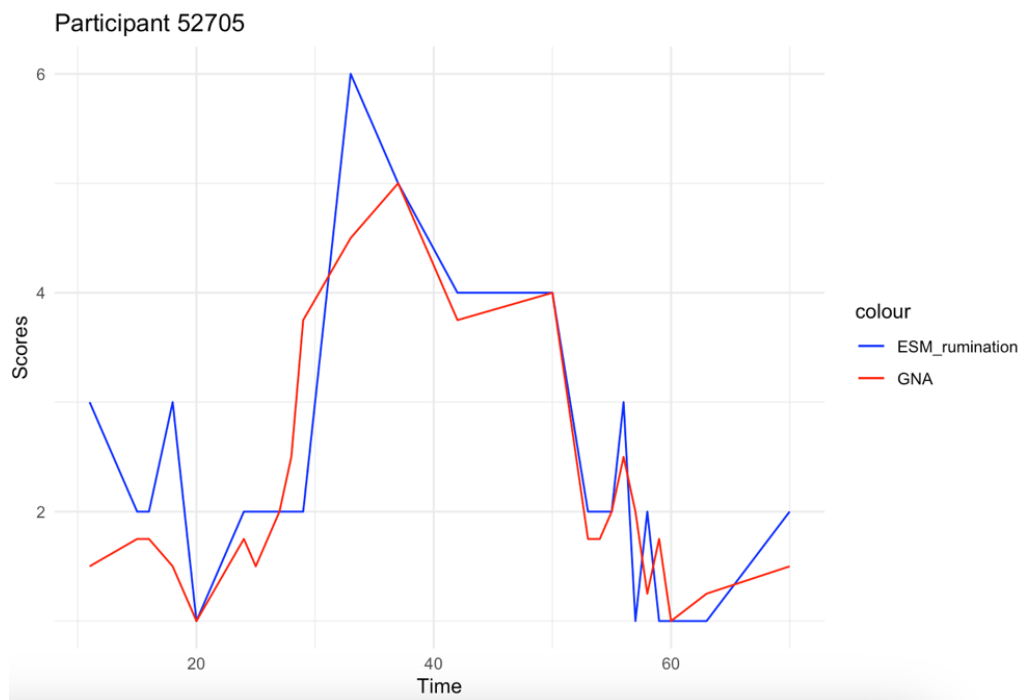


Figure 4

Observed Scores of Rumination and Negative Affect of Participant 70535

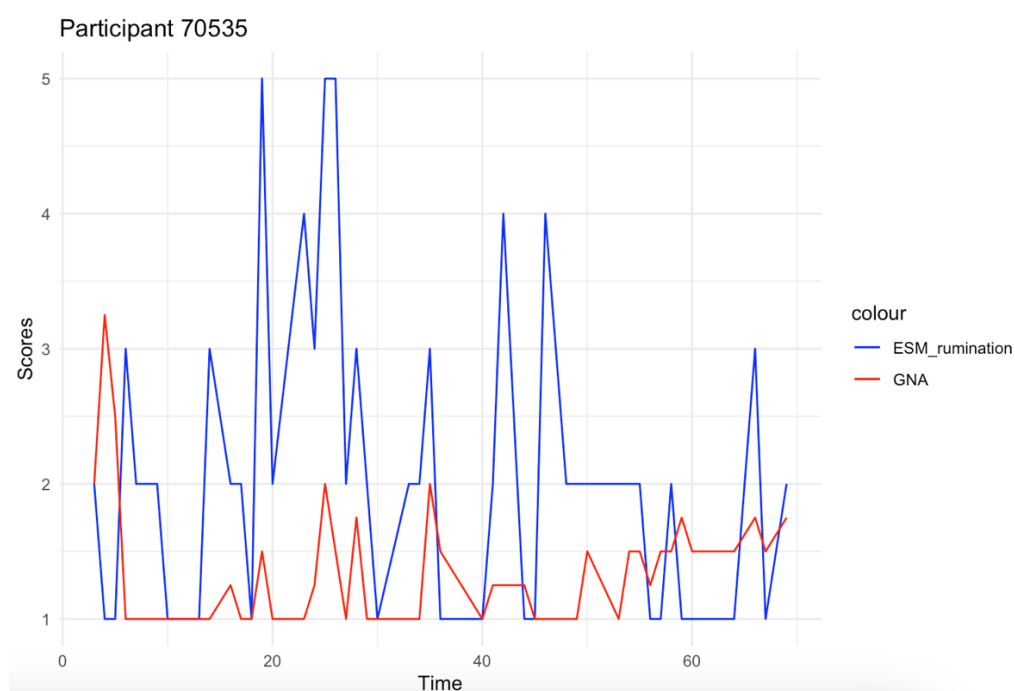
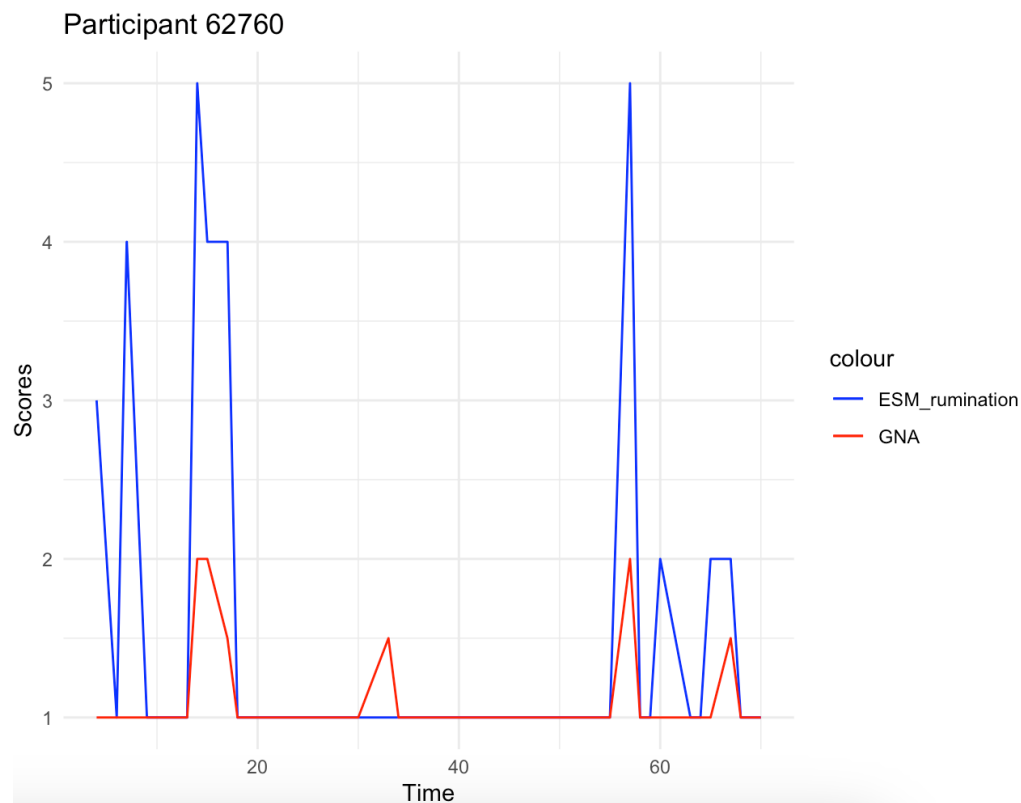


Figure 5

Observed Scores of Rumination and Negative Affect of Participant 62760



Hypothesis 2: Moderation by Company

The interaction between rumination and company was not statistically significant ($b = 0.01$, $SE = 0.02$, $t = 0.55$, $p = .50$). Based on these findings, no support for H2 could be found. The results suggested that the presence of other people does not moderate the association between rumination and negative affect significantly. Further statistics can be found in Table 3 below.

Table 3

Results of the LMM analysing the moderation of company on the association of rumination and negative affect

Parameter	Estimate	Standard Error	t-value	p-value	95% CI	
					LL	UL
Intercept	1.37	0.08	16.76	< .001	1.21	1.54
Rumination	0.27	0.01	18.51	< .001	0.25	0.30
Company	-0.12	0.05	-2.22	.03	-0.22	-0.01
Interaction Term	0.01	0.02	0.68	.50	-0.02	0.05

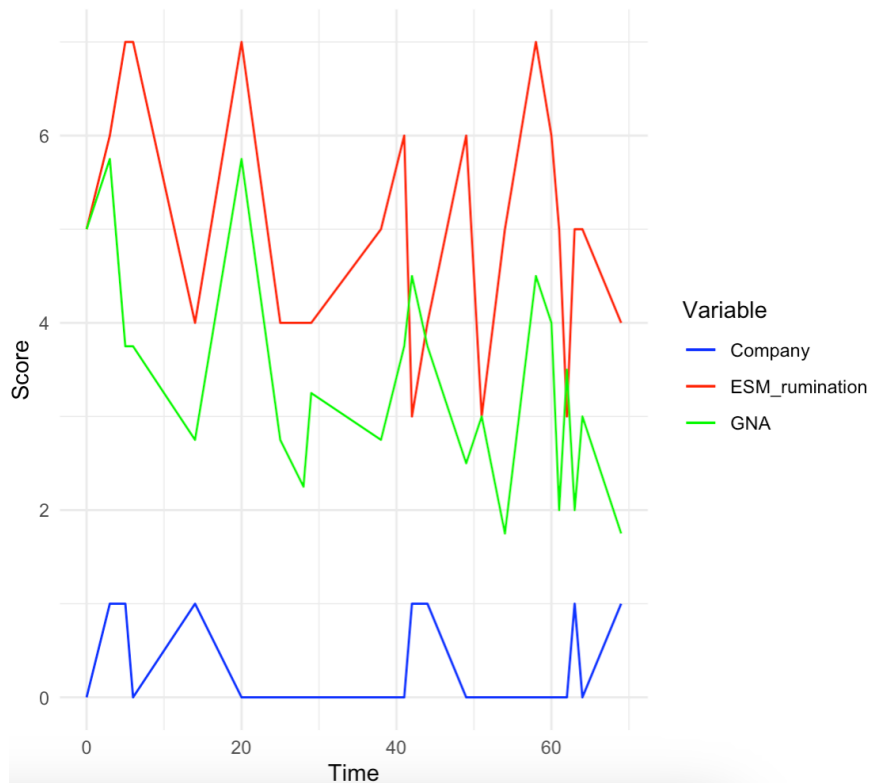
Note: Interaction Term = Rumination*Company; *CI*= Confidence Interval; *LL*=Lower Limit; *UL*=Upper Limit

Individual Representations

Figures 4 and 5 represent the individuals with the highest and lowest levels of rumination, while figures 6 and 7 were the most and least accompanied. A consistent pattern in Figures 4,5,6 and 7 is missing. In the extreme cases of most and least company over time, rumination is quite prominent in the participant experiencing the least company (Figure 7), while the participant with the most company did not seem not experience rumination often in the week of data collection (Figure 6).

Figure 4

Observed Scores of Rumination, Negative Affect, and Company of Participant 62706 with the highest level of Rumination

**Figure 5**

Observed Scores of Rumination, Negative Affect, and Company of Participant 62788 with the lowest level of rumination

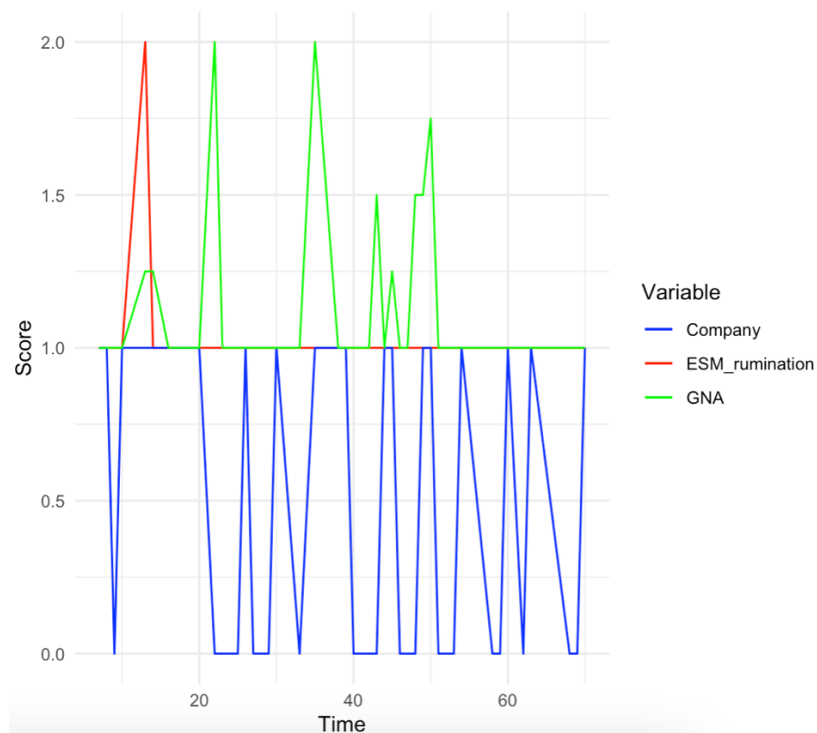
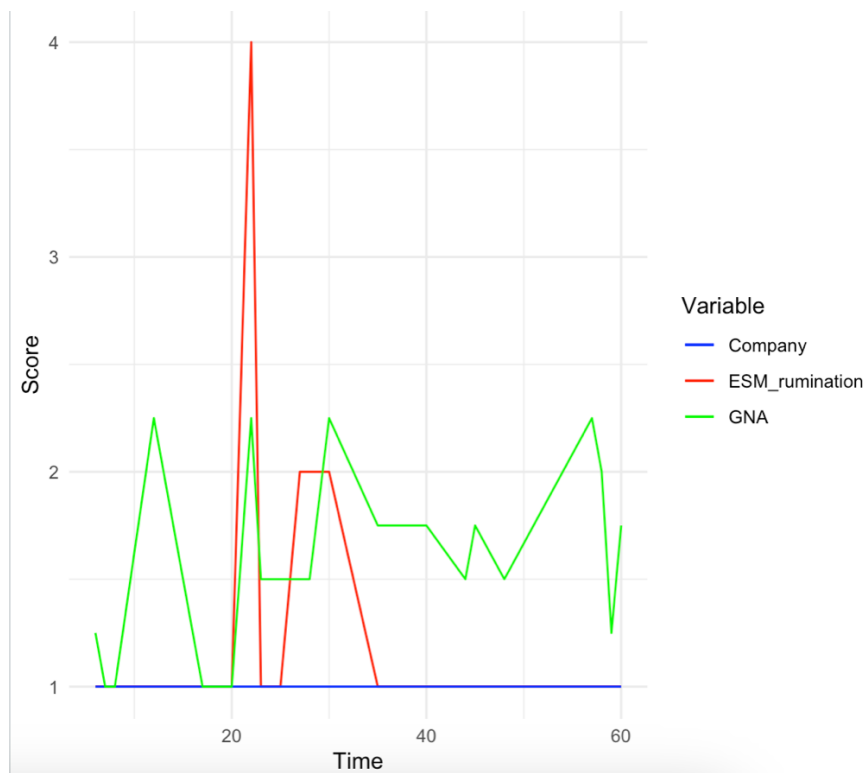
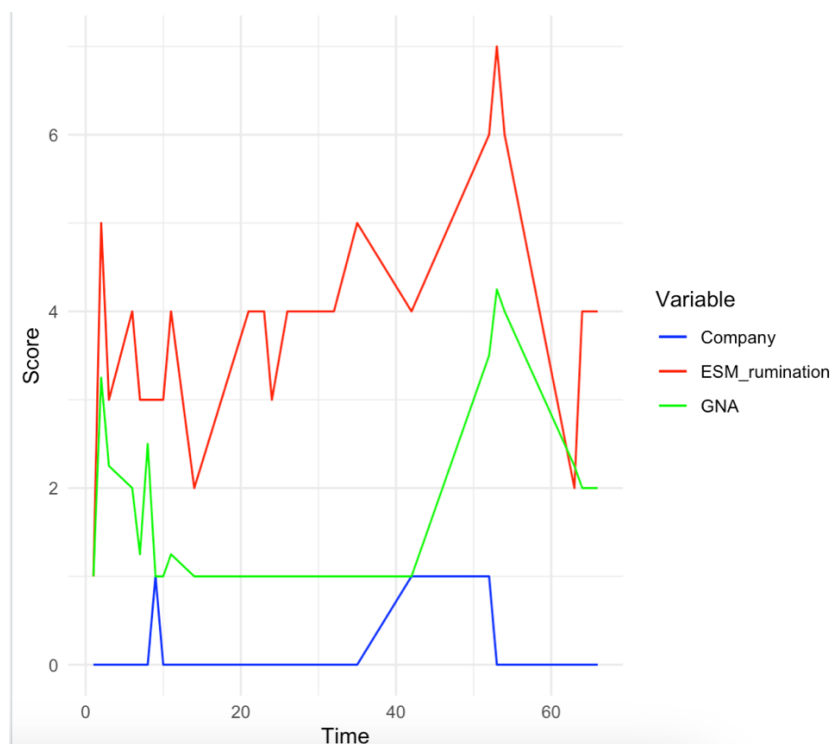


Figure 6

Observed Scores of Rumination, Negative Affect, and Company of Participant 70628, with the most times being accompanied

**Figure 7**

Observed Scores of Rumination, Negative Affect, and Company of Participant 70354 with the least times of being accompanied



Hypothesis 3: Moderation by Liking the Company

The interaction between rumination and the variable representing liking one's company was found to have a marginally significant association with negative affect ($b = 0.01$, $SE = 0.01$, $t = 1.81$, $p = .07$). The moderation would not weaken the association between rumination and negative affect, as initially hypothesised but is associated with higher scores of negative affect in situations of rumination. Further statistics are included in Table 4.

Table 4

Results of the LMM analysing the interaction of liking one's company on the association of rumination and negative affect

Parameter	Estimate	Standard Error	t-value	p-value	95% CI	
					LL	UL
Intercept	1.94	0.17	11.73	< .001	1.62	2.27
Rumination	0.21	0.04	4.85	< .001	0.12	0.29
Liking	-0.12	0.25	-4.66	< .001	-0.17	-0.07
Interaction Term	0.01	0.01	1.81	.07	-0.001	0.03

Note: Interaction Term = Rumination*Liking one's company; *CI*= Confidence Interval; *LL*=Lower Limit; *UL*=Upper Limit

Discussion

This study investigated the association between rumination, especially in moments of social company, and negative affect in daily life. A possible moderating role of social context in daily life was investigated by using data of being accompanied and the degree to which people liked this contact. The association between rumination and negative affect was found to be significant, while the moderation by company was not. The interaction between rumination and liking one's company was marginally significant, suggesting a possible

association between liking one's company and higher negative affect scores in moments of rumination.

Association of Rumination and Negative Affect

As previous studies suggested, a significant association between rumination and momentary negative affect could be found in this study. This could be a significant factor in developing the depressive symptoms that trait studies found (Nolen-Hoeksema et al., 2008). Another way rumination may act on these depressive symptoms is that ruminative thinking might act as a form of learned helplessness. Learned helplessness was found to be a significant part of depression, and as mentioned in the introduction, people tend to use rumination as a problem-solving strategy, but it disrupts this process (Miller & Seligman, 1975; Hong, 2007).

The significance of the association between rumination and negative affect emphasises the importance of this emotion-regulation strategy for research and therapy. Understanding this way of thinking and teaching possibilities to not engage in this might be another therapeutic tool to use with people suffering from anxiety, depressive symptoms, and eating disorders, that rumination is associated with (Nolen-Hoeksema et al., 2008; Whisman et al., 2020).

Moderation by Company

Regarding RQ2, the second hypothesis was rejected as the interaction between rumination and being accompanied was not statistically significant. A moderation reducing the association between rumination and negative affect was hypothesised due to the generally positive effects of company on mood. A possible confounding variable for the hypothesised moderation might be that people that are accompanied already ruminate less and that differences in negative affect might be included in a reduction of rumination rather than the difference in the association between rumination and negative affect of people that still

ruminate in the presence of another person. In line with this, a study by O'Mahen et al. (2010) suggested social functioning as a moderator for rumination in specific populations.

In other studies, co-rumination is usually associated with heightened anxiety and depressive symptoms while also related to greater perceptions of friendship (Carlucci et al., 2018; Hankin et al., 2010). A meta-analysis by Spindel et al. (2016) suggested that internalising one's problems might be the most significant way an association between co-rumination and depressive symptoms is formed. Another study indicated that brooding might be the underlying factor in this association (Bastin et al., 2021).

These findings might indicate a blurred concept of co-rumination in this study. As there is a lack of research in daily reports of co-rumination, the measurement was constructed by rumination in company. Questions not specifically including the brooding part of co-rumination might have led to the construct not necessarily measuring the act of discussing problems and negative experiences with other people comprehensively, which can lead to validity problems.

Moderation by Liking the Company

Hypothesis three needed to be rejected as the moderation of liking the company was not found to be significant. Nevertheless, it resulted in interesting findings. In the moderation analysis of liking on rumination and negative affect, the main effect of liking showed statistical significance like the main effect of company did before. The interaction of liking was marginally significant, hinting in the same direction as the studies mentioned in the introduction that showed an effect of co-rumination on symptoms of depression and anxiety for participants who are accompanied by people they have a high-quality relationship with while ruminating (Haggard et al., 2010; Rose, 2002). This finding contradicts the hypothesis, suggesting a form of security with another person that needs to be established before one can co-ruminate.

Problems often have a deeply personal nature, and individuals are more likely to feel comfortable discussing them in the presence of a trusted company. While this emphasises the significance of building a foundation of trust and security in interpersonal relationships to improve open and meaningful discussions about personal issues, it also directs at a hazard in high-quality relationships which start to focus only on co-ruminating. Engaging in a cycle of constant co-ruminating might turn an initially very close and high-quality relationship to become problem-centred and associated with negative affect.

Individual Representations

For research questions one and two, individual representations suggested a between-person variability, which complicates the interpretation of results on a group level.

The examples of RQ1 indicate substantial between-person variability with correlations ranging from very strongly correlated to no correlation found. It would therefore be interesting to understand the factors underlying the association of rumination and negative affect.

Explanations for these individual differences might be related to the overall resilience of participants, or as it was found by O'Mahen et al. (2010), social functioning works as an essential moderator of rumination in specific populations. It might also hint at a methodical difficulty as the question of rumination could also be interpreted as something positive. The positive side of rumination, thinking about one's problems to solve the underlying issue, could also be associated with rather positive than negative affect. Other than that, the time used to ruminate, as this is not included in the question either, could have an important influence on determining positive or negative ruminating. Previous studies suggested this association of positive rumination with positive affect and psychological adjustment (Gilbert et al., 2016; Yang & Li, 2020). Whiteman and Mangels (2016) found the difference between positive and negative rumination in the two forms of reflection and brooding. Reflection

represents the positive, problem-solving side and brooding is the negative form of rumination connected to negative mood (Whiteman & Mangels, 2016).

Another methodological explanation for individual differences might be the understanding of the word company. People with a non-native English-speaking background reported having misinterpreted the word company for cooperation, therefore responding if they are in their work environment or liking the firm they work for instead of answering the question about being accompanied by another person. This might be a problem in the analysis of the data as no respondent was from a native English-speaking country.

Limitations

While the significance of the relationship between rumination and negative affect is clear, the analysis in the current study does not allow for inferences about causality or directionality. Especially as previous studies suggested a relationship in the direction of negative emotions and experiences to trigger moments of rumination for suppressing these emotions, the association could also be reversed (Liverant et al., 2010).

The item used for the rumination measurement does not exclusively ask for negative rumination. The phrasing also includes moments of positive problem-solving ways of thinking about a problem. This might have led to a decreased association between rumination and negative affect because problem-solving ways of thinking about a problem, the positive side of rumination, tend to be less associated with negative affect (Gilbert et al., 2016; Yang & Li, 2020).

As previous studies suggested, the generalizability from a group level to an individual level proposes a difficulty that needs to be considered (Fisher et al., 2018). The individual data suggested between-person variability that might limit the mentioned generalizability in this study.

The chosen convenience sample, consisting of a large percentage of students, whom the researchers know, or study with at the same university, further decreases the generalizability of this study to make claims about the general public. This skewed effect of undergraduate convenience student samples was shown by previous psychological studies (Hanel & Vione, 2016; Wild et al., 2022).

According to feedback from several participants, the length of the daily questionnaire frustrated them, causing low participation rates and a smaller sample size. This decrease in sample size reduces statistical power, limiting the ability to detect significant associations and interactions in the analysis.

Implications for Future Research

Methodically, a smaller questionnaire with more specific questions about rumination and affect might benefit valid and informative data, as people tend to be less precise while answering a longer questionnaire. The repetitive question about rumination could be asked more precisely for negative rumination to exclude moments of rather positive, problem-solving, prolonged thinking. Connected to this, it would be interesting to find certain underlying factors determining whether thinking about a problem is beneficial and problem-solving or rather hindering this process. The study by Whiteman and Mangels (2016) identified two kinds of rumination, reflection and brooding, which show the difference between positive and negative rumination. However, the underlying causes of people thinking one way or another are still to be assessed.

A possible direction for future research might be the association between rumination and learned helplessness, as both seem related to depressive symptoms and follow a similar structure. If there is a strong association between the two, this information might help the treatment of depression, as rumination is a thinking process and could therefore be targeted in CBT like, as Conradi et al. (2008) suggested.

Company could not be found to moderate the relationship of rumination and negative affect in this sample but had a significant main effect on negative affect. As previous studies about co-rumination already suggest, the effect of the social context still needs to be clarified and should therefore be continuously studied (Carlucci et al., 2018). A qualitative approach, using interviews with people that showed to ruminate often in this or other studies, might help to find a first ground on how people around them affect their rumination by asking for concepts and ways of influence recognised by the participants. These findings could then be used to construct more precise items to investigate co-rumination in ESM studies. Apart from that, the findings concerning the liking of one's company suggest a similar mechanism of co-rumination that Rose (2002) and Haggard et al. (2010) found. The quality of a relationship, or in this case, the liking, seems important to engage in co-rumination. This should be further investigated by comparing different kinds of social relations to find the binding factor that enables co-rumination between people.

The individual representations suggest a substantial between-person variability that needs further assessment. The individual level must be more in the research focus to effectively examine the effects of rumination, especially co-rumination. Rumination in the social context may be dependent on individual factors. It should therefore be first explored on this level to further work with these specific findings on a broader group level.

Conclusion

In conclusion, this study found additional support for an association between rumination and negative affect. Company has not shown to be moderating the association between rumination and negative affect while liking this company tends to be associated with a rather high negative affect in moments of rumination. To fully understand the concept of rumination, its association with the social context needs to be further investigated.

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Appendix A: Baseline Questionnaire

Demographics

- Age: How old are you?
- Gender: What gender do you identify as? Male, female, other
- Nationality: What is your nationality? Dutch German Other
- Occupation: What is your current occupation? Student, Working, Self-employed, studying and working, not working, other
- Highest degree obtained: Middle school (such as MBO, MTS, MEAO or Haupt- oder Realschule), High school (such as HAVO, VWO, HBS or Gymnasium/ Berufsschule/ Berufskolleg), High school, Bachelor, Master, PhD, Other

Appendix B: ESM Daily Questionnaire

Positive and negative affect

Below you can find several questions about your current feelings. Please try to indicate how you felt right before you started to answer the questionnaire!

- How cheerful do you feel right now?
- How enthusiastic do you feel right now?
- How satisfied do you feel right now?
- How relaxed do you feel right now?
- How anxious do you feel right now?
- How irritable do you feel right now?
- How down do you feel right now?
- How guilty do you feel right now?
- 1 (not at all) to 7 (very much)

Social context

Who are you with right now?

- Family member, friend, romantic partner, co-worker/fellow-student, unknown people/others, I am alone
- If not alone:
- I like this company
- 1 (not at all) to 7 (very much)
- I would rather be alone
- 1 (not at all) to 7 (very much)

Rumination

In the last hour, I have been thinking about my problems

- 1 (not at all) to 7 (very much)

Appendix C: Informed Consent Form

Dear participant,

Thank you for your participation in this study.

Brief summary of project

The study is using the Experience Sampling Method (ESM) to obtain data. This means that 10 times a day there will be a prompt to answer a questionnaire containing about 20 items, which will take about 1 minute to complete. The questions regard your psychological well-being in the specific moment you are receiving the questionnaire and the time in-between questionnaires. It is important to fill out as many questionnaires as possible to ensure the success of the project.

To participate in this study, we need to ensure that you understand the nature of the research, as outlined in the participant information sheet. Please confirm at the bottom of the page to indicate that you understand and agree to the following conditions:

- I confirm that I have read the participant information sheet for this study. I have had the opportunity to consider the information, ask questions, and have had these answered satisfactorily
- I understand that to take part in this study, I should
- Be at least 18 years old
- Possess a basic level of English
- I understand that personal data about me will be collected for the purposes of the research study including age, gender, nationality, level of education, current studies, and primary occupation, and this data will be processed completely anonymous and in accordance with data protection regulations.
- I understand that taking part in this study involves that I will be filling in 10 questionnaires every day for one week.
- I am voluntarily taking part in this research, and I know that I can stop the research at any time without giving any reason, without my rights being affected
- I don't expect to receive any benefit or payment for my participation.
- I understand that I am free to contact the researchers or supervisor with any questions I may have in the future.
- I understand that the data collected in this study will be anonymized, and only be used for academic purposes i.e., writing a thesis for the bachelor and/or master.
- I understand that personal data that will be collected within this study will not be shared with anyone other than the study team.
- I agree to take part in this study.

If you have questions about your rights as a research participant, or wish to obtain information, ask questions, or discuss any concerns about this study with someone other than the researcher(s), please contact the Secretary of the Ethics Committee/domain Humanities & Social Sciences of the Faculty of Behavioural, Management and Social Sciences at the University of Twente by ethicscommittee-hss@utwente.nl